Environmental and Energy Study Institute

Briefing Transcript

Coastal Resilience in the Great Lakes Region

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Speakers:

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Scudder Mackey, Chief, Office of Coastal Management, Ohio Department of Natural Resources

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Moderator:

Daniel Bresette, Executive Director, Environmental and Energy Study Institute

Dan Bresette

I'm Dan with the Environmental and Energy Study Institute, thanks everyone for joining us this afternoon, special thanks to representative Debbie Dingell's office for hosting us and helping us get this great room today. Great crowd, great topic. We're gonna have a really excellent briefing, this is our first coastal resilience briefing of 2020 and it's going to be great. Great Lakes, that is. That's a laugh line, an applause line.

If you're joining us today for the first time, let me put today in context. We're about halfway through a briefing series that looks at regional approaches to coastal resilience. In 2019, we brought together panels of experts, practitioners, and community leaders from the Gulf Coast, the Northeast of New England, Louisiana, and the West Coast. Starting today in 2020, we're picking up where we left off and turning our attention to the Great Lakes region. Up next, exactly one month from today, with special thanks to representative Francis Rooney, we'll study coastal resilience in the southeast and then we'll round out our briefing series with Alaska, Hawaii, and even more. If you work for a member from one of these regions and need to catch up, you can access briefing summaries and videos at www.EESI.org, and when you visit us online please take a minute to sign up for our Climate Change Solutions newsletter to learn about other resilience initiatives, clean energy legislation, and stay informed about all manner of EESI goings-on, including our briefing schedule. And this is probably a good time just to make sure that everybody sees this, my colleague Amber made sure that I did this, this is a brand new fact sheet just available today, 'Federal Resources for Nature-Based Solutions to Climate Change.' This is a really impressive document and a great example of the other informative fact-based materials and fact sheets and web articles that you can find on our website, so I encourage everybody to pick that up today, it's just available. Of course, if you've been attending all of our briefings and already subscribed to Climate Change Solutions, well, thanks for your support, and if you really like us be sure to fill out our briefing survey. If you don't like us so much you can take a pass.

The Great Lakes region is the first of our coastal resilience briefings that do not primarily involve an ocean. We'll hear today about why that matters and how that contributes to the challenges facing the communities that depend so much on the health and sustainability of Lakes Heron, Ontario, Michigan, Erie and Superior. The desktop image on my laptop is one of NASA's Blue Marble images of Earth. Specifically the one of North America and North America is right in the middle, and when I look at that image it is impossible not to appreciate how massive, how big the Great Lakes are. They take up a huge portion of the United States, and they're equally prominent, maybe more prominent than some of the other big features like the Great Plains or the Rocky Mountains. When you zoom in though, that's when it becomes clear how important the Great Lakes are to the economic and environmental well-being of the United States, and also to Canada. The U.S. portion of the region, mainly due to the economic activity in and around Chicago, Cleveland, Detroit, Duluth, Milwaukee, and Buffalo, generates more than three trillion dollars in gross domestic product, about 15 percent of the total figure. According to the National Oceanic and Atmospheric Administration, the Great Lakes account for more than 20 percent of all the freshwater in the world. One in ten Americans, and three of ten Canadians, or excuse me one in three Canadians rely on the Great Lakes for drinking water. But while we're relying so much on the Great Lakes and the ecosystem of the region as drivers of economic opportunity, we're simultaneously doing them harm. Our contributions of greenhouse gases to the atmosphere is putting the Great Lakes in peril, and the tens of millions of Americans and Canadians who live in communities in the Great Lakes region are being negatively affected. Today's briefing will explore some of the adaptation strategies and nature-based solutions being deployed in close collaboration between multiple levels of government and the communities they serve, to set and realize resilience goals and measure their progress.

Now that's enough for me, onto our panel. Our first speaker today is Beth Gibbons. Beth is the Executive Director of the American Society of Adaptation Professionals. She's responsible for strengthening the capacities of individual adaptation professionals, adaptation and resilience-oriented organizations, and accelerating the evolution of the adaptation field of practice. Prior to joining ASAP, Beth directed the University of Michigan's Climate Center and managed NOAA's Great Lakes Regional Integrated Sciences and Assessment Center, I'm sure there's a really handy acronym for that one. Beth served in the Peace Corps in Togo, in West Africa, and holds a Master’s degree in urban planning from the University of Michigan. Beth, welcome.

Beth Gibbons

Good afternoon, everyone, and thank you. I'm so short it's great, I wouldn't even be able to see over it, so now I see there's all kinds of people in the room, perfect. As Dan said, my name is Beth Gibbons, and I'm the Executive Director at the American Society of Adaptation Professionals, and I'm gonna be providing a little bit of an overview of what are some of the climate impacts that we're looking at here in the Great Lakes region, what are their opportunities and actions on adaptation which are taking place in our cities, and then I'm gonna talk some about what are the needs for policy and action on the part of the federal government to really be supporting what it is that we need in the Great Lakes. Rob, Scudder and Brody who are gonna speak after me are gonna drill deeper into some specific topic areas around interest in the lakes, but I'm just gonna hope to round that out with a bit of an overview.

Resilience on the Great Lakes is a beautiful thing. Dan already took a little bit of this information, but just some of the power of the Great Lakes region. As he said, this is the largest coastline of the continental United States, 4,500 miles. It has over 30 million people who are in the basin of the lakes, with an additional 30 million people who make up the population of the eight states that make up the Great Lakes region. And you can think of the Great Lakes as being the headwater of the Mississippi River basin, which is an additional 30 million. So as we're thinking about this community, what happens on the lakes has a tremendous effect, a tremendous ripple out through the water systems which we all rely on. In addition to the people, the lakes, and as Brody talked about, the economic power, this also has five out of the ten leading agricultural states in the United States, and that's where we are today.

As we look towards the future, the Great Lakes region is really thinking about how are we going to prepare ourselves for climate impacts? Well, we also think about the potential for opportunities of growth under a changing climate. We have an agricultural foundation, how will we capitalize on that for additional growth in the future? We already see speculative land purchasing happening in Minnesota, Wisconsin, in Michigan, from corn and soybean farmers. We can look around the rest of the country and see these incredible threats which are

bearing down on us. We know around the coasts, we're looking at upwards of 45 million people who will be experiencing once annual flooding in their neighborhoods by 2100. We're anticipating 13 million people having to move from coastal regions. In the West, we're looking at populations of 40 million people who rely on the Colorado River basin which is sustained by Lake Powell and Lake Mead, which now are under 50 percent capacity. So as we think about the Great Lakes region, we're going to need to think about what has to be overcome, the impacts that are with us, but what are we doing to prepare this region to thrive in the future and to be a bastion for all people across our country?

And this challenge is a real one, because while we see a future of opportunity, we also see a history of injustice. We've seen that history of injustice spread itself across our cities from zoning and redlining policies of the 20s and 30s, urban renewal, in the application of FHWA projects in the 50s and 60s, taking out blight but intentionally, or some people would say unintentionally, targeting black and African-American neighborhoods, state-sanctioned violence, which was a factor throughout the 60s but unfortunately continues to be a scourge of our cities today, and of course the more recent subprime mortgage targeting. And the challenge of these policy decisions of our past is that they cast a long shadow. They cast such a long shadow that just last month a report came out and looked at 108 cities across the United States, and it found consistently that neighborhoods that had been redlined in the 1920s, today experienced greater urban heat island effects than the neighborhoods that had been Double-A rated, to the amount of two degrees on average. In the city of Minneapolis, a temperate climate city, the temperature differential between neighborhoods that had been redlined and had been Double-A rated today is a difference of 10.8 degrees. So these histories cast a long shadow, and so it is so, so important that we recognize that the leadership here in the Great Lakes is a boon for us.

We not only have Great Lakes but we have great leaders, and they have been showing up in our cities across the region. We see this in the city of Detroit, a city where we have seen the emergence of the Detroit Climate Action Collaborative, a coming together of nonprofit organizations, businesses, researchers to identify from the ground up what are the needs here, what are the vulnerabilities here, and how are they going to address them? A community led effort to create the first climate ordinance that the city of Detroit then passed, to really show that not only are we going to do this by virtue of the people in this city, but when the city government was ready to step back into a role alongside those community members, they put the ordinance on the table and passed it. In the City of Milwaukee, in a city that has been beset by combined sewer overflows in the 1990s, we were seeing as many as 50 to 60 combined sewer overflows a year. Through the leadership of their Executive Director Kevin Schafer, they've reduced those down to 2.3 annually, and have an ambition now to continue to lower those down to zero. Milwaukee has taken a tact to engage not just the public sector but the private sector, and have created an opportunity for a public-private partnership to capture an additional 50 million gallons of stormwater through green infrastructure. And these efforts have not gone unnoticed by the financial community. The bond raiders found out what was happening in Milwaukee and said we want to help you do more, and what we mean is that you need to tell your CFO to open up more capital for your innovation. And they did, and they opened up $35 million, taking it from savings to actionable capital so they could continue doing this work.

And it's not just in big cities, it's the small cities too. It's Duluth, Michigan or Duluth, Minnesota wow, alright, it's in Duluth, Minnesota, which I think of as the sentinel city of our Great Lakes. It sits on the far western tip, just about 86,000 people, and it's a city that I think of as being between an anvil and a hammer. If you ever look at Duluth, it sits below these terrific bluffs, and it kind of just mocks the shores of Lake Superior, and it has not been without its other things upcoming. The city of Duluth was pounded by storms in 2017, 2018, again in 2018, again in 2019, and they realized that the investments which they had made to restore their lakefront, which had really been an engine for economic revitalization in the whole city, were coming under repeated threat. And so they decided rather than just rebuild as business as normal, they were going to adopt an interesting transect of putting in larger stones to absorb the water, they were going to create a specified slope to a new seawall to slow down the lake's energy, and bring in over 70,000 tons of boulders to do a really mixed natural system plus hard infrastructure work around their waterway, so that they could preserve this important asset that they had on their lakeshore. In Marquette, Michigan, we again saw the local leadership, community groups from the Superior Watershed Partnership stepping up to work with the city after having faced a disaster and lost one of their key stretches of road, the Lakeshore Boulevard, to work to actually move that boulevard back a hundred yards inland, adding to the resilience of the transportation system, but also restoring the waterfront. Again, these activities, when coupled between the natural solutions with the hard infrastructure, there are really the most benefits.

And so important it is that we're doing this. Because climate change isn't something that we are preparing for, it's something that we're living with. You all know that, I'm assuming it's why you're here, but in the Great Lakes region from 1951 to 2017 we've seen 2.3 degrees of temperature increase, we've seen the growing season extend 16 days, we've seen precipitation coming more often and much harder, so we're seeing a dichotomy— less water when you need it, more water when you don't, making it difficult to use. And we expect to see more of it. The maps that I'm showing, and I know they're difficult to see, are showing us what's anticipated in our changes, looking out just to 2070. And we're in 2020 right now, if you're getting a 30-year mortgage it'll take you halfway through the predictions on this map, halfway to seeing six degrees of temperature change, six inches more of precipitation. We're in the midst of the change, and we're expecting to see more, and that is why it is so important that right now we are preparing the way that we are living, working, and governing in our places for these changing events.

I have the honor to serve as the Executive Director of the American Society of Adaptation Professionals, and in response to the RFI from the House Select Committee on the Climate Crisis, our members designed and delivered policy recommendations last year to that committee, and the main themes of them were that climate needs to be mainstreamed, we need to evaluate all federal projects and policies through a climate lens, it cannot be an add-on, and it must include social equity and ecological integrity. We need to be proactive. Climate resilience is not disaster management, this is getting out ahead, it is looking at our communities, it is creating a vision for the future and not just for the Great Lakes region, but for all regions. We need to develop lasting authority, we have seen the fragility of what happens with executive orders and we cannot tolerate that. We need the leadership of Congress. We need to elevate social equity, we need to support nature-based solutions and we need the federal government to not dictate from above what must be done, but use its influence and its reach to facilitate local and regional action. When we do this, and we know that these are not easy things to ask and yet we will ask them anyway. We need to see a modernization of the Stafford Act, we are hoping that this would include climate projections for our flood insurance rate maps, support of the risk rating 2.0 reforms, we want to make sure we're avoiding constructions in risk prone areas, we want to see an update to the FEMA disaster funding and acceleration of CDBG relief. This is something that all communities that suffer disasters need, and our Great Lakes region is no different. We want to see an increase and an expansion of the Great Lakes Restoration Initiative funding, to perhaps become the Great Lakes Restoration and Resilience Initiative. Thinking beyond just restoring, but where do we go from here? And we need to maintain these health priorities that we saw so boldly introduced in the farm bills from last year when you want to see those maintained, because soil health is critical to both our mitigation and our adaptation goals.

Out of the box a little bit more, we'd like to see federal mandates on resilient building codes, we'd love to see the renewal of H.R. 3779, the resilience revolving loan fund, and in the Great Lakes region, cities are beset with the financial challenge of separating their combined sewer systems, something which is a legacy of how they were built. It causes health impacts, economic impacts, and we need to see funding to support this unfunded mandate to separate these systems. When we do this, and we do it well, we know from the National Institute of Building Science that for every dollar we spend on resilience, we can see an 11 dollar return. So we aren't so much asking for the support, but we're asking you to let us give back an opportunity for growth. And then of course we want to ask for the continued support of the critical, critical science and applied science programs that so much of our work is built upon. NOAA's RISA program, the name of the organization that I was at is GLISA, it does have a clever nickname, the RCC's, the CASC, the Climate Hubs, support of the Bureau of Indian Affairs, and Congress continuing to demand and bring forward the National Climate Assessment, not just as a quadrennial report but as something that we can have as a sustained report, a living document for us to continue using. So, we seek the updates, the innovation, and the support, that we believe that if we work together, we can achieve.

The American Society of Adaptation Professionals is poised to help support this effort, our members are in all 50 states, we have members who range from the private to the public, who work on stream restoration to building engineering, and we're keen to see this work move forward, to show support for it, and provide expertise and advice wherever possible. I'm grateful for the opportunity to talk with you all today, and I look forward to questions following our panelists, thank you.

Bresette

Beth, I warned you that I like to ask follow-up questions as we go, this one's probably pretty easy. I'm interested in learning a little bit more about your Select Committee RFI. Can you tell people sort of whether that's publicly available, how they can download it, how they can read it, could you just explain a little bit about other resources you might have on your website as well?

Gibbons

If you go to AdaptationProfessionals.org, we actually launched a new website last week, so fingers crossed it's working, there's a resource library and in that resource library you can find documents like the response that we posted to that RFI. You can also find recommendations to the transition teams to the presidential candidates of 2016, and to the Trump administration in early 2017, as well as a variety of resources on that site. There's additional information about ASAP and the member groups that we operate, and if you would like to join us tonight we'll be having a happy hour at the Dubliner, so come on by and learn more, with beer.

Bresette

A lot of people's resilience will be tested at the Dubliner. Do you also make recommendations for state-level governments as well, in transition teams and things?

Gibbons

We are happy to help convene members to do that work, the only case where we have done it is in Michigan, and I will say that is where I'm located, so there was a special impetus that I felt towards that, but any place where members convene and want to have that administrative support from the ASAP staff, we're happy to make that happen. Josh Foster is here, he's sitting in the second row, he's the secretary of the ASAP Board and he's the lead of our policy and practice group, so he'd be happy to talk with you also about ways to get involved.

Bresette

Thanks for that. For the folks standing in the back, there's a couple empty seats up front, while I'm transitioning to our next speaker you're welcome to come join us. I wanted to ask about the RFI because we did an RFI response too, and a lot of the same themes; near-term solutions as well as long-term solutions, thinking about how we sequence our solutions so that we're maximizing investment or resources, and then the big one is not getting in the way of state and local leadership.

Our next speaker is, I told him earlier the second person I've met named Scudder, so I'm very pleased with that. Dr. Scudder Mackey is the chief of the Office of Coastal Management for the Ohio Department of Natural Resources. He has expertise in conservation geology, aquatic habitat characterization, near-shore coastal processes, coastal wetlands. I love reading scientists' bios, I think it's so much fun. Did I say aquatic invasive species, I'll say it again, hydrology, geospatial mapping. Prior to joining the Ohio Department of Natural Resources, Dr. Mackey was an environmental consultant working on multiple Great Lakes environmental projects in the United States and southern Canada. He holds a PhD in Geology from the State University of New York at Binghamton. Welcome.

Scudder Mackey

I'm gonna have to raise this up a little bit. Well thank you very much for the invitation to speak here, I'm really happy to be representing the Coastal Assembly, which is a bi-national organization that sort of, it's almost like a community of practice in many respects, that represents 22 agencies, state and federal governments, academics, tribes, and we also have 35, 34 members that currently participate in our meetings that are active, many with considerable expertise in coastal wetlands.

And so what I'd like to do today is first talk to you just a little bit about the structure of the Coastal Assembly, what our vision is, it's on the slide, well I need to press the button to start the picture, there we go. Okay, you talked a bit about the vision and what the priorities are. Primarily, this is a group that really enhances a collaboration within the Great Lakes with respect to restoring wetlands, coastal wetlands, but wetlands across the Great Lakes basin. We also serve as a resource, many of the people that serve on the Coastal Assembly, some are more in the administrative side but many of them are, like myself, scientists who've been actively working in the Great Lakes for decades and have considerable expertise, and a lot of restoration work, and continue to do really

innovative work in trying to restore the coastal wetlands, and also wetlands that have either been drained or lost due to development or other impacts. In terms of facilitating communication, we actually, and I'll talk about this in a few minutes, but we hosted the first Coastal Wetland Symposium in the Great Lakes, it was the first time a meeting like this that was brought together, we had over a hundred participants, many of them wetland scientists and agency people who are looking at how can we make strategic investments in the basin in order to improve the wetlands and the wetland functions that we have. And then also promoting science and tool development. There's a couple folks in the academic community who have developed a number of really interesting tools of decision support tools that help us to make better decisions about where we invest in wetlands and actually design these wetlands in a way that are self-sustaining and actually provide the benefits that we're really looking for.

So let's go to the next slide. Why are wetlands important, and what have happened to wetlands in the Great Lakes? Well this slide illustrates basically the loss of wetlands, over 50 percent of the wetlands that existed in the Great Lakes basin on the U.S. side are gone through. They've been drained, they've been filled, or they've been altered due to land-use changes. Up on the top left is a map of Northwest Ohio, I'm from Ohio so I'll be speaking with a little bit of Ohio perspective here. Here this is the Great Black Swamp, and this is the extent of the Great Black Swamp that existed in the early 1800s. The two smaller maps that you see on the upper right, and I know they're very small but just look at the dark green, and then look at the light green. The map on the left, shows the extent, again in the early 1800s, and at the right we have lost more than 90 percent of our wetlands, okay, and wetlands provide critical functions and I'll talk about those in a minute, but what's really interesting is that there's a lot of work going on in part with some of the tools that we developed, but also a lot of assessment work that has been done by numerous agencies to identify areas that are potentially restorable. In many of these areas that were once wetlands, they could be converted back to wetlands. And I would have probably chosen a different color than these bright red dots here, I mean if they're going to be wetlands they should be green dots and not these bright red dots. But this is a map that across the Great Lakes basin on the U.S. side that is showing that the areas where you could restore wetlands greater than 50 acres in size, and these would be really high quality wetlands. And you'll see that in the area on the sort of the east side of Michigan, that Saginaw Bay area, a bay area down through the connecting channels and down into Northwest Ohio, that's actually the focus area for a lot of the initial work that was done by the Coastal Assembly. So we are going to the places where we have a chance of restoring these wetlands that make a difference in the basin, okay, and what's really neat is that because of these losses, and this is sort of a not necessarily a good thing, but it actually, it's providing an opportunity to actually do restoration work and do enhanced conservation work that really make a difference in the basin. So what we're trying to do is fix something that occurred over 100, 150 years ago.

Okay, so let's go to the next slide. Coastal Assembly, we've talked about communication and coordination, well what we're about is basically promoting critical connections. And I'm not the one who put together some of these slides, this little spider thing on the left is sort of interesting, but it basically shows the interconnections between the types of elements that we work with, you know data, developing strategies, partners, and developing projects, allocating resources, and planning, and trying to link all this together in an efficient way that allows us to achieve our goals and objectives in the basin. And we've set ourselves some goals in terms of the things that we would like to accomplish, and what's in the blue box here and I know the text is small, but I can probably just run through them for you. I mentioned before that we sponsored the first Great Lakes Coastal Wetlands Symposium, where we had more than 100 experts, some together share their expertise and advice, and in fact the director of our department, the Ohio Department of Natural Resources showed up, we have the H2Ohio Initiative, 172 million dollars in state funds allocated, this biennium, this two years focused on water quality improvements, about 46 million dollars are allocated toward wetland restoration on the ground. We have 33 projects identified, dollars are going out the door, there are about nine coastal wetland projects that are running through my office right now. The point is that a lot of that work in those projects, those were in part identified based in part on the expertise and the discussions we had with members of the Coastal Assembly in terms of identifying these specific projects. These are nutrient reduction wetlands, so there are different types of wetlands that you can have; wetlands for habitat, which is what we traditionally think about, but you can also have wetlands that are designed for nutrient reduction. And so this was really important for the state of Ohio in terms of allocating the dollars.

We've also developed decision support tools, there's a tool that actually allows you to identify potentially restorable wetland areas by looking at elevation differences, looking at frequency of flooding, and you can actually overlay the property parcels right on top so you can actually identify the specific properties which is critical to say,

okay, is this in public hands, is this in private hands, is there a possibility doing a conservation easement? So what helps guide places that we can go to actually restore wetlands in a very efficient way, okay. The Coastal Assembly also each year is working in cooperation with U.S. EPA and a number of other federal agencies who help manage the Great Lakes Restoration Initiative. We actually surface and develop and assist entities in developing coastal wetland restoration projects, which are then brought up for consideration for funding, and we do that on an annual basis. So what we're doing is interacting with the federal agency, and as in the state of Ohio with the states, where if dollars are available, that we help guide those investments and surface those and provide the opportunities. So the decisions can be made in terms of how you want to invest your dollars.

Okay, development of shared vision and goals, that's not my thing but it's something that's important, but the most important thing about those shared vision and goals is that historically, a lot of the restoration work is piecemeal. I call it random acts of conservation, or random acts of restoration. They're opportunistic, you have these sporadic projects, little projects here and there. What the Coastal Assembly has been working on is an implementation strategy based on landscape conservation design principles, and what this is about, it's an idea of looking at a system, looking at the landscape and designing, not just picking random projects but designing projects that work together, and I'll show an example at the very end here, but we're in a watershed or along the coastline you identify a set of projects, let's say for water quality where water moves from one project to the next to the next, so it's like a stormwater treatment train, and it's a way that allows you to really reach your goals. The analogy, and given my age, I'm not that old, but the analogy is like a retirement account, and a retirement investment where you would have a portfolio, you make a series of investments, diverse investments, and then what happens is that those investments add together to get to your goal. And you have to look at the types of investments we make in coastal wetlands as investments in natural infrastructure in order to achieve the goals. And so this landscape conservation design approach is something that's very innovative, and it really helps us move toward our goals much more quickly.

And then finally we have implemented a program. It's called Blue Accounting, it's that joint project between the Great Lakes Commission and The Nature Conservancy, and it's basically a way that we track the investments that are made in terms of what the makers have restored, and actually track how the progress we're making against the goals that we see. So many times, we invest state and federal dollars into projects, we build the projects, we wipe our hands, and we wash away—and we walk away, we wash our hands I should say, but we walk away, and so what we're really interested in is the long term performance of these wetlands, and we need to track them. This is the accountability part that says hey the dollars that are spent, we make sure that we spend them wisely and for good purpose. An example, this is just some information, this is a work in progress, but this is just an example of where okay, 76,000 acres of wetlands have been restored, you can see the map, it's very small unfortunately but you can see the general areas around the Great Lakes coastlines where these projects have been happening, but also on the plot below and don't worry about the numbers because this I think is from 2015, 16, and 17, this is just some of the information in the database. But what it's showing, I believe the light blue is what our goals are, the blue or the actual investments that we're making, and with the real important thing is that that red line, that trend needs to be going up, so as we move forward we increase the acreage more and more and more, so it demonstrates success and demonstrates that the work that we're doing is actually making a difference.

Talking about coastal resiliency now, this goes in part into what Beth was talking about earlier in terms of some of the climate impacts that we talk about. Coastal wetlands and wetlands in general are absolutely critical in terms of their functional benefits and wetlands are very much impacted by changes in climate, but also by other activities as well, and in terms of the ecosystem services that are provided, obviously fish and wildlife habitat. I've just put some random pictures here, the top left and the bottom right picture are obviously fish and wildlife, at the bottom right there are actually northern pike, this is the standing rush site where this is part of a Coastal Assembly project we identified, we put it in a neat water control structure, reconnected the wetland with the Sandusky Bay, and within about 24 hours of opening up the water control structure, we collected more than 50 northern pike trying to move into the wetland to spawn, so this gives you an idea. And you should know that fishery is a 7 billion dollar industry in the Great Lakes, so this helps support the fishery, it's really cool. On the lower left, obviously water filtration, water quality is important, I talked about the H2Ohio program in Ohio, yeah clean glass of water okay, and then on the upper right there water storage, flood retention, and one of the points was I think in Beth's speech was she said 35 percent increase in storms, precipitation, we're seeing a lot more water in the system,

we're seeing enhanced flooding, so these wetlands actually absorb and retain water and they also work along the shoreline. When we build these in water coastal wetlands or nature-based shorelines, they absorb wave energy, they attenuate wave energy, they help protect the coast and protect that coastal infrastructure.

And this is the second to the last slide guys, so I think I'm going to make my little warning thing here. Okay basically what we're talking about, our strategic investments based on sound science and the changing world, that changing world is the climate that Beth referred to, but also anthropogenic impacts. We see significant shoreline alterations along the Great Lakes coastlines, we see land-use changes. But one of the things I want to point out and I think many of you are familiar with the Great Lakes, we've had record high water levels in the Great Lakes this last year, lakes right now are at record high levels for this month, this next summer is going to be really interesting. We may be six to eight inches higher than we were last, we're gonna see areas that are flooded that have never been flooded before. I was just telling Beth in Geneva on the Lake, the last three weeks we've lost 35 feet of shoreline, 15 feet eroded away just this last weekend because of high water and severe storms. The thing is, with respect to coastal wetlands, coastal wetlands if they're along this relay help absorb that water, they absorb the wave energy and also as a challenge to us as designing and restoring wetlands we have to make sure that they maintain their functionality across a broad range. This plot on the top of Lake Erie, that's from 1860, that's 160 years worth of water level data. Water levels go up, and the water levels go down, that's a six foot range. So we don't have sea level rise issues in the Great Lakes, for those of you who are familiar with marine coasts. So we have to design to that range of water levels which is a real challenge for us, this is where the science comes in.

And then finally down at the bottom left here is Sandusky Bay, my office is located in Sandusky, Ohio, on the bay, and actually I talked about landscape conservation design. Very simply, the mouth of the sand of the Sandusky river, this is a drowned river mouth, is on the left side of the slide, and the water moves from left to right, so we are investing right now in coastal wetlands in this system so that the water moves progressively from one wetland to the next to the next, so that by the time the water comes out through Sandusky Bay and goes into Lake Erie it's a lot cleaner. We have a 40 percent phosphorus reduction goal that we're working for that the state is committed to. These wetland projects are going to help us meet that goal in Sandusky Bay. Some of you who have heard of the harmful algal blooms, that's the reason we're doing the 40 percent reduction.

Okay, so finally I just want to give credit to Christie Deloria Sheffield with the U.S. Fish and Wildlife Service, and Sherry Hagan with the Wisconsin DNR, these are our co-chairs for the Coastal Assembly, I am a member and I've been with the group since its beginning, in its inception, but Christy and Sherry are the ones who have really driven this process, and we have a really strong partnership that are yielding some really good benefits. So thank you very much for your time. One last thing, the hand out, guys, is out on the table on the outside, I think we have a one-page handout.

Bresette

I have a quick follow-up question. So I liked your rollover analogy, but you know in terms of water moving from one to the other, what happens when it gets to the state line, can you talk a little bit about how Ohio's relationships with your neighboring states, are there similar efforts underway there, are there similar offices?

Mackey

With the respect of the Coastal Assembly, all of the Great Lakes states are involved. We have agency representation, but the universities, we have people from OSU, Ohio State University, from the University of Michigan across the Great Lakes, and so this is a team effort, you need to understand that. And when we're looking at the investments that we make in wetlands, we're working now particularly, you saw that area from Saginaw Bay down into Ohio, we're making investments, the best investments we can, wherever they are located irrespective of state. And all of the states are working to improve their water quality particularly on Lake Erie, in particular, in fact the 40 percent reduction is, I believe there's an agreement, I believe with Ohio and Michigan and I think it's also with the province of Ontario which takes us onto the Canadian side of the lake as well.

Bresette

Great, thank you very much for that. Our next panelist is Rob Croll. Rob is a Policy Analyst in the Division of Intergovernmental Affairs at the Great Lakes Indian Fish and Wildlife Commission. And I didn't practice this, Odana, Odana, I should have practiced this. His duties include coordinating the group's climate change program,

which is focused on integrating traditional ecological and experiential knowledge with scientific research in natural resources climate adaptation. Previously, Rob served for 18 years as a waterways conservation officer with the Pennsylvania Fish and Boat Commission, specializing in natural resource criminal investigations. Rob has a Master's degree from the Vermont Law School, and an undergraduate degree in Environmental Studies from Northland College. Welcome, Rob.

Rob Croll

Boozhoo niiji-bimaadiziig Rob indizhinikaaz Gaawiin indoodemisiin Philadelphia indoonjiba GLIFWC indanokii. If you speak Ojibwemowin, you know a couple other things about me, you know that I'm from Philadelphia, my name's Rob, I work for GLIFWC, and by the way I introduced myself I am NOT Ojibwe. I work for the Great Lakes Indian Fish and Wildlife Commission, one of our missions is to integrate or generate culture into everything that we do, and one of the biggest pieces of culture is of course language. When I introduced myself in Ojibwemowin, and I'm not only talking to everybody here but I'm also reminding myself of who I work for, and that is the 11 Ojibwe tribes that make up the Great Lakes Indian Fish and Wildlife Commission.

So what is GLIFWC? GLIFWC is a tribal organization as defined by Public Law 93 638, exercising authority delegated by its 11 member tribes to implement federal court orders and interjurisdictional agreements related to their treaty rights. All of our tribes signed treaties with the United States government back in the mid 1800s, and every single one of those treaties they reserved their pre-existing rights to hunt, fish, and gather in the lands that they were ceding to the United States. Primarily, that off-reservation hunting and fishing and gathering now takes place on federal land and state land, so we work hand-in-hand with primarily the USDA Forest Service, also the National Park Service, all of the state DNRs. You can see on the map there, we are in Wisconsin, Michigan, and Minnesota, that has the dates of the treaties and the red dots there are the reservations for our 11 member tribes. We are an intertribal natural resource agency, and we assist our tribes in securing and implementing their treaty rights, and in cooperatively managing, restoring, and protecting natural resources and habitats in the ceded territories.

So as I said, I worked for the GLIFWC Climate Change Program, we've been around since about 2014, I'm actually the second Climate Change Program Coordinator. This is a list of the projects that we have going on right now, adikameg is lake whitefish, that's very important to the tribes as a cultural species, but also as a commercial species. The treaties guarantee the tribes' ability to make a modest economic living from ceded territory. Namegos is lake trout, we have a phenology study seedbank. The two projects I'm going to talk about today are a vulnerability assessment and the Tribal Climate Adaptation Menu. All of our projects are informed by TEK, and TEK is traditional ecological knowledge, so we're talking about things like oral history, songs, stories, reports from current people who are hunting, fishing and gathering out on the landscape in the ceded territories and reservation lands, and as both my previous colleagues noted, they are seeing changes on the landscape, they are comparing those changes back in some cases thousands of years to the way conditions were for their forefathers. That is part of the TEK that we gather as part of these projects.

So our Climate Change Vulnerability Assessment, which was started back in 2015, out on the table out front is a few copies of version one of our vulnerability assessment, we're in the process of finishing up hopefully this year version two. When it's complete, it will assess the vulnerability over sixty culturally important beings to climate change, that's animals and plants, those beings were determined for us through interviews with tribal members and also expert opinion from GLIFWC biologists. And the other goal is to promote recognition that Anishinaabe Ojibwe knowledge and worldview provide important, needed contributions to the understanding of resource viability and vulnerability. So the vulnerability assessment has a two pronged approach. We used nature serves climate change vulnerability index tool which incorporates climate projections, we used a best and worst-case scenario, or a low and high level emission scenarios, and incorporates literature on natural history of each of the beings, and then those scores were validated by expert reviews from biologists, tribal biologists, university experts. On the TEK side, our TEK outreach specialists did at least three interviews in each of our communities, and the interviewees provided stories, teachings, and knowledge about history, that oral history, but also the changes that they may be seeing on the landscape now, what they heard from their parents and grandparents. This TEK was given equal weight to the expert reviews and was used to validate and adjust scores, and our document incorporates results from both. So this graphic actually is brand spanking new, this is gonna go in version two. The nine species that we note as extremely vulnerable, and this is under a high emission scenario, all are very

important to the tribes. Wild rice, which is probably the most vulnerable, it's not probably, is the most vulnerable species in our assessment. It's the reason why the Ojibwe people live where they do. Hundreds of years ago, they lived on the east coast. They followed prophecy to the Great Lakes, and that prophecy was to go find the place where food grows on the water. That food is Menominee, or wild rice. If wild rice disappears due to climate change, that represents an existential threat to Ojibwe culture. We also looked at vulnerability across categories and our categories are a little different, so crawlers and fliers, swimmers, four-leggeds, and plants. Some of the things we see in this graph is that it's pretty consistent, but the two categories that are the most vulnerable are the swimmers and the plants, and that matches up to the changes that we're seeing in the environment now, and those changes that Beth and Scudder described. The others will obviously follow along, and by 2100 we'll see impacts across the board.

So when we think about climate adaptation, we think about helping those culturally important beings remain on the landscape as long as they possibly can, but also helping our constituents, our tribal members maintain access to those beings. So we know that culturally important beings are going to move, shift ranges, or may disappear completely in the ceded territories due to climate change. We also know that seasonal indicators, those indicators that were used from time immemorial to know when it was time to do certain things, like when the crows come back it's time to go to the sugar bush. Those no longer correspond with their associated natural phenomena, that's part of what we're seeing with climate change. We also know that loss of access to culturally important beings and reciprocal relationships that have been maintained since time immemorial is an existential threat to indigenous culture, physical and emotional health, and we know that tribal homelands, reservations, and treaty-ceded territories are fixed in place. Tribal members can't go to Canada and practice their treaty rights. If wild rice is no longer found anywhere south of the border, they'll find workarounds because they always have and they always will, but it makes practicing those parts of their culture so much more difficult. And we also know that adaptation actions must be culturally appropriate and community supported.

So we have a tool and this is Dibaginjigaadeg Anishinaabe Ezhitwaad, which means doing something the Anishinaabe way, the Ojibwe way. But, with native languages that don't translate well into English, there's always more to it. Anishinaabe was ‘original man’, or first man, the first human being that was created. So doing something the Anishinaabe way means bringing back those old stories and history and ways of doing things. So we needed to think about how do we create an adaptation planning tool that integrates indigenous culture, knowledge, science, and perspective with Western science and perspectives, and also how can we facilitate culturally appropriate climate adaptation between tribes and their nontribal partners, because we don't work in a vacuum. At the bottom you see some of the partners that were involved in this effort, this was by no means a GLIFWC effort. The Northern Institute of Applied Climate Science and the USDA Forest Service were integral, they provided the framework that we used and adapted to create the menu, and you can kind of see the graphic in the center there is how the menu works, you start with a concept and work your way down to on the ground tactics and action. I also have copies of the menu out on the table in front if anybody's interested, and it's also available via PDF on our website.

The menu contains a guiding principle section. And one of the things that was determined early on was that there needs to be a better way for partner agencies to interact with tribes. Quite frankly, consultation doesn't work well and hasn't been working well since the United States began. Part of the reason is because you need to approach tribal people from where they are, from their culture. So this provides a framework to integrate that culture into climate adaptation. Community engagement is super important in tribal communities, if you're just speaking to the Natural Resources Department, or if you're just speaking to the tribal leaders, you are not speaking to the tribe. Another goal is to decolonize that scientific research that goes on in the communities. Too often people go do studies, walk away with the results and the communities never even find out any way that they can access what that research told us.

And we also provide general guidance for working for nontribal partners working in indigenous communities. It's written from an Ojibwe Menominee perspective, but it includes the ability to add customs and culture from other tribal communities. One of the things that we ask for when you're using this product is kind of a perspective shift. Nindinawemaaganidag means all my relatives, and relatives aren't just your cousins and your aunts and uncles, it's, and this is a teaching that I actually heard not too long ago, all of those living things that ever existed, are existing, and will exist into the future. It includes animals, it includes the landscape, rocks are considered an animate being in Ojibwe culture, and streams, and also fire. Decisions for the use of those relatives

were originally communal decisions made with recognition and reciprocity. But today, natural resource management is no longer communal, it's made by individuals, it's made by agencies, and it's made by institutions, and it's a top-down process. This is just a little piece of the menu, these are the community engagement and cultural practice pieces. So consulting cultural leaders, considering that mindful reciprocity, holding ceremonies, establishing camps and monitoring programs, and bringing in the community to do that. And strategy too is kind of an important one, because as natural resource managers we want to manage, we want to get out there on the ground, we want to do things. But in some cases, the culture teaches us it's better to sit back and watch and see how those other beings, those beings that were created before we were, interact with each other and find their own natural solution.

We've done a number of workshops using the menu. On the left you see a list of some of the projects, some are ongoing on the ground right now, some of them are sitting on the shelf waiting for funding. I guess I'll put a plug in here real quick, GLIFWC is a BIA 638 program funded agency, that funding allows us the flexibility to work with our tribes and work to their priorities. We also get funding from GLRI, again the program provides us that flexibility, and we are one of the agencies that's helping to develop the GLRI Distinct Tribal Program that will get money to the tribes via the BIA 638 process. So both of those laws, both of those programs are very important to us and to our member tribes, and all the tribes across the United States. The other piece here is just one of the posters from one of our workshops kind of going through the process on culturally appropriate climate adaptation. With that, I will say miigwech, thank you for listening to me today, from myself and also all of my Climate Change Program team, thank you very much.

Bresette

Rob, when you have a seat would you mind saying your introduction again into the microphone? My introduction of you was picked up but unfortunately that was the least interesting of the two introductions I think, so would you mind saying it again so that our recording system picks it up?

Croll

[Ojibwe language] and what I said there is hello my fellow humans, my name is Rob, I do not have a clan, I'm originally from Philadelphia and I work for GLIFWC.

Bresette

Thanks for that. Can I ask a point of clarification, towards the end of your remarks, you talked about BIA which I think is Bureau of Indian Affairs?

Croll

That's correct.

Bresette

And then also GLIR, could you explain a little bit about what GLIR is?

Croll

I'm sorry, GLRI? Great Lakes Restoration Initiative. Scudder actually did a pretty good job of explaining it, the point that's important for us is the Distinct Tribal Program, which will bring that GLRI money to the tribes in ways that they can better access it and better use it for their priorities, instead of top-down priorities from other agencies.

Bresette

My experience on the Hill, Indian Affairs doesn't get as much attention as it deserves. Could you talk a little bit about how the funding from BIA that you mentioned, how that interacts with GLRI, sort of how it might be different just for the general education of our audience today?

Croll

So the BIA 638 program is the Rights Protection Initiative Program, this is funding that goes out to tribes and intertribal organizations and it's used for a lot of things, it's used for police departments, it's used for climate change programs, it's used for intergovernmental relations. GLRI, as you all know, Great Lakes Restoration Initiative is funding great work in the Great Lakes region. However, tribes, while they were able to access agency EPA programs and other agency programs, weren't really able to work to their priorities and their goals, and having money funneled through GLRI through the BIA program will allow them to prioritize what they need on the ground.

Bresette

And I apologize for the confusion, it would have been less confusing if I hadn't transposed those two letters in my notes. But thanks for that, that's very helpful. Our fourth panelist today is Brody Stapel, he's from Cedar Grove, Wisconsin, where he co-owns and operates Double Dutch Dairy with his brother and father. Double Dutch Dairy milks about 220 cows, and runs 830 acres with two full-time and two part-time employees. He's also served since 2018 as the President of the Edge Dairy Farmer Cooperative, which is made up of 800 dairy farmers throughout nine Midwestern states, and he serves on the Sheboygan County Dairy Promotion Board, and is on the U.S. Farmers and Ranchers Board. Brody, welcome today, thanks.

Brody Stapel

Thank you, hello, welcome, good afternoon, how are we all feeling? Good? A little warm in here, we're gonna try and get through this without breaking a sweat. So, thank you very much, I'm happy to be here today and give sort of an agricultural perspective to climate change and how we as farmers and dairy farmers and particularly in Wisconsin are adapting and being resilient. Show of hands, who knows the difference between dirt and soil? That's impressive, I'm very impressed, thank you, we'll get back to that.

Alright, so, excited to be here because we feel and I feel personally that agriculture is an untapped potential in the future of climate change as we continue to move forward, as the United States is 40 percent landmass, it's farmable cropland, so we have 40 percent of our acres, our entire landmass that is able to sequester carbon and hold water, and we'll get into some more of that. But, I think that farmers that are adapting to climate-smart agriculture and those farmers that are doing that must be included in the conversation. We want to be there, and moving forward, we must be.

So with that, see if we can get technology to work here we are, awesome. So our country's roots are in agriculture, and even today it continues to play a huge role of success in America. Food and agriculture is about a 2.8 trillion dollar industry today. You know, our nation relies on safe and reliable food to feed our families. As all of you may know, that there's more and more demands being put on farmers to be more transparent, which we're all about, we'll show you our farms, we'll show you how we produce your food, and we're happy to do it. But we're also being asked to do that with less and less on our side.

So a little bit about Wisconsin where we're at. We make a lot of milk, we make a lot of cheese. I'm a little bit biased because we like our cheese in Wisconsin, but we have about 7,300 dairy farms in Wisconsin, but a little over one and a quarter million dairy cows. We produce 90 percent of the milk in Wisconsin, goes into cheese, and 90 percent of that cheese comes to Washington DC, to your restaurants, in Mexico, Canada, and all over the U.S. and all over the world. Our farm makes string cheese, 3 million sticks a day is what our company processes and produces, and string cheese is a great snack, so that's my little plug for dairy.

As we continue to move on, some challenges that we're facing as well as, my colleagues up here that were mentioning you know, our precious commodity is farmland, that's what we use, that's what we use to feed our animals, that's what we use to make crop. And we're losing it at an alarming rate, 175 acres an hour, that's a million and a half acres a year that we're losing to development and to some different variable factors. Farmers are on the front lines, we are facing climate change head-on, daily. It was five below zero when I left this morning, I was glad to be down here, and in June it'll be a hundred degrees with humidity so we have to adapt, we have to be able to to meet that challenge daily. So there's many different disasters, there's a lot of information there, I'm gonna just keep skipping through, I don't want to get cut off.

So we're pretty excited, we're starting to put some more science, I'm part of a group as Daniel said at U.S. Farmers and Ranchers Alliance, there's a lot of science coming in and data that is at the fingertips of farmers, and we're happy to present it to you guys as well, about some actual numbers as far as how much carbon we as

farmers can remove. I challenge you in saying that farmers are the only ones really that can deposit carbon into the soil. I shouldn't say farmers, I should say agriculture as a whole, including forestry and farmers that keep their ground covered year-round. So, I would say that you can read some of the stats up there, but we have the potential to remove greenhouse gases, in the next five years I would say that we're going to go from about eight and a half percent of the total emissions, and we'll be able to cut that in half, I think it's 3.8 on the screen there. So again I'll say that farmers and ranchers that are using climate smart agricultural practices, we are a solution, not the solution but we are a solution to climate change.

So let me talk a little bit more about Wisconsin, a pointer here, but you see the little lake in Wisconsin there is Lake Winnebago, and then there's that blue thing on the east side and there's a little thing on the bottom, you probably can't see it anyway but that's where our dairy farm is, eastern Wisconsin, we farm about five miles from Lake Michigan. I've got a piece of ground that's 200 feet from the lake and I like it when I'm waiting for seed or fertilizer because I get to take a stroll down to the lake. It's high, I will agree with my colleagues, it is very high. So anyway, we in Wisconsin here, we've got these farmer led watershed groups that are starting up, popping up all over the state, there's about 31 of them throughout the state, many of them are nonprofit, but it's a great example of the development of partnerships, public-private partnerships. So we've got in these groups, there's environmental organizations, community business leaders, government agencies, universities, we're all coming together looking for solutions, and it's farmer led, farmer driven. So it's pretty exciting as these things start to continue to take off and develop, we're learning from each other, we're learning from the partners, the science is happening on our farms.

So a little bit more specifically, one of the groups that we are involved in is called the Dairy Strong Sustainability Alliance, Edge Dairy Farmer Cooperative was a co-founder of this group. Same thing, we bring together farmers, one of our big partners that we brought on board a few years ago was the Nature Conservancy, and everybody said well how can farmers and Nature Conservancy get along? It's been an amazing partnership, we've really opened each other's eyes and been able to work really well together, but we're bringing together them as well as milk processors, researchers, many other organizations and processors from around the state. So a couple of our goals are listed up there, the land use, soil health, nutrient management, animal welfare, energy use. You know, we as farmers realize that without continuous improvement we will not be able to compete on a global market. So there's so many different aspects, so many different moving pieces here, but we know that we need to be part of the conversation.

So moving on, my little buddy here, on our farm, like Daniel said we do farm along Lake Michigan there with my brother and my dad, we started the dairy about seven years ago, and adaptability and continuous improvement, those are words that we hear from time to time when we go to our meetings, it really underpins what we do in our climate smart efforts. The little thing in there, these are just a couple of the things that we're doing, we have all of our cows wear Fitbits, precision technology, you know GPS auto steer on our tractors, and one of the more exciting things I'll get into here is, I'm sure you've all heard about cover crops, something that we've implemented in the last year too. And going forward, my brother's the cropping guy, I'm the cow guy, so I don't get to play in the dirt as much as he does, I get the other kind of dirt, the one that smells more, but he's really dug into this. You know, everybody knows there's benefits of cover crops. It's probably one of the things that's the most exciting part of dairy farming today, what we are learning about soil and how much potential is in the soil and what we can learn. And the difference between putting a shovel in a field in dirt versus putting it into soil, and for those of you that don't know the difference I can tell you that if I go into my field and jump on a shovel and bare ground, the shovel throws me off because the shovel won't go in the ground because it's so compacted. Soil, if you can basically dig with your hand and it's think of cottage cheese or worm castings, it's just, it's beautiful, it holds water, there's just health to it, and I'm trying to contain my excitement but it is really an another thing that we're really starting to learn a lot about. So you know, like I said we've been doing it for two years, we're already seeing results after a year. Soil compaction is a big thing on our farm, along the lake, Lake Michigan is awesome in the summertime because it keeps us cool, in the wintertime it supposedly keeps us warm, but we have those wet clay soils that really like to stay cool, and you can put seed in the ground and nothing really happens because you need to warm up. If there's something living in that soil through the winter [it] comes back to life in the spring, it warms it up, so that that seed can germinate and get moving.

So a couple of things that we're doing on the adaptability side, we're looking at alternative forages, feeding our animals, you know, with the harsh winters, wet falls, going into winter that we've had, dairy farmers

for forever have been feeding corn and alfalfa. Alfalfa isn't really working for us anymore, so we're going to more of an annual, we can use that land more throughout the year for manure, it's like I said there's so many different things that we can do to adapt, but keeping something growing on that soil year-round is key. But I will tell you that it works great for us. It's a challenge, we had a super wet [year] as my colleague said, I don't know the exact numbers but it was wet, and we sat in the shop a lot of days and watched it rain so there wasn't a nice dry window for us to go after we had harvested our main crop, get out there, plant a cover crop. But you know what, we adapt, we called somebody and said throw it on with an airplane, throw it on with a big truck, I don't care, throw the seed out there, we need something growing out there. Call me in about three months we'll see if it germinated and how the cover crop did. But we're pretty excited to just—it doesn't matter what we need to do, we need to keep something on that soil. But realizing also that one solution doesn't fit all. My farm, we've got ground that spans 30 miles in either direction, and you go ten miles to the west and it's gravel, so it's easier to work with when it's wet, a lot harder to work with when it's when it's dry. So not one size fits all, but I will tell you that soil health is definitely part of the conversation that we need to be having.

So just a couple things as I wrap up here, this is my clan, my family, there's one more that joined us since then, another redhead girl, so the girls are winning. Anyway, I just want to reiterate that you know, for a long time, agriculture has sort of been excluded and farmers have been out there, rural, and just really want to reiterate that we have a lot of, like I said at the beginning, a lot of untapped potential, there's no quick fix, but farmers have been around since the first man. Somebody had to create food, and farmers will be around for a long, long time if we want to continue to have food. So I realize on my side that there's a lot riding on our willingness and our ability to adapt and be resilient. But for me as a farmer, it is so rewarding to bring dirt to life and to put food on your plates, thank you.

Bresette

We are doing very well, we have time for questions, but Brody on one of your slides, I'm going to zip back to it, one of the things you mentioned was energy use, and I was just wondering if you could share a few things that either you're doing, or your fellow Wisconsin farmers are doing on the clean energy side, sort of what led you to have that bullet under the continuous improvement under Dairy Strong?

Stapel

So I would tell you, I mean there's a lot of guys on the bigger dairies that are putting the digesters in that will produce electricity. Energy use, you know it really affects our bottom line, our lower energy use, so we're putting in energy-saving technology, in fact we just got done installing on our farm a few weeks ago variable speed rate motors right, so we can run those motors less. You know it takes a big motor, a vacuum pump to milk cows, and the less we can have that running a day, the more or the less electricity we're using, so you know, it's fuel savings. On the cropping side, we've got tractors now that are driving themselves and therefore there's no overlap, there's less passes through the field, you know there's technology coming out every day for farmers and it's just a matter of adapting it and paying for it, of course.

Bresette

But you know a lot of farms are following that, and I don't think that story is getting told quite as much. And I have an almost six-year-old and if he were here, he would thank you for your contributions to the string cheese economy, we blow through string cheese. We're gonna get to Q&A now, and to kick things off while everyone's thinking of their questions, I'm gonna ask about something that's come up a couple times but not in a lot of detail and that is, what are your organization's and what are sort of Great Lakes coastal resilience, what's the relationship of that broader effort to the Canadian government? To whether it's folks who are in the provinces, or people who are working out of Ottawa, you know there's a northern border to the Great Lakes and it's a different country, and I was just wondering from, if you could talk a little bit about what your perspective is about what the Canadians are doing, what they're bringing to the table, and what the relationship is like?

Gibbons

So I'll speak about this briefly about from the ASAP perspective, our membership is North American, so we have members across the U.S. and in Canada. I think that the Great Lakes are really an incredible region because

they do take multilateral collaboration between the U.S. and Canada and of course the tribes in both the U.S. and on the Canadian side, and the Canadian side has a lot to teach us. You know, they're in a very strong climate, kind of moving climate policy forward, especially the province of Ontario. But they also went through a very very difficult time under the Harper administration where they had their climate programs really disassembled, and so we're looking to them both for understanding how to maintain momentum during challenging political times, and also how they are really able to drive forward this agenda when they have a political will to do so.

Bresette

Yeah let's go right down the line.

Mackey

Yeah, with respect to the Coastal Assembly, and actually a lot of the coastal resiliency work that we do in the state agencies but also in the federal agencies, if the province is actually working with us, we have staff and there's continual communication between the efforts that we take in terms of restoring wetlands along the U.S. side and also on the Canadian side. I've been up to the Canadian Center for Inland Waters, Environment Canada, Burlington, and spent several days up there along with several other experts, where we're actually working very closely with the Canadians. They are now developing a set of tools where I think they have like 450 specific wetlands and a large database, and they're actually running a series of simulations in terms of potential climate change impacts. They want to understand what's gonna happen to those wetlands, how are they going to expand, how are they going to contract, will they lose kinetic connections with the Great Lakes, how is that going to impact the fisheries, so they're dealing with the same issues that we are. And one other point I'll make is that yeah we have high water levels on the US side, they have high water levels on the Canadian side as well, and particularly on Lake Erie, that North Shore, the dominant winds are coming out of the southwest so their shoreline is eroding even faster than ours is, and the same thing on Ontario as well. So they're facing many of the same issues and there's a lot of really good close communication in the scientific community, but also between the agencies and the governance.

Croll

So actually a really cool thing happened when I was on my way here yesterday, I set up an appointment with some folks from Environment Canada to talk to them about our Tribal Climate Adaptation Menu. They are kind of in the same process that the U.S. federal government is here, trying to work with their First Nations who are often leading the way on climate adaptation and climate mitigation, and we're hoping that one of the tools that will maybe be able to help them with is the adaptation menu. GLIFWC is also part of the Great Lakes Water Quality Agreement, we have people that serve on a number of the Annex subcommittees so we're active in that binational Great Lakes Water Quality Agreement as well.

Stapel

Well I can tell you my farm doesn't do much with Canada other than the fact that my wife is Canadian, Western Canada away from the Great Lakes. But you know, when I go back there, her family's in agriculture and so we actually are adapting some of their practices. They're really big on cover crops out there, they know it's working. Other than that, I don't know that I have much, you know, other than to say from a U.S. farmers and ranchers perspective, our efforts I think can't stop at our borders right, if we're going to have a agriculture involved it will include Canadians, and we need to go south of the border and across the pond as well, so I think it really is going to take a big umbrella effort to continue to adapt and be resilient.

Bresette

Thanks, that's a really helpful perspective. Do we have any questions from out in the audience? I saw you first, we have a microphone and that's for recording purposes, so it's important to use it.

Audience

My name is Todd Wiggins, nice to meet you, thank you for a great presentation. So could you expand a little bit more about the potential for expansion south of the border as you mentioned, being that we are losing a

lot of our farmlands as you pointed out, what would be the potential for hydroponics or mowing multi-level farming, or more innovative farming that could be contained within the U.S. rather than necessarily sending out the capabilities.

Stapel

I don't know that we're referring to sending out, I mean I'm all about American agriculture right, I guess my point was, America can't stand on its own, and have its farmers doing climate smart practices and climate smart agriculture. At some point, all farmers are gonna have to get involved, so I'm not at all advocating for outsourcing agriculture, I think we have the best and the brightest here in this country, and we need to continue to develop that and continue technologies and be able to adapt to that. So I can't speak to hydroponics, I'm a dairy farmer, but I guess that would be my take.

Bresette

You hear that a lot in talking about sort of climate strategies, if it could work here, that's great, but it needs to be exportable so that you know the rest of the world...

Stapel

And I would say you know, as I reiterated here that what works on my farm in Sheboygan, Wisconsin, won't work on Joe's farm in Texas. But it's really neat to see, if you follow, there's several farmers that have a great social media presence, if you follow farmers and how they're doing things differently, we all have sort of the same end goal in mind.

Bresette

Okay, next question right here.

Audience

Josh Foster from American Society of Adaptation Professionals. I was wondering how the Waters of the United States, or the change in that legislation may affect your endeavors, particularly in wetlands restoration, and maybe also in farming.

Mackey

I think obviously it has a potential impact, and if you lose protections to the waters of the U.S., that can directly impact wetland functions and our ability to actually restore the wetlands and/or protect the existing wetlands. You know what's interesting is, we're investing you know, 40 million dollars, 46 million dollars in wetland restoration, yet I am aware of projects in Ohio where there are waivers being granted where existing, highly functional wetlands are actually being degraded or basically filled for certain development purposes. Now you have mitigation banks and whatever, but I think the mitigation banks are not getting anywhere near the natural, the effectiveness of the natural wetlands that they are attempting to replace. So I'm not sure that it's necessarily a positive move in terms of from a wetland perspective. I do think that we do need to protect the waters of the U.S., and certainly we need to protect the wetlands that we have in existence now.

Stapel

Just real briefly, one of the things I guess I didn't mention in my presentation and other advantages of the cover crops right, we're holding nutrients so dairy farmers get rid of manure, where's that manure go all winter long while we're waiting to plant the next crop? Cover crops take up from manure, hold the manure, there's the Dairy Strong Sustainability Alliance has done work and we have all these soil simulators with rainfall and how much you know coming out of a cover crop with soil, it's clear water running out of the bottom of the simulator, so it's really neat to see some of those practices that are going on because as farmers, who are stewards of the land, that live on the land, we want nothing more than protecting the land. But I would also, my last point, I know EPA did the original waters of the U.S., I don't know that there were farmers at the table, and I think that now on the rewrite there's farmers at the table or they're at least seeking input, so we're pretty excited to see that as well.

Bresette

Other questions, we have one a little bit towards the back.

Audience

Hi, this question is for Brody. I was wondering if you on your farm are doing any work to mitigate methane, and if that's something that you guys are thinking about right now.

Stapel

So somewhere I have some information on that, but we aren't. Some of that technology is very, very expensive. As I mentioned before, the methane digesters, where they can take that manure and they can capture that methane and use it to power generators, at a 220 cow dairy, it's not affordable technology, but if there was technology that becomes affordable in the future we're all for it. The more that we can do to release less methane, but, I think that... we'll leave it there.

Bresette

Thanks, any other questions? Alright well, I think we have time for one more. So this was a really hard one. Let's pretend that we had the same briefing three years from today. What would you like to say that you've accomplished in your efforts sort of over that period of time? If you were making a similar presentation, what would you like to be able to say about your work, sort of over the next three years, what would be success for you? Again Beth, you get to go first and then we'll go down the line.

Gibbons

Okay, success in our work looks like a more resilient country overall. It means that we have not just disaster preparedness and disaster finance, but we actually have this rolling fund for resilience that we're thinking about. How do we stop the perverse incentives in the way that we respond to disasters by looking to this future and doing that with really adequate funding from the federal, state, and moving down to the local level? I think that we see that narrative shifting, and I think in three years we see not, as we have shaved down this mountain of uncertainty and we've shaved down the mountain of political unwill to act on this, and we're actually going forward and it's not just to combat a complete doom and gloom, but to actually move to a more resilient and a brighter future for all of us.

Mackey

I can do this at a couple of different scales with respect to wetlands. So certainly, with the investments that the state of Ohio is making in the H2Ohio program, 33 projects initiated right now, I'd like to see the bulk of those projects completed, on the ground, and starting to function. Now, it's going to take a little while for the wetland plants to mature and grow and whatever, but we would be well on the way of getting that done. I'd like to see some measurable reductions in phosphorus loads coming into the Great Lakes, particularly in Lake Erie, and maybe a reduction in the harmful algal blooms, the frequency and the size of the blooms that we have. And also the last thing I would like to see, particularly through the Coastal Assembly, is that you know the states and the federal government and the folks that are working on wetlands, that we really fully implement the landscape conservation design principles where the investments that we make in natural infrastructure are made smart and strategically where they work together, because up to this point we've made some progress, I mean the acres are increasing, but when you look at some of the other things, you know we're not reaching our goals quick enough, let's put it that way. And I think we can design these projects and implement these projects in a way that can move us much more quickly, and we can do it now, and smarter, and that's what I would like to report.

Croll

Three years is kind of a short time and a long time at the same time. One of the things that you didn't see on my list of projects that was up there was adaptation planning, because we've not really started that as an agency yet. We're creating all these tools, hopefully once the vulnerability assessment is complete we'll be able to get out into our communities and sit down and ask the people who need it the most what they want, what they

think climate adaptation is, and what they want to see happen in the ceded territories, and then finding a way to work with our federal and state partners to make that happen to preserve those treaty rights and those beings that the tribes rely upon.

Bresette

Brody, I think you get the last word on the question.

Stapel

Well three years from now, I won't be changing diapers hopefully. So really, I think we continue to work towards that healthy soil, healthy animals on my farm, you know what healthy soil looks like, on my farm it's less pesticides, less inputs because the ground is providing what we need, so we don't need to purchase that. On the animal husbandry side, I had a thing up there for Fitbits on our cows, technology allows us to see that cow and what's happening in her stomach before we can see it with our eyes, continuing to adapt to that technology and watch transformation on our farm. Like I said, I sit up here as an excited farmer, and there's not a lot of them around considering the low period that we've been through the last five years, and there's so much great stuff and like Rob said three years is a long time, but it's also gone just like that.

Bresette

So I'm imagining the first cow getting a Fitbit and then the other cows like hey that's pretty cool, and then in a couple days, 220 Fitbits, right? I wonder how many, yeah, I just think that would be funny. Let's give our panelists a round of applause, they were tremendous. And let me also say thanks once again to representative Debbie Dingell and her staff for helping us with the room today. Let me also thank EESI staff, we're wearing these super awesome lapel pins, you can find us, most of us are here. If you have any questions about coastal resilience or any other climate change, adaptation, mitigation, clean energy, hope you'll have a chance to find one of us and ask us some questions. Please also take our survey and sign up for our newsletter, but thank you all. Our next briefing is next week, it's next Thursday the 20th, we're doing a briefing with the Business Council for Sustainable Energy on their release of their 2020 fact book. It just was released today, I went to their launch before coming here, lots of really interesting data points about clean energy trends and sustainable energy trends in the U.S. over the last decade, so that's going to be a good one. More information's available online, hopefully you'll be able to attend that as well. But thanks for joining us this afternoon and hope you have a great rest of your afternoon, and [to Beth] I hope you have a good happy hour.
