

**National EPA-Tribal Science Council (TSC)
Fall 2015 Face-to-Face Meeting**

Courtyard Marriott Washington, D.C./U.S. Capitol
1325 Second Street, NE
Washington, D.C.

December 1 – 3, 2015

MEETING SUMMARY

Monday, December 1, 2015

Theme: Laying a Foundation for Advancing Tribal Science

Invocation

Mike Durglo provided the traditional greeting and invocation.

Welcome, Introductions and Agenda Overview

Curtis Munoz, TSC Tribal Co-Chair, Kiowa Tribe of Oklahoma, Carnegie, OK; and Dave Jewett, EPA Office of Research and Development (ORD), Ada, OK

After the participants introduced themselves, Curtis Munoz explained that the theme of the meeting is “reconnecting,” and he hopes that the TSC will move forward with the activities it has envisioned. Improving and reinforcing communication among the members is important. Curtis provided an overview of the agenda, noting that he looks forward to the TSC returning to its prior balance. Dave Jewett agreed with Curtis’ statements, noting that his priority for the TSC is in regard to tools: tools to reconnect and tools that can be adapted to meet the science needs of tribes.

Jeff Mears provided an overview of the citizen science portion of the agenda, explaining that he has been appointed to EPA’s National Advisory Council for Environmental Policy and Technology (NACEPT), which has been charged with advising the Agency regarding citizen science. The timing is ideal to explore this topic because it is a current focus of the White House. Jeff would like TSC input to allow him to inform his comments to NACEPT, and he also would like to explore citizen science opportunities that can help tribal communities engage in science. Tribes have different capacities than states and do not necessarily need legally defensible data to meet their needs.

Caucus Sessions

The Tribal Caucus and EPA Caucus met separately to discuss the TSC operating structure and other pertinent TSC business.

TSC Business

Fred Hauchman provided the report-out for the EPA Caucus:

- The TSC is a diverse group whose expertise can be leveraged to support science in tribal communities.
- In terms of the TSC’s operating structure, the goal is to deliver the best possible support for tribal science. The bias is toward keeping the current operating structure, but the EPA Caucus will work with the Tribal Caucus to improve the operating structure as needed.

- The TSC has only begun to tap into the tools, expertise and capabilities of ORD and EPA. With creativity and empowerment, the EPA Caucus should be able to take advantage of these opportunities and increase support for tribal science.
- Because the TSC must be results-oriented, the EPA Caucus would like a short list of tribal needs and priorities that EPA can help to address.

Curtis provided the report-out for the Tribal Caucus:

- The Tribal Caucus would like to keep the current operating structure because the TSC is a unique tribal-EPA partnership, and this structure allows direct access to EPA offices, programs and regions. Establishing a Co-Vice-Chair could provide assistance when the Co-Chair is unavailable.
- Monthly calls should maintain a consistent structure and schedule to encourage participation; report-outs from each TSC member who also serves on other EPA-Tribal Partnership Groups should be scheduled each month.
- The TSC must produce tangible accomplishments and outputs.
- The TSC must return to its original mission: increasing science capacity in tribal communities. Science means knowledge. What science can be brought to the table to benefit tribes? The tribal voice must be heard to address science needs in Indian Country.
- The TSC should reconnect with the National Tribal Operations Committee (NTOC), particularly so that the TSC can learn tribes' national priorities.
- The TSC should establish better communication with other EPA-Tribal Partnership Groups to sustain connections, synergize activities and decrease duplicative efforts. Perhaps a budget could be established to allow Tribal Representatives to attend face-to-face meetings of the various EPA-Tribal Partnership Groups.
- Regional Tribal and EPA Representatives must communicate better.
- Responsibility and accountability are key, and TSC representatives must hold each other accountable. If TSC members cannot commit to and participate on the Council, there is no shame in resigning. Each Council member needs to be honest with his- or herself and ask, "What can I bring to the TSC?"

The following points were made during the TSC business discussion:

- Action groups could be established, with every TSC member required to belong to and participate in a group. Each group would provide a report-out during the monthly TSC teleconferences.
- Meeting dates and times should be kept consistent from month to month, and face-to-face meetings should be held consistently twice per year.
- Continuity and communication are important, and everyone must participate in monthly TSC and Caucus teleconferences. The Co-Chairs must address absenteeism within their Caucuses, and the monthly agenda architecture should encourage participation. For example, EPA Representatives could provide a 5-minute presentation (two per monthly teleconference) about their jobs and any related, relevant information as it pertains to tribal science. This will allow the Tribal Representatives to better understand EPA staff roles and responsibilities.

- Discussion topics should include clear objectives and end results, with the Council focusing on no more than two to three topics simultaneously. Each topic should have a background presentation to establish basic knowledge, and expert presenters on each topic should be invited to provide more in-depth information during teleconferences and meetings. Regional Indian Program Coordinators can serve as resources and present on teleconferences.
- A different grantee from the Tribal ecoAmbassadors Program could present at each monthly teleconference.
- EPA hosts frequent tribal and research program webinars that can inform the TSC's work.
- One potential tangible output could be a two- to three-paragraph synopsis of each TSC face-to-face meeting that can be sent to program and regional senior management by EPA Representatives and to Regional Tribal Operation Committees (RTOCs) by Tribal Representatives. Generally, TSC Tribal Representatives attend RTOC meetings and provide report-outs about TSC activities; TSC EPA Representatives may attend if agendas include relevant topics.
- Not all of the TSC's outcomes have been tangible (e.g., the seed planted following the Traditional Ecological Knowledge [TEK] Training Workshop), but intangible outcomes are important, too.
- The TSC can sponsor technology or eco "cafés" to disseminate information to tribes about available and forthcoming ORD tools, resources and research.
- Because tribes would like EPA tools to help them conduct science on their lands, the TSC should explore how ORD tools can be adapted to meet tribal needs.
- The TSC has a responsibility to develop an outreach component to disseminate tribal science information to tribes (e.g., webinars that explain how tribes can utilize tools); this outreach can be considered an output.
- The TSC should explore how to formalize its relationship with RTOCs, in particular ensuring that a TSC report-out is a standing agenda item at each RTOC meeting.
- The TSC should explore the possibility of branding itself with a logo if this is not in conflict with current Agency rules. If a logo can be developed, all communications should include this logo.
- It is important that science information be readily available to address tribal science needs. In particular, the TSC should facilitate communication of available ORD expertise to tribes. For example, the TSC could develop a directory of expertise so that tribes know which EPA entity to approach to address specific issues and find specific information.
- The TSC has a responsibility to examine the tribal science priorities (TSPs) identified by the tribes that were not chosen as national TSPs and communicate their status to tribes.
- Sustainable energy is a subtopic of climate change. Because climate change is the "new normal," all topics explored should be viewed through an energy perspective.
- Each EPA-Tribal Partnership Group could be invited to present to the TSC following the partnership group's face-to-face meeting.
- Because the TSC is tribally driven, the Council must focus on tribal science needs while still meeting EPA requirements.

- EPA websites must meet strict Agency requirements, but with contractor support, the Tribal Caucus could establish a website without having to undergo EPA's stringent approval process. This website could provide information about projects of interest to tribes that have been delayed (e.g., the Tribal-Focused Environmental Risk and Sustainability Tool [T-FERST], which has been delayed as a result of the EPA website restructure). The website also could include information about upcoming events, white papers and so forth.
- The TSC should connect with those staff members who coordinate tribal grants within each region.
- The TSC should connect with active tribal science organizations.
- Billy Maines (National Tribal Caucus Chair) has indicated that the National Tribal Caucus is eager to reconnect with the TSC and welcomes and will advocate for TSC presence at annual meetings. This is an opportunity to identify key science research priorities that can be brought to the attention of the TSC.
- The TSC must consider how to disseminate information that helps to build capacity for tribes, many of which are underserved and suffer Third World conditions.
- A suggestion was made to support tribal youth to engage in science, technology, engineering and math (STEM) education and/or tribal science internships. Enrolling tribal youth in science programs and internships would be a positive outcome for the TSC, and hiring tribal scientists is a key benefit to tribes. As an example, more Oneida members have degrees than there are available science jobs with the Oneida Tribe of Indians of Wisconsin. Internship opportunities with other tribes would provide connections for these Oneida professionals.

Citizen Science: Overview and Example in Action

Jay Benforado, Deputy Chief Innovation Officer, EPA ORD, Washington, D.C.; and Chris Whitehead, Sitka Tribe of Alaska, Sitka, AK

Citizen Science Overview

Jay Benforado explained that most organizations have not thought about how to strategically harness crowdsourcing and citizen science. Citizen science is not new and has been accepted for many years (e.g., the Audubon Christmas Bird Count), but new tools and technologies are accelerating the public's ability to perform effective citizen science. The question is how to develop projects so that people (nonscientists) who want to contribute are able to do so because citizen science can interact with society in a variety of ways (e.g., networks that allow citizens to input information). Volunteers can be included in many steps of scientific research and monitoring, such as defining research questions; collecting, processing and analyzing data; and disseminating results.

The Federal Community of Practice on Crowdsourcing and Citizen Science (www.digitalgov.gov/communities/federal-crowdsourcing-and-citizen-science) includes 40 federal agencies working together to consider how citizen science can help agencies. Jay provided several examples of federal citizen science efforts that highlight the amount of environmental monitoring performed outside of EPA and the creativity in meeting the varied needs of the government agencies: Did You Feel It? (U.S. Geological Survey [USGS]), Citizen Archivist Dashboard (National Archives), Nature's Notebook (National Science Foundation), mPing (National Oceanic and Atmospheric Administration [NOAA]), MapGive (U.S. Department of State), and Measuring Broadband America (Federal Communications Commission). The Federal Community of Practice on Crowdsourcing and Citizen Science website features case studies, a resource library, a guide for establishing citizen science programs and projects, and a program catalog.

The recent White House Office of Science and Technology Policy memorandum to federal agencies provided a directive for all agencies to increase citizen science and outlined principles to guide government activities for the greatest value and impact. Because an online presence is important, agencies have been requested to describe citizen science projects on a government-wide website. The memorandum also encourages agencies to build internal capacity and increase support, which provides tribes with the opportunity to identify problems that need to be addressed. EPA would like recommendations regarding how to build support and internal capacity for citizen science.

The focus of EPA citizen science is to work with communities to understand local problems, monitor the environment, engage volunteers in research relevant to the Agency's mission, and educate the public about environmental issues. Jay wondered whether tribal citizen science interests are similar to this paradigm. Currently, EPA's vision of citizen science is to encourage an educated and engaged citizenry to help solve environmental problems, increase use of local data to support communities, fill current gaps in environmental data collection, make valuable contributions to environmental and health research at decreased costs, and improve environmental governance.

To inform EPA's citizen science policies, NACEPT has begun a year-long process to advise the Agency on how to strategically use citizen science to advance its mission. There is an opportunity to focus on tribal citizen science needs, and Jeff Mears can communicate these needs to NACEPT to help form its recommendations. NACEPT was given the following three charge questions related to citizen science:

How can EPA:

1. Sustain and improve current EPA projects and programs?
2. Invest in citizen science approaches for the greatest gain?
3. Increase the impact of knowledge/data generated via citizen science?

Kelly Wright asked how EPA can help tribes to develop Quality Assurance Project Plans (QAPPs) for citizen science projects. Jay responded that online QAPP-development resources exist, but more importantly, designated personnel can help with this aspect. For example, the state of California employs a citizen science coordinator who ensures that QAPPs are completed at the front end of project design.

Neil Patterson asked whether each region employs quality assurance (QA) personnel. Bob Hillger explained that regional research must include a QAPP, and communities must be included in QAPP development for all community projects. Beth Jackson and Patti Tyler added that each region has a QA coordinator and program. Lon Kissinger explained that the regions are exceedingly concerned about ensuring that all QA aspects are taken into consideration. When tribes were not capable of accomplishing certain QA requirements, Lon advises them on how to move forward in the best manner possible. Information collected via citizen science can be valuable even if it is not collected under the most desirable data quality requirements. Jay added that EPA will work with tribes to develop appropriate plans.

David Charters advised not to count on funds unless they are provided directly by ORD. Generally, citizen science is not funded by EPA and does not have appropriate QA in place for use in a regulatory context. For example, the Superfund program manages citizen science data as anecdotal data. Jay noted that several EPA projects involve citizen science data, and citizen science projects can be designed in a variety of ways to ensure that the data are fit-for-purpose. The pace of technology is outpacing policies, which has prompted the Agency to prepare for these technology changes and the onslaught of big data. EPA would like to know how to deal with this "new world." Many observations related to environmental protection are not complicated, and the Agency's partner organizations (e.g., Trout Unlimited) use citizen

science. Jeff Mears added that if tribes have technical assistance, they do not need EPA funds. He would like to see tribes use citizen science to empower their communities. Ultimately, Jay and Jeff would like concrete information so that NACEPT can make recommendations that enable tribes to engage in citizen science.

Citizen Science Case Study

Chris Whitehead explained that the Southeast Alaska Tribal Ocean Research (SEATOR) program is involved in a variety of projects in Southeast Alaska, including the Southeast Alaska Tribal Toxins (SEATT) partnership. SEATOR supports partnered tribes working together on climate change-related impacts on the marine environment in Southeast Alaska; this unprecedented unification of Alaska tribes provides credibility. Despite the common concern about subsistence clam resources and the increased prevalence of harmful algal blooms (HABs), Alaska state agencies have not provided needed assistance regarding these issues, so SEATOR created the SEATT partnership in late 2013 using EPA Indian General Assistance Program (GAP) funds to create an early warning system. Paralytic shellfish poisoning (PSP) from HABs is caused by a toxin more lethal than sarin nerve gas, with coastal Alaskan Native populations being 12 times more likely to be affected by PSP than non-Native communities.

Currently, only commercial shellfish are tested for safety by Alaska state agencies, with no subsistence or recreational regulatory testing. This created a niche for SEATT, which monitors species abundance, cyst beds, HABs and other conditions. As part of an approved QAPP, SEATT provides training to citizen scientists via workshops, videos and a sampling manual. Citizens also receive equipment that allows them to communicate their findings to Chris, who is able to identify species remotely from his computer desktop. Data collected by SEATT are provided to NOAA's SoundToxin Database and Phytoplankton Monitoring Network. The citizen science data collected by SEATT are reliable and allow state agencies to make informed decisions. This real-time citizen monitoring has allowed the development of an early warning system and forecasting tools.

SEATT provides outreach to tribal and nontribal citizens about the health risk potentials related to the subsistence clam harvest and coordinates with state and local health departments about this issue. The group also is developing an interactive online mapping tool to help fisherman and clambers make informed decisions. The Sitka Tribe of Alaska Environmental Regulatory Laboratory (STAERL) was established to support SEATT with real-time shellfish toxin analysis and provide regulatory data to tribes and communities to assess their vulnerability to risks associated with marine biotoxins. Tribes can use the laboratory to develop subsistence shellfish management plans.

Although it is a challenge to maintain funding for citizen science, many small communities in Southeast Alaska are interested in engaging in citizen science. Chris is working with many partners (e.g., NOAA, University of Alaska Fairbanks, commercial geoduck industry, Alaska Department of Environmental Conservation) to obtain funding for equipment and supplies for these interested communities.

Denise Jensen asked how the partnership would maintain operation of STAERL. Chris responded that the funding backbone would be commercial industry use of the laboratory. He also would like the state to reassess its position and begin to share funds.

Beth asked whether the state of Alaska has been interested in obtaining the partnership's data. Chris explained that the state did not collaborate at the beginning of the process but is starting to become more involved. The state has recognized STAERL as a regulatory laboratory. Currently, the state is not interested in phytoplankton data or an early warning system because it does not manage subsistence or recreational shellfish use, but the state may become interested as it begins to realize the value of SEATT.

Citizen Science Discussion

Jay expressed hope that this is the beginning of a productive conversation between EPA and tribes about citizen science. Many opportunities to work with tribes exist, and he is impressed with current tribal citizen science projects.

In response to a comment from David Charters about the term “citizen science” being a misnomer, Jay noted that many different terms are used for the phenomenon, and the language has not been solidified yet. The key question is how to engage nonexperts in performing science. David Charters stated that citizens perform sampling, whereas experts perform analysis. Jay explained that EPA has a long history of engaging volunteers for water monitoring, with more than 2,000 volunteer water monitoring organizations in existence. Citizens engage in much more than sampling, and federal agencies such as the National Aeronautics and Space Administration utilize citizen data analysis. In other cases, the community determines which problem will be addressed, designs the data collection and analysis, and owns the data. Ultimately, a wide range of activities exist under the term “citizen science.” David Charters argued that ultimately it is “science,” and his concern is that using the term “citizen science” qualifies and denigrates the science as opposed to elevating it. Jay agreed that citizen science ultimately is science; it is a subset of science that new technologies are enabling more than ever before. Jeff Mears noted that the term “citizen science” can be used as a marketing tool to increase interest without denigrating the science performed.

Carley Whitecrane noted that citizen science reminds her of how her community discusses issues that need to be addressed; it is about the collective weight of what is occurring in a community. There is a great need for citizen science, and she can see the potential benefits for her tribe. TEK comes from the same type of community knowledge, which has a time-tested history dating back many hundreds or thousands of years. It is bigger than any one person’s lifetime or the era of recorded science and forms the basis of belief systems.

Ed Washburn reminded the TSC members to consider two questions: What is citizen science? What input can the members give to Jeff Mears to help inform NACEPT’s recommendations?

The meeting was recessed at 4:36 p.m.

Wednesday, December 2, 2015

Theme: Challenges to Address...Tools to Reconnect

Short-Term Tribal Research Priorities and Other Tribal Science Issues

Robert Kavlock, Deputy Assistant Administrator, EPA ORD, Washington, D.C.; Michael Slimak, National Program Director, EPA ORD Sustainable and Healthy Communities (SHC) Research Program, Research Triangle Park, NC; and Jeff Frithsen, EPA ORD, Washington, D.C.

Introduction to Research at EPA

Robert Kavlock explained that EPA is a public health agency, and public health depends on ecological health. As a result, the Agency makes linkages between human and ecological health. EPA engages in a combination of short-, mid- and long-term basic and applied research. ORD is responsive to urgent needs (e.g., Gulf oil spill), explores innovative and sustainable solutions, provides leadership in environmental science, and collaborates with other agencies and organizations through a variety of mechanisms. ORD’s six research programs align with EPA’s goals to: (1) address climate change and improve air quality, (2) protect America’s waters, (3) clean up communities and advance sustainable development, (4) ensure the safety of chemicals and prevent pollution, and (5) enforce laws and ensure compliance. Each of the six research programs has developed a Strategic Research Action Plan (StRAP) that articulates the

science challenges, topics and outputs for the next 4 years for each program; the programs currently are working on implementing these plans.

ORD comprises 13 laboratories and research facilities and 1,755 full-time equivalents within a \$521 million budget. The office partners with regions to undertake broad research topics with a large breadth of expertise; this research is considered the premiere ecological research in the world. ORD is making a visible difference in communities through a number of research priorities, including next-generation air monitoring, addressing children's environmental health risks, and providing methods for cumulative risk assessment to reduce community health risks. To solve complex public health issues, ORD will use a systems approach to understand the context and many dimensions of each problem. ORD also has established state, tribal, local and international partnerships to address research needs and develop tribally focused assessment tools and approaches. Ultimately, ORD supports EPA decision making by offering sound science.

SHC Research Program

Michael Slimak explained that three important EPA strategic priorities are important to communities: (1) working to make a difference in communities, (2) cleaning up communities and advancing sustainable development, and (3) working toward a sustainable future. Communities include tribes, which have the concept of sustainability rooted in their cultures. The SHC Research Program's StRAP includes four program objectives to: (1) determine the social, economic and environmental impacts of decision alternatives on community wellbeing; (2) determine the causal relationships between human wellbeing and the environment; (3) clean up and revitalize communities, restore habitats, and advance sustainable waste and materials management; and (4) provide sustainability assessment methods to build a sustainability framework. The research program's slogan is "Research to Harmonize Nature and Communities." Among the program's research topics and project areas is a goal to assess health disparities in vulnerable groups, which includes Native Americans.

The SHC Research Program recently has begun an effort to understand the interrelationships between ecological and human health for tribal sustainability, and Michael would like to report the results to the TSC when they are ready. Examples of projects under this effort include fish consumption and climate change impacts on tribal health and wellbeing, forecasting natural toxin blooms on tribal lands, and the cumulative effects of exposure to chemical and nonchemical stressors on tribal members. Other research examines tribal dietary practices (with the goal of restoring heritage diets) and explores the creation of GIS-based mapping tools to build the environmental assessment and management capacity of tribes. EPA grants have been provided to investigate indoor air quality and asthma associated with cook-stove practices, issues with tribal and community water distribution systems, and climate change adaptation. The program also explores the value of ecosystem goods and services.

One research program output is EnviroAtlas, an online decision-support tool that provides users with the ability to view, analyze and download geospatial data. The tool is designed to inform decision making, education and additional research. Michael highlighted the "Eco-Health Relationship Browser" (enviroatlas.epa.gov/enviroatlas/Tools/EcoHealth_RelationshipBrowser/introduction.html) component of EnviroAtlas. DASEES (Decision Analysis for a Sustainable Environment, Economy, and Society) is a Web-based tool that facilitates the application of structured decision making, which is a process to elicit and organize key stakeholder values and relevant scientific knowledge for making community-based decisions. Another decision-support tool for communities is the Community-Focused Exposure and Risk Screening Tool.

A significant part of the SHC Research Program is to understand the social determinants of environmental health using complementary population-based and animal approaches. Because many Environmental Impact Assessments do not consider human health outcomes, Health Impact Assessments that include

determinants of health and health outcomes have been developed. The program has developed a holistic approach to characterize the current state of wellbeing in its Human Well-Being Index (HWBI), which is relevant to any community at any spatial scale and over time. The HWBI highlights the link between the flow of ecological, economic and social services and human wellbeing, informing and empowering communities to equitably weigh and integrate human health, socio-economic and environmental factors to foster sustainability in their built and natural environments. A Tribal Well-Being Index is in development, and Michael would like to present to the TSC about this in the future.

In response to a question from Ted Coopwood about how the SHC Research Program interacts with the Human Health Risk Assessment (HHRA) Research Program, Michael explained that HHRA is the “keeper” of risk assessment methods and methodologies. The HHRA Research Program now understands that the social determinants of health must be considered in addition to chemical exposure, so the program is moving toward deterministic methods and approaches. The SHC Research Program works closely with HHRA as that program develops risk assessment methods.

David Charters asked how the SHC Research Program intends to involve tribes in developing the Tribal Well-Being Index. Michael responded that he is unsure about the specific details at this time, but at the very least, the TSC will be engaged. In response to a comment by Jeff Mears, Michael explained that he could work with the Oneida Tribe of Indians now in regard to the HWBI.

In response to a question from Neil, Michael explained that the research program has been working with EPA’s enforcement and compliance personnel to develop tools to hold corporations accountable. Remedial Project Managers use technological support centers, which have collected relevant research for many years, to make decisions at Superfund and other sites. Several of the TSC members have been involved in this process.

Bob Hillger asked whether a formal process exists to incorporate tribal issues into the StRAPs. Monica Rodia explained that the TSC’s National TSPs were linked to the appropriate research programs.

The TSC members discussed approaches to disseminate ORD information to tribes, connect tribes with appropriate ORD individuals, and ensure that tribal needs are met by ORD:

- The TSC newsletter could be resurrected to disseminate information about available tools and resources.
- Regional ORD personnel should be more engaged with the RTOCs. Regional Science Liaisons can help with this.
- A formal consultation mechanism to include tribal concerns in StRAPs should be established and implemented.
- Tribal partners should be engaged throughout the tool development process to ensure that the end product meets their needs.

Safe and Sustainable Water Resources (SSWR) Research Program

Jeff Frithsen observed that water is life and explained that the SSWR Research Program’s goal is to improve the quality of U.S. water resources. One priority is to recognize the dynamic “one water” hydrologic cycle: If water systems are healthy, the watershed is healthy, and if the watershed is healthy, ground and drinking waters are healthy. Other priorities are to transform the concept of “waste” to “resource” and prepare for changes in climate and extreme weather events. The four overarching SSWR topics are watershed sustainability, nutrients and HABS, green infrastructure, and drinking water and

wastewater systems. The SSWR Research Program is collaborating with Alaska tribal communities to characterize the fate of contaminants released from nearby landfills. Another collaboration with the Otoe Missouri Tribe explored disinfection byproduct control using aeration technologies. An example of the SSWR research-to-implementation process was a biological treatment technology that was taken from pilot- to full-scale at a small water system in an Iowa community; this effort was a collaboration between ORD, Region 7, and state and local partners. The research program also provides technical assistance to water systems (e.g., *Naegleria fowleri* drinking water contamination in Louisiana). Jeff Frithsen described the extensive tribal involvement during the Bristol Bay assessment, which characterized the biological and mineral resources of the Bristol Bay watershed, identified mining impacts on fish resources, and informed watershed protection decisions. All affected tribes participated in the consultation and coordination process, with TEK being included in the assessment, which led to a 404(c) determination to protect the watershed.

The research program has developed tools, such as the Causal Analysis/Diagnosis Decision Information System (CADDIS), which is an online resource developed to help regional, state and tribal scientists and engineers conduct causal assessments in aquatic systems. Other tools include Basins (*Better Assessment Science Integrating point and Nonpoint Sources*), a multipurpose environmental analysis system to help regional, state and local agencies perform watershed- and water quality-based studies, and the Drinking Water Treatability Database, a publically available, interactive database. In addition to developing tools, the SSWR Research Program performs a variety of communication and outreach activities, including webinars and workshops. The program is interested in feedback so that it can improve its activities.

In response to a question from Beth, Jeff Frithsen explained that the SSWR webinars have a listserv and a master email list that includes all of ORD.

Neil asked how pervasive tool use is in states with EPA-delegated authority. Jeff Frithsen used CADDIS as an example, explaining that some states have adopted EPA's Stressor Identification Guidance in addition to two approaches promoted by EPA: state-based monitoring programs and the use of robust ecological indicators. State reporting requirements have improved over time, with CADDIS providing information about designated use results. Some states have adopted the CADDIS approach in their regulations.

David Charters would like the TSC to connect with ORD's communication group. Jeff Frithsen explained that each research program contributes to the newsletter produced by the ORD communications team; the newsletter disseminates information about available and forthcoming tools and research. The SSWR Research Program would like to engage with the TSC early and often during the research process. David Charters said that the TSC could help ORD to develop a tribal communication strategy.

Assessment of the Potential Impacts of Hydraulic Fracturing (Hydrofracking) for Oil and Gas on Drinking Water Resources

Jeff Frithsen explained that EPA launched a study in 2010 to determine the relationship between hydrofracking and drinking water. The study has produced a 2011 study plan, a 2012 progress report, 12 technical reports, 13 journal publications, and the external review draft of the *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources* ("Draft HF Assessment Report"). Products can be found at www.epa.gov/hfstudy. The Draft HF Assessment Report is a state-of-the-science integration and synthesis of information concerning impacts on drinking water resources; it is not a human health, exposure or risk assessment, nor is it designed to inform specific policy decisions or identify best management practices.

Hydrofracking is a technique to increase oil and gas production from rock formations in which fluids are injected under pressures great enough to fracture the formations; oil and gas flow through the fractures

and up the production well to the surface. The study and the assessment were organized to follow the water used in the hydrofracking water cycle, which consists of water acquisition, chemical mixing, well injection, flowback and produced water, and wastewater treatment and waste disposal. The assessment noted that spills of hydrofracking fluids and produced waters have occurred; when spills occur, they can and have reached drinking water resources through multiple pathways. The total number and frequency of spills resulting from hydrofracking activities are unknown at the national level. Most of the large volume of hydrofracking wastewater is disposed of using underground injection control (UIC) wells. UIC disposal and wastewater reuse vary geographically. Of the 1,173 chemicals reportedly used in hydrofracking fluids or detected in flowback and produced water, only 147 have human oral toxicity reference values. The absence of toxicity reference values limits the ability to conduct future site-specific exposure and risk assessments.

The Draft HF Assessment Report Assessment identified existing and potential mechanisms and impacts to drinking water resources as a result of hydrofracking activities. These mechanisms include water withdrawals in areas with low water availability, spills of hydrofracking fluids and flowback/produced water, hydrofracking conducted directly in formations containing drinking water resources, well-integrity failures, subsurface migration of gases and liquids, and inadequately treated wastewater. The number of documented impacts to drinking water resources is small relative to the number of fractured wells. Despite vulnerabilities, there is no evidence of widespread, systemic impacts on drinking water resources as a result of hydrofracking activities. Sources of uncertainties in the assessment include the paucity of long-term systematic studies, insufficient data available to characterize well integrity over time, and the inaccessibility of some information on hydrofracking activities and potential impacts. The next step is for EPA's Science Advisory Board (SAB) to review the Draft HF Assessment Report via an open public process. The Agency will use comments from the SAB and the public to revise and finalize the report.

Karen Hamernik noted that human oral toxicity values depend on statutes. Jeff Frithsen agreed, noting that the assessment defaulted to reference doses, but many sources were examined.

Mike objected to characterizing impacts from hydrofracking as "small" compared to the overall presence because even one incident of an aquifer being contaminated is too much. The cleanup of even one aquifer is an enormous effort. Jeff Frithsen explained that the report was a science report versus a policy report, so that type of assessment was outside of the scope of the report.

Curtis wondered why companies are not required to disclose the chemicals that they use in their hydrofracking operations. Knowledge about these chemicals could inform exposure and risk assessments. Native people are very concerned about this. Jeff Frithsen responded that industry has reported that it is looking for ways to use "greener" chemicals. The data, however, are incomplete, so it is difficult to determine whether this is an actual trend. Chemical disclosures, nonetheless, have been increasing.

Denise said she would like EPA to be more proactive from a regulatory standpoint and institute statutes. More studies are needed sooner rather than later. If dischargers are not required to obtain permits, they should be. Jeff Frithsen responded that, in terms of being proactive, EPA is limited by resources. Some discharge methods require permits, which are provided at the state level.

Tribal Children's Health Priorities

Ruth Etzel, Director, EPA Office of Children's Health Protection, Washington, D.C.

Ruth Etzel provided information about her background with Alaska Native mentors, who taught her five important lessons:

1. Some cultures place an incredible value in children.
2. Self-determination is incredibly important.

3. Historical trauma is an important factor that affects children.
4. Children must be involved in STEM education early in life.
5. TEK is important.

She asked the TSC Tribal Representative from each region to share the most important children's health concerns of his or her region.

- Jeff Mears (R5 Tribal Representative): He agreed that self-determination is important, and tribes should be provided with tools to perform their own research rather than allowing EPA to perform it for them. Tribes also should hire their own service providers; this simple distinction will inspire and engage tribal youth, allowing tribal children to see the various opportunities available to them. For example, Oneida children see Oneida dentists and doctors, which can be inspiring. He added that tribes are not taking care of their children as they should be, as evidenced by gangs, suicide rates, obesity and drugs.
- Carley (R9 Tribal Representative): Her tribe has seen a significant influx of heroin and other drugs and an increase in cluster suicides that affect tribal youths. Drinking water issues range from drought to *Giardia* infection during the rainy season. Because of the remote location of tribal lands, it is difficult to keep a doctor. Diabetes, obesity and commodity foods are problems for tribal children.
- Mike (R8 Tribal Representative): Children need discipline, but discipline has negative connotations in today's society. Parents must be taught parenting skills and encourage their children to be involved with community gardens and other positive activities. It is important to introduce tribal youth to environmental programs early to inspire them.
- Denise (R7 Tribal Representative): Parenting skills are important, as is the home environment. Children are more susceptible to the increased drug use found in schools without a solid foundation that begins at home. There is a push for children to leave the reservation at a young age to pursue opportunities, but Native children need to remain with their Native families.
- Curtis (R6 Tribal Representative): Social eating and obesity are his concern. His tribe is seeing diabetes in children as young as 5 years. He also is concerned about indoor air quality, asthma, and mold and pesticide exposure.
- Neil (R2 Tribal Representative): Drugs, gangs and children's health problems concern him. He would like the TSC to fund or establish a mechanism to find funding for STEM education and internships. He would like to see a collaboration with Mike's tribal children's program and/or similar programs that expose children to community gardens, environmental programs and other activities that show the youths what the reservation could look like in the future. The loss of indigenous language is part of the challenge. Learning his native language was transformative for him because of the descriptive terms that simply are not part of the English language; his tribal language is based on relationships with the environment rather than on the environment as a resource to be exploited.
- Kelly (R10 Tribal Representative): Children and elders are most important to his tribe. Agricultural pesticide exposure has been a problem, but a more significant problem is in regard to teaching and learning. Accountability compounds this problem. Children need to be stimulated early so that they are interested in education. He is envious of the Oneida, who seem to be doing well in training members. Youth in his tribe are not interested in pursuing education, so he would like to stimulate an interest in education for youth in his tribe. Also, risk scenarios specific to tribal children are needed.

Ted provided information about the tribal youth curriculum he helped to develop. The curriculum is available online, on a USB drive or in hard-copy format. Anyone using the curriculum can be ready to use any of the nine topics covered (e.g., water, sun safety, sustainable foods/community gardens) within 10 minutes. The curriculum is very interactive and can be taken home and shared with families.

Ruth thanked the Tribal Representatives for sharing their children's health concerns and promised to find tools for the TSC to disseminate to address these important issues. Because children are particularly susceptible to environmental exposures from lead, woodstoves, food and other contaminants that have an array of different effects, there is a need for specialty training for clinicians to understand the specific effects that contaminants produce in children's bodies. As such, her office has established Pediatric Environmental Health Specialty Units around the country.

Jeff Mears explained that his tribe had hosted a food sovereignty summit at which tribal chefs presented passionately about food. After being asked about fry bread, one chef noted that tribes speak of fry bread as if it is a significant part of their history, but it is a recent development as a result of tribal adaptation to commodity foods. Fry bread contributes to obesity, and tribes need to let go of this "tradition" and teach their children to eat better. Ted added that he has a similar experience with traditional soul food, which is a generational curse that is killing African Americans and needs to be let go. Healthy food is a significant component of children's health.

Citizen Science Case Studies

Whitebark Pine Survey and Invasive Species Application: Mike Durglo, Confederated Salish and Kootenai Tribes, Polson, MT

Mike explained that a company called CNO World helped his tribe to develop an app for the tribe's wetland work and non-native species identification. The app allows tribal members or other interested citizens to take pictures of flora and fauna and send them to the tribe for inclusion in a tribal database.

Whitebark pine in the area have been affected by blister rust and pine beetles, which are persisting throughout the year as a result of climate change rather than dying off. Whitebark pine, which help to retain snowpack, are dying as a result of the infestations. The tribe currently is identifying healthy trees and genetically testing their seeds each spring. Interestingly, the tribe has found that trees are families that spread from a grandmother tree. The tribe is in the process of developing an app that allows tribal members and other citizens to take pictures with geolocation information to send to the tribe.

Leech Lake Air Monitoring Project: Kristen Benedict, EPA Office of Air and Radiation, Research Triangle Park, NC; and Brandy Toft, Leech Lake Band of Ojibwe, Cass Lake, MN

Kristen Benedict and Brandy Toft described the Leech Lake air monitoring project, the goal of which is to assist the Leech Lake Band of Ojibwe in understanding local-scale air quality issues and potential differences between local- and regional-scale particulate matter (PM). EPA has lent three PM sensor devices to the tribe to determine potential benefits and limitations of the sensors, examine sensor precision and accuracy, and evaluate spatial gradients in concentrations near PM emission sources. The 4- to 6-month co-location study began in October 2015 after approval of a Category IV QAPP intended for education and outreach initiatives. The study will occur in two phases, with periodic co-location of the sensors with a Federal Reference Method (FRM) monitor and periodic mobile monitoring near local sources to examine the affects of sources on local air quality. The FRM monitor is located in a remote location with no shelter; staff make routine weekly visits to the area to manually download the data from the monitor. EPA is not able to endorse any sensors, but the two sensors selected for the project (RTI MicroPEM, with cost of approximately \$2,900, and AirBeam, with a cost of approximately \$250) have been evaluated by the Agency, and the data are publicly available. The data quality objectives for the

project were developed to determine whether the monitors can work outdoors and throughout the winter with the same precision and accuracy as the FRM monitor.

Although there have been many challenges in implementing this project (e.g., calibration issues, computer connection and timestamp issues, intermittent outages with data loss), each challenge and the resulting lesson learned have been invaluable and an integral part of the process to determine whether these sensors can be used in the field. The next steps are to continue the field deployment of the sensors and collect data until the end of February 2016. The final project report will document the study design, collected data, data analysis results, project challenges and lessons learned. The results of the study are highly anticipated, and the Leech Lake Band of Ojibwe has been fielding a number of questions from other tribes. Results will be presented at the 2016 National Tribal Forum on Air Quality.

Karen asked whether high humidity affects sensor results. Kristen responded that temperature and relative humidity affects characteristics included in the evaluation. Brandy added that the sensors include a humidity correction factor, and one goal is to determine how well this corrects for high humidity.

Tribal Climate Change Principles: Responding to Federal Policies and Actions to Address Climate Change

Kathy Lynn, University of Oregon, Eugene, OR; Bob Gruenig, Tribal Environmental Policy Center, Rio Rancho, NM; Garritt Voggesser, National Wildlife Federation, Denver, CO; and Kyle Powys Whyte, Michigan State University, East Lansing, MI

Kathy Lynn explained that the Pacific Northwest Tribal Climate Change Project is a collaboration of many tribal, academic, federal and other groups. Attention during the past decade has increased regarding the impacts of climate change on indigenous communities. The *2014 National Climate Assessment* includes a dedicated chapter on indigenous peoples, lands and resources. The President's State, Local and Tribal Task Force on Climate Preparedness and Resilience encourages direct pathways for tribes to provide input, knowledge and experiences regarding climate change, but direct action to help tribes build capacity to address climate change is needed. The tribal climate change principles developed by the researchers are intended to guide federal policies and actions to help tribes address climate change. This effort comes from an earlier effort by the National Congress of American Indians (NCAI) to develop principles to address U.S. climate legislation that had not considered tribes nor included tribal input. Through the initial set of principles, the possibility of funding allocations for tribes was bolstered; however, the legislation was not passed. The Affiliated Tribes of Northwest Indians (ATNI) passed a resolution in September 2015 to adopt the tribal climate change principles and forwarded this recommendation to the NCAI.

Kyle Powys Whyte provided an overview of the tribal climate change principles:

Strengthen Tribal Sovereignty in the Climate Change Era

1. Federally recognized tribes and other indigenous peoples and indigenous communities must be partners with full and effective participation in assessing and addressing the problems of climate change at the local, regional, national and international levels and must be accorded at least the status and rights recognized in the *United Nations Declaration on the Rights of Indigenous Peoples* and other international standards relevant to indigenous peoples.
2. Tribes must have fair and equitable representation on all federal climate committees, working groups and initiatives in which states, local governments and other stakeholders are represented.
3. The federal government should establish a high-level interagency tribal government task force to examine and propose solutions to close gaps across the federal agencies' relationships and programs

with tribes and to develop, recommend and implement tribal-specific solutions that enable the agencies to support and foster tribal climate-resilient planning and investment.

Support Tribes Facing Immediate Threats From Climate Change

4. Indigenous peoples must have direct, open access to funding, capacity-building and other technical assistance, with their free, prior and informed consent, to address the immediate and long-term threats from climate change.

Ensure Tribal Access to Climate Change Resources

5. Tribes must have fair and equitable access to federal climate change programs.
6. Tribes must be made eligible for existing and future federal natural resource funding programs for which states are eligible but from which tribes currently are, or might be, excluded.
7. A fair and equitable set-aside of direct monies or allowances must be made available for distribution to tribes through legislation, administrative actions, and existing and future federal natural resource funding programs.

Traditional Knowledges and Climate Change

8. Indigenous traditional knowledges—with the free, prior and informed consent of indigenous peoples—must be acknowledged, respected and promoted in federal policies and programs related to climate change.

Kyle concluded that these principles can empower the ideas explored in the TSC's Climate Change Issue Paper and also the tribal science that is specific to each tribal community as it deals with climate change adaptation and mitigation.

Kathy explained that 29 tribes, approximately one-half of which are located in Alaska, have developed climate change planning documents. During the previous 3 to 4 years, approximately \$20 million has been allocated directly to tribes for climate change planning, most of which is from the Bureau of Indian Affairs (BIA) Tribal Cooperative Landscape Conservation Program grants. A number of potential sources exist to allow tribes to engage in climate change adaptation and mitigation activities, and it is important to monitor and collate this information to make it available to tribes.

Ted noted that many tribes do not have the capacity to compete with professional grant writers to obtain climate change funding and asked how this issue is being addressed. Kathy responded that one effort focuses on changing the timelines of grants so that tribes have enough time to obtain approval from their tribal councils. Kyle added that the group is considering a number of solutions to address this issue and is speaking with federal agencies about how to empower federal staff who are in the position to help tribes be competitive in obtaining funds to build capacity to address climate change in their communities. Many funding programs do not provide support for tribes at the early stages of climate change planning, and the goal is to identify training funds to move tribes past this stage so that they can compete for available funds for later stages.

Curtis noted that many tribes are hesitant to work with the USGS Climate Science Centers because of historical trauma and distrust. Kyle replied that the eighth principle addresses exploitation of tribal knowledge and science; the first principle regarding self-determination serves to highlight this as well.

In response to a comment about federal coordination across agencies to engage with tribes, Garritt Voggesser explained that the envisioned task force could include a core group of tribal leaders from all regions to communicate with representatives from all pertinent federal agencies at once.

Neil asked whether there was recognition in any of the discussions about existing treaty rights and provisions or the potential for new treaties to be developed. He would like tribes to be included in any international treaties developed regarding climate change. Kyle responded that once a group is established that is directed by regional tribal leaders, this idea may be introduced and pursued.

Mike would like the TSC to develop a letter of support for the principles.

Kathy explained that the Pacific Northwest Tribal Climate Change Project has launched an online tribal climate change guide (tribalclimateguide.uoregon.edu), which provides information about available grants, programs, tools and other resources. In response to a question by Tom Baugh regarding how the guide is funded, Kathy explained that financial support was derived from various sources of federal and nongovernmental organization funding.

Jeff Mears indicated that he still was unsure who Kathy and her group represented and which entity had sanctioned the principles that her group had developed. He expressed his concern that placing her presentation on the agenda prior to the federal panel could give these agencies the impression that she is speaking for tribes. He asked whether the group had consulted a steering committee of tribal members to guide the group's actions. Kathy explained that she did not represent any specific tribe, although she coordinates the Pacific Northwest Tribal Climate Change Network. She has worked with Pacific Northwest tribes for the previous 10 years on a range of government-to-government issues and has a long-term personal interest in environmental justice issues. She would like to use the support received from tribes and federal agencies and identify ways federal agencies can meet their trust responsibilities to tribes in terms of climate change. The principles are a product of those who volunteered their time to develop them. She believes that the NCAI and ATNI resolutions carry the principles forward. Carley commented that her tribe has worked with the University of Oregon, and the relationship had been respectful. Eric Wood (USGS) indicated that his agency's Office of Tribal Relations (OTR) supports Kathy's work. Mike expressed his support for the work Kathy performed with his tribe in developing its climate change adaptation plan; he understands Jeff's question because it is important to know the motivation behind the effort.

Denise asked about the source of the climate tools in the online guide. Kathy responded that the climate tools include a broad mix of resources from the Institute for Tribal Environmental Professionals (ITEP), tribes and nontribal organizations. Kathy added that recommendations for relevant tools that are not already included in the database are welcome.

In response to a question from Rachael Novak (BIA), Kathy explained that all funding opportunities listed under the "Funding" tab in the online guide are specific to tribes.

Climate Change Roundtable With Federal Partners

Panel: *Rachael Novak, BIA, Washington, D.C.; Gary Morishima, U.S. Department of the Interior (DOI) Advisory Committee on Climate Change and Natural Resource Science (ACCCNRS), Mercer Island, WA; Scott Aikin, U.S. Fish and Wildlife Service (FWS), Vancouver, WA; Alicia Bell-Sheete, U.S. Forest Service, Washington, D.C.; Chris Swanston, U.S. Forest Service, Houghton, MI; Eric Wood, USGS, Sioux Falls, SD; Linda Belton, NOAA, Washington, D.C.; Andy Miller, EPA ORD Air, Climate and Energy (ACE) Research Program, Research Triangle Park, NC; Stephanie Santell and Felicia Wright, EPA Office of Water (OW), Washington, D.C.*

Moderator: *Mike Durglo, Confederated Salish and Kootenai Tribes, Polson, MT*

Federal panel members provided information about their agencies' climate change activities and efforts that are of interest to tribes.

U.S. Forest Service (Alicia Bell-Sheete and Chris Swanston)

- The agency has a substantial body of TEK work and 40 years of climate change work; U.S. Forest Service began integrating this work with tribes during the past 10 to 15 years.
- The Tribal Climate Change Research Program was established formally in 2010 from previous U.S. Forest Service efforts in climate change and TEK. Through this program, field scientists perform a broad range of research, such as work on culturally significant plants.
- The agency has partnered with the University of Oregon on a Tribal Climate Change Network and with ITEP on a similar program in the southwestern United States.
- U.S. Forest Service has established formal program direction on tribal flagship adaptation partnerships, the overarching goal of which is to integrate the agency's significant body of tribal and climate change work into a cross-boundary effort. A specific goal for 2015 was to establish at least one tribal flagship adaptation partnership in each region.
- The agency does not have traditional, competitive funding programs but instead institutes stewardship contracting and cost-sharing agreements.
- U.S. Forest Service has a tribal engagement roadmap developed by the research department to include tribal participation in developing the agency's research agenda to ensure that tribes' data and research needs are met.
- The Northern Institute of Applied Climate Science, which is funded by U.S. Forest Service and non-U.S. Forest Service organizations, is a cross-boundary institute that works with any entity interested in addressing climate change issues while meeting the specific needs and vulnerabilities of the entity's lands. With permission, the institute shares success stories to help other organizations.
- Under the Cultural and Heritage Cooperation Authority, the U.S. Forest Service has a provision that allows for confidentiality and Freedom of Information Act exemption that other federal agencies do not have.

EPA OW (Stephanie Santell and Felicia Wright)

- In 2010, OW began to develop a climate change strategy to explore tribal concerns and interests, performing a good deal of outreach and consultation with tribes regarding tribal climate change impacts and challenges. One of the five pillars of the completed strategy is to work with tribes to understand their unique climate change issues.

- As a result of tribal requests for climate change funding, the office examined potential funding sources and found that GAP grants can be used for climate change activities. Healthy Watersheds Consortium Grants can be used to protect watersheds from climate change impacts. This grant program will soon release a request for proposals (RFP) to award the \$3.75 million in funds for the next 6 years.
- OW is examining the integration of climate change activities into its Clean Water Act Section 319 grants program. Proposals from tribes for this RFP are due January 15, 2016.
- The office leveraged funding to host workshops aimed at drought concerns; the 14 workshops that have been held in the western United States have helped vulnerable systems to be more resilient to climate change impacts.
- OW is examining tools for utilities to address drinking water, wastewater and stormwater issues, including the Climate Resilience Evaluation and Awareness Tool (CREAT), a risk assessment tool that allows water utilities to evaluate the potential impacts of climate change. The Seminole Tribe of Florida is part of the beta testing for CREAT.
- The new Water Infrastructure and Resiliency Finance Center will distribute funding and technical assistance that tribes can take advantage of for many needs, particularly disaster recovery.
- The Water/Wastewater Agency Response Network enhances preparedness and overall resilience against disasters and promotes effective sharing of resources among utilities; tribal utilities are encouraged to participate in this network.
- OW is considering developing a paper regarding tribal climate change adaption planning, action and opportunities.
 - The purpose of the paper would be to identify approaches tribes have taken to address climate change concerns, with a particular focus on water quality and resources.
 - The paper would be organized with sections on actions completed to date, overarching concerns and vulnerabilities, and examples of successful models.
 - Specific categories would include vulnerability and risk assessment, decision-making tools, adaptation planning and strategies, water quality and quantity concerns, data analysis, modeling, monitoring and assessment, habitat loss, flooding, sea level rise, protection of sensitive species and use of TEK, and wildfires.
 - A key outcome of this paper would be to inspire collaboration and sharing of successful models among tribes to address climate change issues across varied geographies.
 - OW would like TSC input regarding the above categories to ensure that the paper will be effective in meeting its goals.

BIA (Rachael Novak)

- BIA has five to six funding categories, the largest of which supports strategic adaptation plans and vulnerability assessments.
 - Most funding of BIA's Tribal Climate Resilience Program is focused on planning rather than implementation.

- Funding support is available for monitoring for supplemental indicators.
- Travel funding is available to support training opportunities. BIA also will support ITEP for the next 5 years in providing climate change adaptation training.
- Another category supports youth management and research internships and engagement to increase youth involvement in climate change adaptation.
- BIA understands that tribes have different capacities and will take this into account for future competitive funding opportunities.
- Because these are “638” funds, they can be used by tribes to leverage additional funding (i.e., they can be used as a match for funding sources requiring a match).
- BIA coordinates with other federal agencies to streamline and collate relevant climate change information in one central location.
- BIA geospatial specialists can provide direct technical services to tribes.
- BIA is establishing five tribal climate science liaisons to coordinate with the USGS Climate Science Centers; these liaisons primarily will be involved with climate extension services for tribes as well as research.

USGS (Eric Wood)

- The USGS is not a traditional funding source, particularly in terms of tribal climate change impacts. Rather, the agency cost-shares with other entities, such as EPA, and provides technical support.
- Monique Fordham, in the USGS OTR, is the agency’s National Tribal Liaison. The agency also has geographic and mission area liaisons to tribes.
- The Climate and Land Use Change Mission Area (known as CLU), and to a lesser extent the OTR, are responsible for the majority of tribal climate change activities that do not fall under the Climate Science Centers. Discretionary funds for USGS staff/scientists to work with tribes are available.
- The Water Mission Area has been working with tribes since the establishment of the USGS.
- USGS integrated projects allow scientists to apply their expertise to major issues of a tribal nature (e.g., the tribal component of Hurricane Sandy reconstruction).
- A significant portion of USGS funding for tribal climate change activities comes through the Climate Science Center mechanism, which is relatively new. There had been backlash because of the lack of funding for tribal activities during the initial setup of the centers. Although the centers were not designed specifically to work in Indian Country, progress in this area has been made since their inception. It is important to ensure that the relationships between the centers and Indian Country that have been built are not soured because of growing pains.

FWS (Scott Aiken)

- FWS began examining climate change impacts in 1999, and in 2006 began a deeper discussion regarding climate change. The strategy developed between 2008 and 2010 (*Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change*; referred to as “Climate

Change Strategy”) has served as a guide on how to apply FWS management and statutes. Landscape Conservation Cooperatives, which are intended to serve as funding vehicles, grew from this strategy.

- FWS has been tasked with addressing, from a habitat perspective, climate change impacts and how tribal, state and federal governments can coordinate on these issues.
- One of the goals of the Climate Change Strategy that feeds into the agency’s soon-to-be-released Native American policy is to engage and collaborate with tribes about common issues. After its expected release in January 2016, FWS will begin earnestly engaging in climate change discussions with tribes.
- An overarching goal is to implement true management from a collaborative standpoint between the federal government, states and tribes that is novel and effective. FWS would like TSC input on how to achieve this goal.

DOI ACCCNRS (Gary Morishima)

- The DOI ACCCNRS reports to the U.S. Secretary of the Interior, providing advice about the Climate Science Centers and the USGS National Climate Change and Wildlife Science Center.
- In July 2015, the committee released its first report, which is focused on actionable science. Two papers (a climate change and indigenous peoples primer and TEK guidelines) from the Tribal and Indigenous Peoples Matters Workgroup were cited in the report.
- Climate change is a culturally, socially and environmentally cross-cutting issue, and the committee attempts to address climate change in a holistic manner while dealing with a fragmented federal government.

NOAA (Linda Belton)

- NOAA places an emphasis on “environmental intelligence,” ensuring that decision makers—including tribal governments—have the right tools and data to make decisions regarding resilience.
- NOAA works with tribal colleges and universities and tribal governments on climate change research and how climate change affects water resources.
- The agency has provided technical assistance for the Tribal Coastal Resiliency Act, a bill introduced in Congress to amend the Coastal Zone Management Act to provide funding for coastal tribes that have had to move inland as a result of sea level rise. The legislation has received bipartisan support.
- NOAA works with fisheries, particularly in Alaska and the Pacific Northwest, on climate change issues related to fish populations.
- NOAA is working to ensure that Alaska villages have the current information for their climate change planning.

EPA ORD ACE Research Program (Andy Miller)

- How to best connect relevant science to end users, particularly how to connect the science to the specific needs of tribes, is a critical question for all agencies.

- The research program is soliciting input regarding how to incorporate TEK and respect cultural heritage into its research agenda.
- The program focuses on understanding climate impacts, vulnerabilities and adaptation and how they affect air (including indoor air) and water quality and aquatic ecosystems. A number of past and current studies address these vulnerabilities and impacts in Indian Country (e.g., coal fire stoves in the Navajo Nation).
- ACE also is involved in the Local Environmental Observer Network and in the area of environmental justice, recognizing that tribal communities are particularly vulnerable to climate change. The key goal is to determine how Agency actions affect sustainability.
- The research program also actively develops tools, such as T-FERST, that can be of use to tribes. In addition, the broader applications and tools that the program develops can be applicable in a tribal context.
- The ACE Research Program is seeking input regarding how to connect science to tribes, better inform them about ACE science, and overcome challenges that disconnect ACE science from tribes.

Following the presentations, the TSC members engaged in a discussion and question-and-answer period with the panel members.

Mike is interested in the Tribal Caucus developing a clearinghouse for climate change information.

Curtis provided the TSC members with information about the Redstone Statement, which was the result of the International Summit on Indigenous Environmental Philosophy hosted by the Kiowa Tribe of Oklahoma. TSC members were provided with a hard copy of the statement, which can be found online at webarchive.library.unt.edu/unt/indigenousenvirosummit10/20120220212925/http://indigenousenvirosummit10.unt.edu.

Lon referenced the paper “Fostering Tribal Engagement in Climate Science Centers and Landscape Conservation Cooperatives” written by several members of the panel and wondered whether case studies that highlight the developed principles and how tribal interactions have worked in the Pacific Northwest should be pursued. Alicia Bell-Sheetter said that case studies are being collected, and they will be included in the interagency portal once it is developed.

Bob Hillger asked whether the federal agencies had established a community of practice (CoP). Alicia responded that a CoP exists for natural resource agencies that had started as an interagency land management adaptation group. The CoP members are very science oriented. A different CoP focused on climate includes EPA. A tribal CoP meets informally each month. Scott Aiken said that these connections have allowed the sharing of pertinent information and knowledge, which has been beneficial in the field. For tribes, a CoP is particularly beneficial because of the fractured nature of the federal government. Alicia added that the U.S. Forest Service international program works with indigenous peoples in other countries.

Neil commented that the tribes in Region 2 have a different perspective, as federal lands and programs are rare in the region. As a result, tribes must deal with states to address climate change and build resilience, and the relationship can be contentious because the tribes’ context for land use is based on treaties. The tribes must constantly invoke treaty rights and responsibilities, which the states do not appear to understand, respect or recognize. He asked federal agencies about their practical experiences in dealing with state agencies about these issues. Gary Morishima responded that there are a number of activities in this area. An initiative in the western United States (Treaty Rights At Risk) attempts to highlight that

federal agencies—acting within their own authorities, missions and responsibilities—often work at cross purposes, to the detriment of ecological functions, processes and services that tribes need to maintain their lifestyles and cultural values. A meeting was taking place that day in which a request was being made to assign a “czar” to take control of the fragmented jurisdiction. Dealing with states introduces additional issues, as they do not always recognize that tribes must be dealt with as sovereign entities. In response, an effort has been made to stress the obligations and responsibilities of the United States to recognize and honor the treaties, which are protected by the U.S. Constitution regardless of state laws. Scott added that states are protective of FWS Section 6 funding; this funding is based on hunting and fishing taxes and fees and is ultimately redistributed to states for management of natural resources. Tribes should be more present at Association of Fish and Wildlife Agencies meetings to display a sovereign presence and highlight the vitality of tribal natural resource management. Felicia Wright explained that EPA is developing a new policy to recognize tribal treaty rights in its actions. Tribal consultation about this policy, in which tribes expressed strong support, recently concluded.

Neil stated that linguistics is a powerful tool for climate change adaptation and mitigation, and he encouraged scientists to learn and understand the local indigenous languages, which provide a great deal of insight into the environment and climate change.

Curtis and Dave Jewett thanked the federal panel members for their participation and recessed the meeting at 4:30 p.m.

Thursday, December 3, 2015

Theme: Taking Action and Moving Forward

Develop TSC Action Items With Timeframes/Deadlines

The TSC discussed ideas to move forward, focusing on communication. The Council synthesized its discussion as follows:

- The contractor will develop an official PowerPoint presentation for TSC members to use for report-outs to EPA senior management and RTOCs.
- The TSC will resurrect the newsletter to disseminate pertinent information to tribes. The TSC Newsletter Working Group will include the Co-Chairs, Ted, Beth, Kelly and Carley. Meetings will begin in January 2016.
- The TSC will develop a plan to make monthly calls more engaging and ensure that they provide information useful to tribes. The TSC Monthly Call Working Group will include the Co-Chairs, Patti, Mya Sjogren, Tom, Jeff Mears and Kathy Mayo.
- The TSC should explore whether resources can be obtained to allow researchers with pertinent information for tribes to present at RTOC meetings.
- The TSC could develop webinars to explore topic areas and ORD research programs, with the goal of harmonizing topics with tribal needs and interests.
- One-pagers describing presentations about tools and research could be developed and archived for later use.
- The TSC should foster relationships with other EPA-Tribal Partnership Groups and the NTOC.

- The TSC should explore the creation of a clearinghouse that includes contacts for topics of tribal interest.
- With contractor help, the Tribal Caucus should develop a website to disseminate information that is not subject to EPA's stringent publication rules.
- TSC EPA Representatives should develop a greater understanding of RTOC organization and procedures, and the RTOC meeting calendar should be publicized among the TSC members.

The TSC members suggested the following locations for the TSC Spring 2015 Business Meeting:

- Santa Fe, New Mexico
- Anchorage, Alaska (Dave Jewett will determine regional travel costs for this location.)
- Polson, Montana

The TSC recognized 11-year member Denise Jensen for her service with a thank-you ceremony and plaque presentation.

The meeting was adjourned at 11:47 a.m.

TSC Action Items

- ✧ The TSC will resurrect the newsletter to disseminate pertinent information to tribes.
- ✧ Curtis, Dave Jewett, Ted, Beth, Kelly and Carley will serve on the TSC Newsletter Working Group.
- ✧ Monica will schedule the first meeting of the TSC Newsletter Working Group for January 2016 and will send an invitation to the Working Group members.
- ✧ The TSC will develop a plan to make monthly calls more engaging and ensure that they provide information useful to tribes.
- ✧ Curtis, Dave Jewett, Patti, Mya Sjogren, Tom, Jeff Mears and Kathy Mayo will serve on the TSC Monthly Call Working Group.
- ✧ Monica will schedule the first meeting of the TSC Monthly Call Working Group for January 2016 and will send an invitation to the Working Group members.
- ✧ Dave Jewett will determine regional travel costs for meeting in Anchorage, Alaska.

**National EPA-Tribal Science Council (TSC) Fall 2015 Face-to-Face Meeting
PARTICIPANTS LIST**

Curtis Munoz
TSC Tribal Co-Chair
Kiowa Tribe (Region 6)

Dave Jewett
TSC EPA Co-Chair
U.S. Environmental Protection Agency
Office of Research and Development

Scott Aiken
National Native American Liaison
U.S. Fish and Wildlife Service

Ken Bailey
U.S. Environmental Protection Agency

Thomas (Tom) Baugh
U.S. Environmental Protection Agency
Region 4

Alicia Bell-Sheeter
U.S. Forest Service

Linda Belton
National Oceanic Atmospheric Administration

Kristen Benedict (via teleconference)
U.S. Environmental Protection Agency

Jay Benforado
U.S. Environmental Protection Agency
Office of Research and Development

David Charters
U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response

Destinee Cooper (via teleconference)
U.S. Environmental Protection Agency
Region 9

Ted Coopwood
U.S. Environmental Protection Agency
Office of Children's Health Protection

Mike Durglo
Confederated Salish & Kootenai Tribes of the
Flathead Reservation (Region 8)

Ruth Etzel
U.S. Environmental Protection Agency
Office of Children's Health Protection

Jeff Frithsen
U.S. Environmental Protection Agency
Office of Research and Development

Bob Gruenig
Tribal Environmental Policy Center

Karen Gude
U.S. Environmental Protection Agency
Office of Water

Karen Hamernik
U.S. Environmental Protection Agency
Office of Chemical Safety and Pollution
Prevention

Fred Hauchman
U.S. Environmental Protection Agency
Office of Research and Development

Amanda Hauff
U.S. Environmental Protection Agency
Office of Chemical Safety and Pollution
Prevention

Robert (Bob) Hillger
U.S. Environmental Protection Agency
Region 2

Bart Hoskins
U.S. Environmental Protection Agency
Region 1

Orville Huntington
Alaska Federation of Natives (Region 10)

Elizabeth (Beth) Jackson
U.S. Environmental Protection Agency
Office of Environmental Information

Denise Jensen
Winnebago Tribe of Nebraska (Region 7)

Robert Kavlock
U.S. Environmental Protection Agency
Office of Research and Development

Lon Kissinger
U.S. Environmental Protection Agency
Region 10

Chris Koepfel
U.S. Forest Service

Kathy Lynn
University of Oregon

Kathleen (Kathy) Mayo (via teleconference)
U.S. Environmental Protection Agency
Region 5

John McKernan
U.S. Environmental Protection Agency
Office of Research and Development

Cynthia McOliver
U.S. Environmental Protection Agency
Office of Research and Development

Jeff Mears
Oneida Tribe of Indians of Wisconsin (Region 5)

Andy Miller (via teleconference)
U.S. Environmental Protection Agency
Office of Research and Development

Gary Morishima
U.S. Department of the Interior Advisory
Committee on Climate Change and Natural
Resource Science

Rachael Novak
Bureau of Indian Affairs

Neil Patterson
Haudenosaunee Environmental Task Force
Community (Region 2)

Mary Powell
U.S. Environmental Protection Agency
Office of International and Tribal Affairs
American Indian Environmental Office

Monica Rodia
TSC Executive Secretary
U.S. Environmental Protection Agency
Office of Research and Development

Stephanie Santell
U.S. Environmental Protection Agency
Office of Water

Mya Sjogren
U.S. Environmental Protection Agency
Office of Research and Development

Chris Swanston
U.S. Forest Service

Kai Tang
U.S. Environmental Protection Agency
Region 2

Amber Tilley (via teleconference)
U.S. Environmental Protection Agency
Region 7

Brandy Toft (via teleconference)
Leech Lake Band of Ojibwe

Patti Tyler
U.S. Environmental Protection Agency
Region 8

Garritt Voggeser
National Wildlife Federation

Ed Washburn
U.S. Environmental Protection Agency
Office of Research and Development

Kyle White
Michigan State University

Carley Whitecrane
Karuk Tribe (Region 9)

Chris Whitehead
Sitka Tribe of Alaska

Eric Wood
U.S. Geological Survey

Felicia Wright
U.S. Environmental Protection Agency
Office of Water

Kelly Wright
Shoshone-Bannock Tribes (Region 10)

Contractor Support

Mary Allen
The Scientific Consulting Group, Inc.

Kristen LeBaron
The Scientific Consulting Group, Inc.