# National Advisory Council for Environmental Policy and Technology (NACEPT) Meeting

**North Carolina Museum of Natural Sciences, Nature Research Center**
**William G. Ross, Jr. Environmental Conference Center, Fourth Floor**
**Raleigh, North Carolina**

**May 10 – 11, 2017**

**MEETING SUMMARY**

***Wednesday, May 10, 2017***

**Welcome, Introductions and Overview of the Agenda**
*Eugene Green, Designated Federal Officer (DFO) for the NACEPT, Federal Advisory Committee Management Division (FACMD), Office of Administration and Resources Management (OARM), U.S. Environmental Protection Agency (EPA); William Ross, Jr., NACEPT Chair, Council Member, Gillings School of Global Public Health Advisory Council, University of North Carolina at Chapel Hill*

Mr. Eugene Green (NACEPT DFO, FACMD, OARM, EPA) welcomed the NACEPT members and other attendees to the meeting. A list of participants is provided in Appendix A. He explained that the meeting would focus on two major topics: (1) NACEPT's next report on citizen science with the discussion building on the ideas suggested during the Council's February 2017 administrative teleconference and (2) approval of the *Final Report of the Assumable Waters Subcommittee*.

Mr. William Ross, Jr. (NACEPT Chair, University of North Carolina at Chapel Hill) welcomed the participants to North Carolina and asked them to introduce themselves. He explained that three members had rotated off of the Council: Mr. Howard Learner (former NACEPT Vice Chair, Environmental Law and Policy Center), Dr. Ronald Meissen (Baxter International, Inc.), and Dr. Olufemi Osidele (Southwest Research Institute). Ms. Shannon Dosemagen (Public Laboratory for Open Technology and Science [Public Lab]) currently is acting as NACEPT Vice Chair.

Dr. Alison Parker (Office of Research and Development [ORD], EPA) presented an overview of the agenda, provided as Appendix B, and outlined the goals of the meeting, which are to form relationships, experience citizen science occurring in North Carolina, become familiar with new and exciting citizen science work, and discuss the Council's next report on citizen science.

The official certification of the minutes by the Chair is included as Appendix C.

NACEPT members were provided with the *Final Report of the Assumable Waters Subcommittee* (www.epa.gov/sites/production/files/2017-05/documents/awsubcommitteefinaldraftreport4-30-17.pdf) and the Assumable Waters Subcommittee PowerPoint Presentation (www.epa.gov/sites/production/files/2017-05/documents/awsubnaceptpresent5-final.pdf).

**Opening Remarks**
*Jason Cryan, Deputy Director and Chief of Research and Collections, North Carolina Museum of Natural Sciences and Tom Earnhardt, Chair, North Carolina State Museum of Natural Sciences Museum Advisory Commission*

Dr. Jason Cryan (North Carolina Museum of Natural Sciences) welcomed the participants to North Carolina and to the museum. The North Carolina Museum of Natural Sciences is a true science museum but also a public science institution that performs a good deal of education and outreach. The museum's goal is to bring science to the public in a relevant way and increase the public's literacy and appreciation of science, which dovetails nicely with NACEPT's focus on citizen science. The museum emphasizes the importance of citizen science and creates many different opportunities for the public to engage in scientific research. The North Carolina Museum of Natural Sciences will host the Citizen Science Association's CitSci2019 Conference in 2019.

Mr. Tom Earnhardt (North Carolina Museum Advisory Commission) welcomed the participants to North Carolina and explained that the state has incredible habitat differentiation, which results in diverse species residing within the state. Recalling a time when the state's many streams and rivers were affected by the textile and paper mills, he expressed gratitude for the impact of the 1970 enactment of the National Environmental Policy Act. NACEPT has been providing advice to EPA since 1988, and he appreciated both NACEPT's and EPA's efforts to effectively address the issues of pollution and enhance natural resources and quality of life. The United States is a cleaner place because of these efforts. He closed with an anecdotal story that demonstrated how environmental injustice is a bipartisan issue.

**Clips From *The Crowd and the Cloud***

Mr. Jay Benforado (ORD, EPA) thanked the Council for its work on the first citizen science report, noting that it has received positive attention throughout the Agency. The first report discussed the "what and why" of citizen science; the second report will focus on the "how" of implementation. He suggested that NACEPT assist EPA in considering the implementation issues.

Mr. James Joerke (Johnson County [Kansas] Department of Health and Environment) noted that the political context has changed significantly since the Council produced its first report. NACEPT will need to address this in developing its second report. Mr. Benforado responded that EPA has only one political appointee from the new administration; he approved this meeting so that the Council could continue its work on citizen science. Noting that citizen science must stand on its own as an important tool, Mr. Benforado said he would like the next report to focus on partnerships and other groups that can help EPA address environmental protection and citizen science implementation.

Dr. Giovanna Di Chiro (Nuestras Raíces, Inc.) mentioned that the EPA Administrator has provided NACEPT's charges in the past. Mr. Benforado explained that the Council is still working on the initial citizen science charge, which is to provide advice on how the Agency can use citizen science to perform its work.

Dr. Parker presented several relevant clips from *The Crowd and the Cloud* (crowdandcloud.org), a four-episode PBS television documentary series that showcases the power of citizen science in the digital age.

**Collaboration and Networks in Citizen Science Presentations and Panel Discussion**

Citizen Science and Human and Environmental Health: Missing the Crowd
*Caren Cooper, Assistant Director, Biodiversity Lab, North Carolina Museum of Natural Sciences*

Dr. Caren Cooper (North Carolina Museum of Natural Sciences) explained that she coarsely divides citizen science into two categories: community-based and crowd-based, each of which varies in characteristics along a continuum that moves from science performed for regulatory purposes to science

performed to obtain general knowledge. Community-based citizen science often emerges in response to problems (e.g., Tonawanda Coke Air Modeling). EPA is responsive in these instances but needs to be more proactive, and crowd-based citizen science can help the Agency accomplish this. Crowd sourcing can provide baseline data, reference communities, trained volunteers and infrastructure that can be shared, and having these in place helps community-based citizen science when it emerges.

Currently, a network of individuals is "taking the pulse of the planet" on smartphones. The role of public science is to build these networks and make sense of the collected data, ensuring that the data are useful. The next generation of scientists is being trained to think about science in this manner. This next generation also is concerned with data quality, which can be managed with consensus and repeated samples. Other areas to be considered are training and testing, sensors and calibration, filtering and flagging, modeling, followup and expert review, and a reputation system. Dr. Cooper provided examples of citizen science efforts using digital vouchers (iNaturalist) and specimen vouchers (Sparrow Swap). Opportunities for citizen science participation include smart cities, the Internet of Things and self-tracking. Dr. Cooper also noted that it is important to consider social-ecological systems because to understand the ecology of an area, the human interactions within the area also must be known; for example, some stressors affect human well-being in a subjective rather than objective manner.

Dr. Cooper asked the NACEPT members to consider the following discussion points: Can large-scale crowd-based citizen science be designed as scaffolding and a foundation to proactively support local-scale community-based citizen science? What emerging areas of environmental monitoring are not yet participatory? What needs to change within scientific and government institutions so that crowd-based data can be accepted as fit for multiple uses in environmental health research?

Mr. Robert Kerr (Pure Strategies, Inc.) noted that participatory data are being gathered within the Internet of Things. Ms. Darlene Cavalier (Arizona State University) added that devices are able to gather a great deal of useful information, and citizen science is beginning to teach the people who are collecting these data. Mr. David Rejeski (Environmental Law Institute) commented on the need to determine sources from which data may be harvested that have not been previously identified.

Community-Agency Collaboration Opportunities: Supporting and Integrating Community Science for the Public Good
*Gretchen Gehrke, Data Quality and Advocacy Manager, Public Lab*

Dr. Gretchen Gehrke (Public Lab) commented that community science and action can be highly relevant in the environmental protection landscape. She explained that Public Lab is an open community that works with groups to perform low-cost environmental monitoring to discover and document what is happening in their local environment so that any issues can be addressed. It is important to make science relevant to the community. She described two broad and key barriers to the utilization of community science as it currently relates to EPA procedures and policies: (1) no established pathway exists for integration and utilization of community data and (2) the current monitoring focus may be insufficient.

Established parameters, communicable evidence and a trusted relationship are needed for the Agency to be able to respond to community data. Establishing agreements based on years of trust-building relationships has worked well to achieve this. When the public can collect data that are useful to, valued by and responded to by local, state, tribal and federal environmental agencies, then the power of citizen science can be used to create a more inclusive and equitable system in which people can identify and address pertinent issues in their environments. Limited resources (i.e., personnel, time, funding) requires EPA to be creative with its available resources and prioritize partnerships that focus on health and well-being with the goal of allowing the Agency to meet its mission to protect human health and the environment.

A key reason often cited for the lack of a pathway for use of community-collected data is incongruent methods and data quality, but an opportunity exists to use big data to support local indicators. EPA can

assist where the nexus of big data and local data meet. Dr. Gehrke suggested that the Agency expand Water Quality Portal data, assess the relationships between low-cost and easily measurable parameters and toxicants, and support and utilize massive citizen science data collection to build a pathway for community science data. To accomplish this, EPA may need to directly subsidize laboratory analysis costs for the public to utilize state public health laboratories.

In terms of the second barrier, the potential insufficiency of the current monitoring focus, support for community intervention and remediation efforts may be necessary in the United States. Support could include dedicating personnel and funding to investigating and optimizing the effectiveness of various do-it-yourself remediation strategies. If funding and regulations are rolled back, it will be essential to support community capacity to protect health through direct intervention. The future also may lie in "exposome" exploration. The exposome encompasses the totality of human environmental exposures from conception onward and is considered a leading edge of environmental health research. Understanding and documenting personal exposures better through low-cost means could have regulatory implications regarding how compounding factors are regulated.

Dr. Gehrke provided four recommendations for building partnerships and enhancing the relevance of community science to environmental agencies and to community members:

1. Invest in substantial multiparameter and pollutant studies to assess whether indicators common in community science studies can be optimized.
2. Improve access to sample analysis to facilitate information gathering and data integration in the more immediate future.
3. Devote time and resources to supporting community capacity with direct remediation.
4. Look to the future and harness the power of community science to explore the exposome, which has massive public health and environmental regulation implications.

Ms. Erica Bannerman (Prince George's County, Maryland) asked how Public Lab defines the term "community." Dr. Gehrke responded that the definition is fluid. Some communities are location-specific; others are based online.

Community-Owned and Managed Research (COMR): Model for Compliance and Measurable Outcomes
*Omega Wilson, West End Revitalization Association (WERA)*

Mr. Omega Wilson (WERA) described the four model principles of WERA's COMR: (1) funding equity, which includes the fair and direct funding of community groups; (2) management parity, which means that the community group leads or co-leads the research; (3) science for compliance, which results in the legal leverage of data; and (4) careful selection of partners, which also includes discharging any that fail to meet the COMR principles. COMR is a resource for community-based organizations when partnering with university- or federally funded researchers or when challenging government contractors' "community input" results. The community-based participatory research model is not strong enough to leverage compliance and enforcement of public health statutes and violations of civil rights laws. Mr. Wilson provided five examples of successful COMR partnerships in North Carolina, South Carolina, Maryland and Texas, as well as examples of documentation, publications and presentations on the topic.

Mr. Wilson described four "PAIN" (physical, artificial, institutional, noncompliance) barriers that discourage communities from working with local, state, tribal and federal agencies, including EPA: (1) physical barriers, such as lack of water/sewer infrastructure, dead-end streets, and industrial park expansion; (2) artificial barriers, including extraterritorial jurisdiction and city and county lines; (3) institutional barriers, which include racism, inexperience, self-interest and blindly following instructions; and (4) noncompliance barriers, including the lack of enforcement of public health statutes, civil rights, and Title VI and environmental protection laws. Mr. Wilson provided specific examples from 1999 to 2014 of how agencies and personnel intending to be helpful actually created PAIN barriers.

To illustrate why COMR is preferable to community-based participatory research, Mr. Wilson cited a 2007 article that states that, "as illustrated by the COMR model, we must overcome deeply entrenched views and policies that serve to maintain university control of the research enterprise, and we must build the research capacity of community-based organizations" (Seifer SD, Greene-Moton E. 2007. Realizing the promise of community-based participatory research: Community partners get organized! *Progress in Community Health Partnerships: Research, Education and Action* 1(4):291–294). Mr. Wilson commented that EPA and university scientists often wait until problems arise and then conduct studies rather than performing baseline assessments to prevent crisis and human exposures.

Panel Discussion

*Caren Cooper, North Carolina Museum of Natural Sciences; Gretchen Gehrke, Public Lab; and Omega Wilson, WERA*

Dr. Irasema Coronado (University of Texas at El Paso) asked the panel members about who validates and analyzes all of the community-collected data and where the data are stored. Mr. Wilson responded that, for one of his examples, the University of North Carolina (UNC), which is EPA-certified, performed the community water analysis. The samples were validated by UNC. The residents who identified the samples were concerned community members. Dr. Cooper added that many public databases exist to store various types of ecological data, but public databases to store critical data, such as for contaminants, are lacking; shared infrastructure for these critical data is needed, as most databases that store this type of information are proprietary. Dr. Gehrke commented that very basic infrastructure exists (e.g., EPA's STORET database), but public accessibility needs to be fostered. Validation can be built into the database. For example, West Virginia has a good model in which different community groups have different levels of certification that allow different access to the various tiers of the database.

Dr. Emmanual Crisanto Battad Liban (Los Angeles County Metropolitan Transportation Authority) wondered about the role of EPA on a national scale versus local regulations. He asked the panel members how the Agency, if it becomes a facilitator of citizen science, can work with states to meet local and community needs and allow citizen science to become a foundation. Mr. Wilson replied that EPA must develop partnerships with many types of groups and organizations. The key is for communities to see the Agency working with people, groups and other agencies (e.g., Indian Health Service) that support citizen science. Working with state agencies will be important as well. Dr. Cooper added that success would come from partnering with a wide variety of communities and stakeholders to be proactive. The Agency needs to develop a flexible and innovative plan that builds on existing efforts and identifies environmental problems before they escalate. Dr. Gehrke cited the structure of EPA, which can provide base protections that can be enhanced at the local level with citizen science. Communities and local governments can assess the complexities of their specific exposures. Funding is needed for research that allows local governments to enhance their regulations and implement permit limits to be more protective for their unique exposures.

Mr. Donald Trahan (Louisiana Department of Environmental Quality [DEQ]) asked about techniques that could be applied to bridge the gap that exists between industry and communities and build trust between these entities. Mr. Wilson provided the example of communities that file complaints against corporations and then are persecuted as a result. He thought that the overreach of industry into the North Carolina state legislature provides many of the challenges that community groups face. Dr. Gehrke commented that trust building is more complex than data validation, but techniques that could be employed include implementation of validation standards, detection limits and so forth. Common standards for research should be applied to individual, community, local, state and federal data. The study design is key.

Mr. Ross asked each of the panel members to provide closing statements regarding the power of partnerships in relationship to citizen science. Dr. Gehrke stated that the Agency has the potential to be creative in its collaborations and utilize the "strength of many hands" for data gathering and study replication. EPA can use its institutional assets to process data and understand relationships between easily measurable, low-cost parameters and potential toxicants and risk. Integration of these aspects will

allow the Agency to support communities that have concerns and also to use citizen science data to meet its mission. Dr. Cooper commented that it is necessary to move from big data to small data and be proactive rather than reactive. Crowd-sourced data are powerful, and a great deal of flexibility exists to manage data quality issues and data validation. EPA must not overlook the need for large-scale projects, as much can be learned from them. Mr. Wilson noted the need to avoid data that underestimate death and suffering, commonly known as "DUDs data," in the community. Community members are not numbers on a bar graph or pie chart; their problems are personal. Communities want partnerships that provide data that will help the community address its problems and not just be used in an academic manner. EPA must find these types of partners and help them to work with communities.

**Citizen Science at EPA: Operational Issues**
*Chet Wayland, Director, Air Quality Assessment Division, Office of Air Quality Planning and Standards (OAQPS), Office of Air and Radiation (OAR), EPA*

Mr. Chet Wayland (OAQPS, OAR, EPA) explained that sensor technology and use of sensors are growing rapidly. This growth has surprised the Agency, which has not been as nimble in adopting the technologies as staff had hoped. Community groups are replacing old citizen science approaches with newer sensor technology, and independent organizations are deploying sensors in numerous studies in cities across the United States. EPA and state and local air agencies are trying to evaluate the devices and determine how to accurately communicate the data. Recent interest from companies such as Google, IBM and Weather Underground reinforces this increasing demand for sensor data.

Sensors provide many benefits. Sensor measurements can help to fill data gaps across the country and provide much more localized information. They are low cost, fairly easy to deploy, and generally provide real-time information. Furthermore, the market for sensors is wide open. Unfortunately, these devices also have several negative aspects: sensor data quality can be highly suspect, sensors cannot yet accurately measure all pollutants, and sensor developers do not have uniform data standards, which makes data sharing difficult. Little information is available regarding the health effects that coincide with short-term pollutant information. The fact that the market for sensors is wide open also is a negative.

Although the Agency has not defined its specific role with respect to sensors, EPA can provide expertise in some key areas. For example, the Agency could help to ensure that sensors are evaluated to ensure they provide accurate information, help to develop communication tools that developers and others can use to accurately interpret short-term data, encourage the development of common data standards to help facilitate easier data sharing, and accomplish this in an encouraging or voluntary fashion as the Agency does not have specific regulatory authority in this area.

In describing some current Agency efforts, Mr. Wayland reported that EPA and the South Coast Air Management District have performed specific sensor evaluation efforts and are continuing with other evaluations. The Agency also is developing messaging regarding short-term data. EPA and states have created an E-Enterprise Advanced Monitoring Scoping Team (EEAMST) under the collaborative E-Enterprise initiative. The EEAMST endorsed five recommendations and has developed teams to carry out four of the five recommendations. In addition, EPA is working with several groups interested in displaying sensor data and has issued a Smart City Air Challenge to encourage efforts to explore big data from sensors.

Mr. Wayland summarized that EPA is at a pivotal moment in environmental management. Sensors can be a tremendous benefit to better understand environmental issues and can empower communities and citizens to take action where they live. The Agency must understand the current limitations of sensors, work to improve the quality of these devices, and ensure that data from sensors are being communicated accurately. It is a changing world, and the Agency is very encouraged by these technologies while at the same time working hard to ensure that they provide useful information that can help to improve environmental outcomes. The first NACEPT report on citizen science was an excellent summary of all of

these points, and EPA looks forward to continuing to work with different groups in staying current about citizen science and innovative technologies.

*Discussion*

Mr. Rejeski thought that it would be interesting to test a sensor against a network of 20 sensors with machine learning. Such a network can provide a great deal of information, including knowing when a sensor is beginning to fail and should be replaced or reconfigured. He recommended that EPA perform this type of testing. Mr. Wayland commented that Region 4 was attempting to perform such a test.

Mr. Clinton Woods (Association of Air Pollution Control Agencies) asked whether NACEPT should consider parallels with third-party verification in developing its second report. Mr. Wayland responded that EPA's former Environmental Technology Verification Program was cited as being too stringent, and developers stopped submitting their technologies for assessment. The initial step of investigating Federal Equivalent Methods and Federal Reference Methods could lead to the more advanced step of developing a third-party verification program. Mr. Benforado added that EPA had analyzed programs that could serve as models for such a program, but there are issues with funding and other concerns. Perhaps NACEPT could provide an idea of how the Agency could facilitate third-party verification. Mr. Wayland commented that third-party certification is not a novel idea, and NACEPT could explore lessons learned from other programs.

Dr. Liban asked Mr. Wayland what he would like to see in terms of NACEPT's recommendations. Mr. Wayland responded that the Council could provide ideas and recommendations on implementation. It would be helpful for NACEPT to examine the Agency's current areas of focus and determine whether they are appropriate or if EPA needs to make some changes.

Ms. Bannerman asked about the evolution of air monitoring sensors, and Mr. Wayland replied that current sensors are not ready for regulatory air monitoring. It is important to think about a new paradigm because when sensors become good enough, monitoring will change.

A NACEPT member asked whether the European Union was working on the issue of sensors. Mr. Wayland responded that in addition to European countries, China also is exploring this area for the upcoming Beijing Olympics.

Ms. Eunyoung Kim (Synapse International, LLC) would like to see case studies that demonstrate the entire cycle of how EPA will be involved in citizen science so that citizen science data are useful for regulations. Mr. Wayland responded that this is part of the challenge of Agency citizen science implementation. He provided the analogy of a puzzle. EPA has not put all of the pieces together yet to show the whole cycle, but the Agency is working on it.

Mr. Ross asked about the development of better maps, including which entity has developed the best map. Mr. Wayland explained that Google and the Weather Underground have the best maps. The private sector has better resources and skills to be able to present data, and EPA must learn to work with these companies.

**Citizen Science at EPA: Operational Issues—EPA Lightning Talks**
*Tim Barzyk, Research Physical Scientist, National Exposure Research Laboratory (NERL), ORD, EPA; Kristen Benedict, Scientist, OAQPS, OAR, EPA; David Lehmann, Scientist, National Health and Environmental Effects Research Laboratory (NHEERL), ORD, EPA; Ron Williams, Research Chemist, NERL, ORD, EPA; Amanda Kaufman, Physical Scientist, OAQPS, OAR, EPA; Deborah Ortiz, Physical Scientist, Office of Environmental Justice and Sustainability (OEJS), Region 4, EPA*

Several EPA staff members provided 5-minute "lightning" talks about their experience with citizen science at the Agency.

Dr. Tim Barzyk (NERL, ORD, EPA) explained that he views citizen science through the lens of a dragon analogy—get burned or climb onboard and soar. EPA must remember that stakeholders (e.g., state and local governments, industry) have a deep interest in citizen science efforts. EPA also must recognize that sensors can be a powerful tool, and some stakeholders may want to use them in the litigation process. The Agency "wears two hats" and needs to find a way to merge these two hats into one by supporting citizen science with a holistic message within EPA. Understanding the basics of technologies is important so that the Agency can develop a template on how to incorporate new technologies as they are developed; EPA also must acknowledge that it will not be able to keep up with all technologies that are being developed. The Agency also must consider how to develop a defensible research plan that allows individuals to use the best-available information and appropriately analyze, interpret and communicate data. If citizen science measurements are related to regulations, how will this new paradigm affect stakeholders? It will be important to determine the relation of citizen science data to risk-reduction actions and actionable solutions. In addition to guidance regarding technology and research designs, guidance is needed on how to interpret data in a decision-analysis framework that helps to inform decision making.

Ms. Kristen Benedict (OAQPS, OAR, EPA) described EPA work related to the first NACEPT report, including work on consumer-oriented turnkey devices, portable devices for research and screening, and large-scale air monitoring networks. Challenges to implementing citizen science include data quality concerns and how Federal Equivalent Methods, Federal Reference Methods and third-party certifications will complement each other. EPA is developing relationships with nontraditional big data providers, which are moving into the realm of environmental data. The Agency can educate about its own databases and scaling when mapping. The transition of roles will be complicated as people begin to stream environmental data. In moving forward in this area, EPA must recognize that there still is a great deal to learn and more work to be done to ensure data quality initially and over time, establish data standards and common formats, address data interpretation issues, and determine the performance of sensors near sources. Mr. Benforado commented that the term "data utility" is less pejorative than the term "data quality."

Dr. David Lehmann (NHEERL, ORD, EPA) described his work on enhancing declining honey bee populations, which the White House directed EPA and the U.S. Department of Agriculture to address. HiveScience, a citizen science project for beekeepers, is a potential solution to meet the goal of reducing colony losses during winter to less than 15 percent within 10 years. The rationale for the program is that development of low-cost biomarkers of hive health could provide beekeepers with an effective means of monitoring colonies and informing timely decisions regarding possible treatment options. The project recruited and trained citizen scientists (beekeepers) via a project-specific website, which allowed data collection, reporting and sharing. In working on this project, Dr. Lehmann identified several challenges to implementing citizen science projects at EPA. First, the process for developing and launching citizen science projects is not fully developed. Although a desire exists to employ modern technology to engage the public, careful, advanced planning is required to utilize these technologies. Budget instability is another challenge. It is important that Agency scientists looking to engage in citizen science projects work with the Innovation Office, implement early and frequent communication, utilize free citizen science platforms, and plan for operations and maintenance costs. He agreed with many of the recommendations in the first NACEPT report.

Mr. Ron Williams (NERL, ORD, EPA) stated that EPA is a stakeholder in terms of sensor technologies. The Agency uses technologies for discovery, evaluation and integration into the research portfolio. He explained that many of the sensor developers did not understand environmental air quality and the fundamental principles of what they were trying to measure. The Air Sensor Toolbox for Citizen Scientists is where EPA places its research and development findings in evaluating air sensor technologies. Citizen scientists do not need to be professionals, but they must think like professionals. EPA has purposefully used data from lower quality technologies for nonregulatory applications because good quality assurance procedures were in place. EPA is trying to put sensors in the hands of the public through pilot projects and is working to integrate sensors into a wide variety of Agency field research

activities. Mr. Williams concluded by acknowledging that the demand to understand this technology sector is increasing in intensity.

Ms. Amanda Kaufman (OAQPS, OAR, EPA) explained that the Air Sensor Toolbox for Citizen Scientists is a great resource for implementing successful air projects. Following the release of the toolbox, EPA provided community air monitoring training to teach best management practices. Attendees who participated in the training still communicate with EPA scientists and report local project successes using information gained from the training. The Agency also is participating in a community-led sensor collocation project. Project partners were trained, and they placed sensors near federal monitors so that the data points can be compared, calibrated and normalized. Air Sensor Kits have been developed for the classroom because involving kids early in citizen science projects is beneficial.

Ms. Deborah Ortiz (OEJS, Region 4, EPA) highlighted her background and experience in citizen science to illustrate the importance of citizen science. Training students early is key. She noted that a dichotomy exists at EPA; some scientists are interested in engaging in citizen science, whereas others are not. Those who are interested should be supported. Also, EPA will need to collaborate with communities and state agencies to be successful. It is important for the Agency to inspire the next generation of citizen scientists and encourage the integration of citizen science within EPA.

Following the lighting talks, the NACEPT members and EPA personnel met in small groups to discuss important citizen science topics that should be included in the next report. The group identified several key points:

- E-waste is an important area of consideration because technology changes quickly.
- Quality control, central control of knowledge, connections with states, and engaging people and stakeholders are important.
- The citizen science "universe" contains many moving parts. Because local communities can become overwhelmed, EPA could prioritize a few regulatory actions and look at successful partnerships and replicate these successes.
- How data affect individuals must be considered, including how to communicate data in a way and format that people can use. EPA must create a value for citizens.

Mr. Rejeski noted that a great deal of actions can be taken as one moves along the spectrum from regulatory actions toward community engagement and education. Ms. Bridgett Luther (Code Blue Innovations) added that it is important to manage expectations. Individuals will collect data that they expect to be used, and EPA must be clear about how the Agency will use these data, or people will become frustrated. Dr. Coronado commented that those who can interpret the data will have the power, which could be troubling if this power is not used beneficially.

A participant added that in a free enterprise market, possessing and disseminating data could turn into a form of currency. Mr. Kerr agreed that free enterprise is important, and a great deal of opportunities exist for businesses to be encouraged to drive the measurement and monitoring market. The private sector will produce faster results than the government sector.

Mr. Benforado, as he was listening in on the groups, heard conversations about the importance of science, technology, engineering and mathematics (STEM) education and using citizen science to increase the environmental literacy of the American public.

Dr. Coronado wondered about the implication of international relations. Ms. Kim commented that consumerism is the source of the international air problem.

Ms. Benedict asked NACEPT to consider whether there is a role for citizen science in data analytics.

Ms. Cavalier noted that any partnerships that EPA forms with private companies (e.g., Google) must be mutually beneficial (i.e., two-way rather than one-way).

**Public Comments**
*Eugene Green, NACEPT DFO, FACMD, OARM, EPA*

Mr. Green called for public comments; there were none. He reported that he had received one public comment by email, and it has been entered into the public record.

***Final Report of the Assumable Waters Subcommittee***
*Laureen Boles, NACEPT Subcommittee Liaison, New Jersey Environmental Justice Alliance and Patrick Fields, Managing Director, Consensus Building Institute*

Ms. Laureen Boles (NACEPT Subcommittee Liaison, New Jersey Environmental Justice Alliance) explained that the subcommittee had met eight times during the past 2 years and had performed diligent research regarding the intent of the U.S. Congress.

Mr. Patrick Fields (Consensus Building Institute), the neutral facilitator for the Assumable Waters Subcommittee, continued the presentation of the subcommittee's work because the subcommittee's chair, Dr. Barry Rabe (University of Michigan), was unable to attend the NACEPT meeting in person. He explained that the final report provides advice and recommendations to EPA on how to clarify for which waters states and tribes will assume Clean Water Act (CWA) Section 404 permitting responsibilities and for which waters the U.S. Army Corps of Engineers (USACE) will retain permitting authority. CWA Section 404(g) authorizes states and tribes to assume authority to administer 404 programs in some navigable waters and adjacent wetlands with EPA approval. Two states and no tribes have been approved to assume this program; Michigan has administered its program continuously since 1984 and New Jersey since 1994. Confusion about the meaning of Section 404(g)(1) is one of the issues that has prevented other states and tribes from assuming 404 programs.

The subcommittee identified some key considerations:

- Assumption by a state or tribe does not alter CWA jurisdiction over waters of the United States.
- Neither the subcommittee's report nor recommendations are intended to alter in any way the definition or scope of federal jurisdiction.
- The subcommittee's report speaks only to the administrative division of authority under CWA Section 404 between USACE and an approved state or tribe.

The subcommittee also acknowledged that rivers, lakes, streams and other water bodies and their adjacent wetlands are definitively linked legally, hydrologically and by policy; these often are referred to as "waters." The subcommittee chose the terms "waters" and "adjacent wetlands" for the report and recommendations.

Tribes have additional considerations in assuming 404 responsibility. CWA Section 518 authorizes EPA to treat eligible tribes in a manner similar to states, and states generally will not assume authority for administering a 404 program on Indian lands. When a state is applying for assumption, those waters on tribal lands that will be retained by USACE must be specifically addressed in a memorandum of agreement (MOA).

In developing the recommendation, the subcommittee explored three primary topics: (1) the origins, legislative history, and processes of Section 404 state or tribal assumption; (2) the extent of U.S. waters

that may be assumed by an approved state or tribe or retained by USCAE; and (3) the extent of wetlands that also must be retained by USACE following state or tribal assumption. Within the subcommittee, EPA representatives recused themselves from shaping the recommendations because the Agency will be receiving the advice from NACEPT. EPA representatives, however, participated in the discussion, formulation and review of the alternatives and provided technical advice. The U.S. Fish and Wildlife Service participated in the discussions but did not take a position on the final recommendations.

The subcommittee examined three "waters" alternatives on how to clarify those waters for which the USACE will retain permitting authority and those waters that a state or tribe may assume:

- Waters Alternative A—*Case-by-case determination of USACE-retained state- or tribal-assumable waters at the time of program assumption*. This is a "status quo" alternative in which USACE, states and tribes currently struggle to define retained and assumed waters. Because this would not meet the charge of the subcommittee to provide clear, easily understood and implementable recommendations, this alternative was not put forward.

- Waters Alternative B—*Primary dependence on Rivers and Harbors Appropriation Act of 1899 (commonly known as the Rivers and Harbors Act or RHA) Section 10 lists of navigable waters to define USACE-retained waters*. USACE districts maintain lists of USACE-regulated waters for every state except Hawaii. When a state or tribe initiates the assumption process, the relevant USACE district will use the appropriate Section 10 list to develop a list of retained waters by deleting waters included on the Section 10 list based on historical use only, adding tribal waters in the case of state assumption, and identifying and adding waters that appropriately belong on the Section 10 list. USACE can add waters if it identifies waters that are eligible for inclusion but are not on the list at the time of assumption, following some future alteration in the physical condition of a water body such that it would be regulated under Section 10, or following consideration of the RHA case law and relevant factors set forth in Section 10 regulations.

- Waters Alternative C—*Use of RHA Section 10 waters plus 33 CFR 328.3(a)(1) traditionally navigable waters defined as retained waters*. For purposes of state and tribal assumption, the list of navigable waters that would be retained by USACE would include all Section 10 list waters and any waters for which stand-alone or traditionally navigable waters determinations have been made previously. The appropriate USACE district would evaluate all of its completed case-specific traditionally navigable waters determinations to establish whether addition of the water body to the list is warranted under a stand-alone determination. Rare occasions may occur that compel USACE to make a new or revised determination after it has provided the list to a state or tribe.

The subcommittee did not reach agreement on a single recommendation; therefore, it put forth a majority recommendation (Waters Alternative B) and a USACE alternate recommendation (Waters Alternative C). The majority of the subcommittee members thought that only RHA Section 10 waters were what Congress intended to be retained by USACE.

The subcommittee used three criteria to assess the quality of its recommendations. In terms of criterion 1 (provides clarity and is easily understood and implementable), Waters Alternative B, use of Section 10 lists only to define USACE-retained waters, is practical. The recommended alternative provides a clearly defined set of USACE-retained waters and reduces confusion and prolonged negotiations. In terms of criterion 2 (consistent with the CWA), the majority recommendation is consistent with CWA Section 404(g) based on the plain language and legislative history. This history led the majority of subcommittee members to conclude that the navigable waters to be retained by USACE were intended to be the same waters regulated by the RHA. In terms of criterion 3 (comports with congressional intent that qualified states assume responsibility for the Section 404 regulatory program), the majority recommendation makes it easier for states and tribes to understand the costs associated with assuming the program, which in turn

makes it easier for a state or tribe to assess its ability to assume and administer a CWA 404 permitting program.

USACE does not think that there should be a distinction between different uses of the term "navigable waters" under different sections of the statute, which the Corps believes is consistent with CWA Section 404(g) purposes. USACE also thinks that traditionally navigable waters reflect the concept of navigability appropriate to ensure the CWA objective of restoring and maintaining the chemical, physical and biological integrity of U.S. waters. Under Waters Alternative C, states and tribes would know the Section 10 lists and stand-alone determinations made by USACE districts. Waters Alternative C would result in more USACE-retained waters depending on each state's characteristics, whereas Waters Alternative B would allow more waters to be assumed and administered by states and tribes and also would provide a single and clear list of retained waters.

The subcommittee examined three wetlands alternatives to clarify for which wetlands USACE will retain permitting authority that are adjacent to waters retained by USACE, leaving the remaining adjacent wetlands to be assumed by a state or tribe:

- Wetlands Alternative A—*USACE retains all wetlands whether touching or not touching retained navigable waters regardless of furthest reach*.

- Wetlands Alternative B—*USACE retains the entirety of wetlands touching retained waters regardless of furthest reach*.

- Wetlands Alternative C—*USACE retains all adjacent wetlands between retained waters and the National Administrative Boundary*.

The subcommittee did not reach agreement on a single recommendation for adjacent wetlands; therefore, it put forth a majority recommendation (Wetlands Alternative C) and a USACE alternate recommendation (Wetlands Alternative A). The majority recommendation is that USACE retain all adjacent wetlands landward to an administrative boundary established during the development of a memorandum of agreement with USACE, with a 300-foot National Administrative Boundary as a default in which a state or tribe could negotiate with USACE a line in either direction from the boundary. This is consistent with the subcommittee's findings about the origin and purpose of Section 404(g), establishes an administrative boundary consistent with established state or tribal boundaries, provides flexibility to states and tribes, provides assurances that USACE maintains navigability as required by the RHA, allows for the identification and mapping of the administrative boundary prior to assumption, uses an easily distinguished process, provides a reasonable and implementable separation of administrative authority, and maximizes the efficiency and effectiveness of assumed programs. This alternative would balance administrative consistency across states and tribes with flexibility to adapt to each state's or tribe's regulatory and hydrological characteristics.

Under Wetlands Alternative A, USACE would retain permitting authority over all wetlands adjacent to navigable waters utilizing the definition of adjacent wetlands currently being used by the Corps for Section 404 regulatory actions. USACE has a defined process for determining adjacent wetlands, and USACE personnel are familiar with these procedures.

The subcommittee also unanimously recommends allowing the Michigan and New Jersey programs to continue to operate as they have been.

*Discussion*

Dr. Liban asked who would select the recommendation to act on if the Council approves the report as is with both recommendations. Mr. Mark Joyce (FACMD, OARM, EPA) responded that the EPA Administrator would make the decision.

Dr. Coronado asked about the budget associated with assumption. Ms. Kathy Hurld (Office of Wetlands, Oceans, and Watersheds, Office of Water, EPA) responded that states and tribes receive block grants to implement CWA programs; no additional funds are provided for assumption.

Mr. Joerke asked whether the budget reduction for USACE resulting from a loss of responsibilities had been estimated. Mr. Fields explained that after considerable research, the subcommittee had decided that this issue was outside of its charge.

Mr. Rejeski asked what had prompted the request to NACEPT to examine this issue. Mr. Dave Davis (Virginia DEQ) responded that a number of states had explored the feasibility of 404 implementation several times, and this issue had come up each time, making it impossible for states to determine the feasibility.

Mr. Woods asked about the reasoning behind NACEPT encouraging guidance rather than a rule. Mr. Fields responded that the subcommittee had discussed this question and identified the advantages and disadvantages to both guidance and rules. The subcommittee decided that, at the very least, guidance is needed to help states and tribes. Mr. Woods added that the cover letter accompanying the report could reiterate that the recommendations are being offered in the absence of congressional clarification.

Mr. Joerke moved that NACEPT approve the *Final Report of the Assumable Waters Subcommittee*. Mr. Rejeski seconded the motion. Mr. Ross then called for additional comments regarding the motion.

Dr. Liban was concerned that offering four recommendations may result in maintenance of the current status quo, which may be counterintuitive to the charge of the subcommittee. Mr. Ross pointed out that the status quo definitely would be maintained if the report is not approved and sent to the Administrator. An EPA staff member noted that the recommendations will be sent to the EPA Administrator, who will determine how to proceed. This process is no different for this report than any other NACEPT report.

A participant asked which entity would determine which waters are assumable if EPA approves the program. Ms. Hurld explained that Congress gave EPA the authority to approve or disapprove state programs. USACE provides the state or tribe with a list of waters that the Corps will retain, and this list is submitted when applying to EPA. A NACEPT member clarified that the state approaches USACE, which informs the state what waters the Corps will retain and what the state will assume through an MOA. The MOA then is provided to EPA as part of the assumption package. Ms. Hurld confirmed that this is the correct process and added that without the MOA, the request package is not complete. States have identified that one of the challenges is that discussions but not actual negotiations are occurring between USACE and states when determining which waters are retained by USACE. Adjacent wetlands provide additional challenges. Mr. William James (USACE) explained that the Corps has been issuing permits under RHA since 1899, including in waters subsequently covered by the CWA.

Ms. Bannerman asked for an explanation of the benefits in USACE retaining authority. Mr. James responded that this scenario would be consistent with the terminology and definitions already in place; he noted that these were in place before the 404(g) statute was written. Therefore, the term "adjacent" already was understood when Congress instructed USACE to retain navigable waters and adjacent wetlands, and USACE understands what adjacent wetlands should be retained.

Mr. Kerr asked for confirmation that implemented agreements would be between USACE and individual states. Mr. Fields explained that USACE issues the permits, and EPA has the responsibility to administer the overall program. The EPA Administrator will discuss the recommendations with USACE, and a decision will be made based on these discussions. Mr. Rejeski asked whether EPA and USACE would negotiate the recommendation. Mr. Fields responded that this would be one way to explain it.

A participant commented that current EPA regulations are limited on the establishment of retained waters. Mr. Fields attributed this to the way the statute is written.

Ms. Peg Bostwick (Association of State Wetland Managers) thought these questions were pertinent. The subcommittee saw the need for guidance to be used by USACE districts, EPA regions, states and tribes when undertaking assumption. Geographic differences may cause variances in how programs are run in different states. Legal changes over time will add challenges; for example, when the state of Michigan assumed the program in 1984, USACE did not view the scope of adjacent wetlands in the way it did in 1994, when the Corps negotiated with the state of New Jersey. The question is whether USACE retains Section 10 waters that it administered prior to the enactment of the CWA or whether it will retain some of the CWA waters added after the enactment of the RHA.

Ms. Luther asked whether minority opinions usually are included in NACEPT reports. Mr. Fields explained that the subcommittee chose to include the minority recommendation in this case to ensure that the report constructively discussed all opinions. Mr. Joyce added that minority recommendations have been included in past reports, but it is not typical. He has never seen the full NACEPT amend a report from a subcommittee. When necessary, the Council has included a letter with pertinent explanations about the report.

Mr. Ross asked the Council to vote on the motion on the table to accept the *Final Report of the Assumable Waters Subcommittee*. NACEPT approved the motion unanimously.

Mr. Green instructed NACEPT members to provide any comments for the letter that will accompany the final report within 3 days (by May 16). Mr. Joyce urged the Council to submit the letter and report to the Administrator no later than the end of the following week (by May 19). Mr. Fields explained that the report would be formatted prior to being sent to the Administrator.

Mr. Ross thanked the Council members for a productive day and recessed the meeting at 4:30 p.m. EDT.

***Thursday, May 11, 2017***

**Welcome**
*Emlyn Koster, Director, North Carolina Museum of Natural Sciences*

Dr. Emlyn Koster (North Carolina Museum of Natural Sciences) welcomed the participants to North Carolina and to the museum and apologized for being unavailable the previous day. He explained that citizen science is important to the museum, and he appreciated NACEPT's work on citizen science. The North museum will host the Citizen Science Association's CitSci2019 Conference in 2019, which is the 140th anniversary of the North Carolina Museum of Natural Sciences. He noted that museums have a social responsibility in addition to their science and environmental responsibilities.

**Proposal for 2017–2018 Work**

Mr. Joyce explained that NACEPT has developed series of reports in the past. He will send links to these reports to Mr. Green, who will forward them to the NACEPT members so that they have an example of how the Council has handled a report series in the past. Also, funding may be available to translate the first NACEPT report on citizen science into Spanish. Mr. Joyce remarked that he recently attended a meeting about lead and drinking water, and citizen science had been introduced in various contexts.

Dr. Parker provided several recommendations for methods that the workgroups should follow in developing the second report. It will be important for NACEPT members to speak to and document feedback from external groups (e.g., states, partnership groups). NACEPT members also must think about where and how to disseminate the second report (e.g., blogs, outreach, meeting presentations); the Council can amplify and promote the messages contained in the report. NACEPT is encouraged to provide advice on specific citizen science projects being implemented by EPA staff. Mr. Benforado commented that the Council could review the quality assurance guidance document on citizen science groups and data developed by ORD. He also encouraged the Council to determine what themes will

resonate with the new administration when writing the second report. Ms. Dosemagen noted that NACEPT members could publish blog posts or articles about the report and its recommendations to reach a broader audience.

Dr. Coronado asked whether it is possible to track the number of times the first report has been downloaded. Mr. Green said he would check on that.

Dr. Liban asked about the interview process that was employed during the writing of the first report. Dr. Parker replied that it was not a formal process. Dr. Patricia Gallagher (Drexel University), Mr. Jeffrey Mears (Oneida Nation), Ms. Barbara Jean Horn (Colorado Parks and Wildlife), and Ms. Luther had performed the interviews and could provide information about the processes they used. Dr. Gallagher commented that she is interested in citizen science in the context of broadening science literacy. She interviewed members of a nearby environmental education center, which led to more interviews. The interviews were helpful in identifying current citizen science activities, and a few were turned into case studies for the first report. It was a time-intensive process but very rewarding. Ms. Luther noted that her interviews indicated that EPA's role would be to coordinate citizen science efforts and ensure that citizen science groups know the data and information that the Agency needs and can use for regulatory purposes. She suggested that the new report emphasize public-private partnerships, which will resonate with the new administration.

Mr. Benforado recommended that the overarching theme of the next report be partnerships. Dr. Gallagher commented that many community organizations, when partnering with academia and research institutions, receive only 3 percent of the project budget; therefore, it is not a true partnership. Ms. Cavalier noted that because citizen science volunteers typically do not receive feedback when the project is over, they are not motivated to participate in additional citizen science projects. It may be more beneficial for EPA to support existing citizen science projects, aggregating what already is available, rather than beginning new projects. Communication is critical. Dr. Di Chiro agreed, adding that environmental justice groups see data collection and analysis and the resulting action as a method of empowerment. As an example, she described a project in Philadelphia that is providing STEM education by allowing students to apprentice at a solar company. Linking citizen science projects to general scientific knowledge will foster sustainable communities.

Mr. Rejeski cited several crowd-funding efforts to fund massive citizen science projects (e.g., an Indiegogo project aimed at supporting 80,000 students to monitor air pollution), including government-sponsored crowd-funding requests (e.g., Australia). Crowd-funding efforts resulted in approximately $30–40 billion raised in 2016. He also cited a "heat map" developed by lawyers that shows laws and regulations that enhance or inhibit citizen science efforts across the United States. The lawyers also produced an analysis for each state. It is important to ensure that citizens understand the laws before initiating a citizen science project.

Dr. Parker summarized the themes that the members had discussed during the Council's February 2017 teleconference, which included providing guidance on EPA citizen science activities and focusing on regional, state, local and tribal work and collaboration. She introduced the two proposals for how NACEPT could organize the coming year's work:

- *Proposal A*: Organize around three themes: (1) implementation of citizen science within EPA and partnership structures, (2) collaboration with states and tribes and potentially with local governments, and (3) technology and sensors and their associated necessary infrastructure and collaborations.

- *Proposal B*: Focus on an overall theme of collaboration with three subthemes: (1) collaboration within EPA; (2) collaboration with state, tribal and local governments; and (3) collaboration with others.

Mr. Benforado added that the themes within Proposal B will resonate with the new administration. NACEPT may be able to provide specific advice and recommendations regarding certain aspects of its first report, which mentions the three groups outlined in Proposal B.

Ms. Cavalier asked about the history of NACEPT and how its past recommendations have been received. Mr. Benforado replied that NACEPT was created in 1988 because there was a need for EPA to receive external expert advice regarding its actions with regard to environmental policy and technology. Some NACEPT recommendations have had more impact than others, depending on the reaction of the EPA Administrator and the activeness of the Council. Mr. Joyce added that there is not always a 1:1 correlation between the recommendations and resulting effects and actions. Although it is difficult to precisely characterize how the Council's recommendations affect EPA's programs and policies, it is clear that they do have an effect. Mr. Kerr explained that a series of pollution prevention reports developed by NACEPT in the 1990s had a significant effect, and many staff members retained copies that they referred to often. Dr. Parker commented that many Agency staff have seen the first report on citizen science as support for activities that they would like to carry out; it has had a significant effect within EPA.

Mr. Ross asked each NACEPT member to state his or her preference for Proposal A or B. The Council members were evenly split on the two proposals, and some members did not think that the two were mutually exclusive. After discussing the pros and cons of each proposal, the members asked Dr. Parker, Mr. Benforado and Ms. Dosemagen to develop a hybrid proposal.

**Workgroup Organizing**

After Dr. Parker, Mr. Benforado and Ms. Dosemagen developed an alternate proposal to guide NACEPT's work on the second report, Dr. Parker explained that the workgroups would not be completely parallel in structure and reorganization could occur during the writing process if necessary. The four proposed workgroups would focus on (1) EPA's role; (2) technology (e.g., open data and technology tools, big data); (3) state, tribal and local governments; and (4) information to action. The overarching theme of the report will be collaboration. If necessary, the topics can be reorganized after the writing begins.

A NACEPT member asked whether the state, tribal and local governments workgroup would include nongovernmental organizations (NGOs). Dr. Parker suggested that NGOs be included throughout the report. Ms. Dosemagen thought that NGOs would be included in the workgroup focused on information to action based on the comments that she had heard. Many projects are about producing a paper; the question is how to move from a model that focuses on the academic portion to one that supports the goals and objectives of community groups and partners (e.g., NGOs).

Dr. Gallagher asked whether "open tools" refers to hardware or data collected through the tools. Ms. Dosemagen responded that the workgroup would make that decision.

Ms. Boles wanted to see a larger focus on community organizations and foundations that they support. Ms. Dosemagen thought this topic would fall under the workgroup devoted to information to action. Mr. Karl Konecny (Northwest Motion Products) agreed with Ms. Boles, noting that NGOs should have a bigger focus. Mr. Benforado acknowledged that this is a potential gap in the proposed workgroup structure.

Mr. Rejeski suggested that the desired changes be a focus, including those regarding data analytics. He commented that data will not drive change.

Mr. Trahan noted that EPA's role is a common theme in the other three proposed workgroups; therefore, he did not think that having it as a stand-alone focus provided any benefit. Mr. Matthew Howard (The Water Council) thought that EPA's role should be emphasized; the report should be explicit in the

understanding that EPA's role flows from the information contained in the first report. Mr. Benforado suggested that NGOs and academia be the focus of a workgroup rather than EPA's role.

Mr. Konecny asked where STEM education would fit in. Dr. Parker responded that STEM could be incorporated into all aspects of the report. Ms. Cavalier suggested that many examples of citizen science and STEM should be sited in the report.

Ms. Bannerman and Dr. Parker pointed out the difference between collaboration and partnerships; explicit partnerships are not always beneficial, as Mr. Wayland pointed out in his presentation.

The NACEPT members agreed to form workgroups based on the following four topics and will reorganize if it becomes necessary: (1) information to action; (2) NGOs and academia; (3) state, tribal and local governments; and (4) technology.

**Workgroup Discussions**

Information to Action

Lead: Dr. Graciela Ramirez-Toro (InterAmerican University of Puerto Rico)
Members: Ms. Boles. Ms. Cavalier, Dr. Di Chiro, Ms. Horn, Mr. Kerr, Ms. Luther and Mr. Rejeski

The workgroup began the session by attempting to define "information to action" and developed the following:

- Some of the workgroup members define information as data; these data could be derived from formal peer-review processes or from other sources.
- Another member indicated that data are not information until they are analyzed, related to standards and expected outcomes, and converted into an intelligible (communicable) form; for information to produce action, it must produce a reaction to motivate change.

The workgroup determined its research and writing agenda:

- Research the ways to democratize data.
    - Not set on data only.
    - How to build the background to motivate people?
- Look into what the workgroup can lay out for EPA in terms of a move from information to action.
    - Identify other actors.
    - How to create a new kind of scientist?
    - What are options (information) for behavior change?
        - What happens with the information? What makes people do something (i.e., motivation factors—for all actors)?
        - Explore how EPA could benefit from examining data that can be used to engage "the new kind of scientist."
- Bring forward good actors and success stories because bad actors always exist.
- Look into how to match and mate intermediaries in a science-based manner (e.g., Walmart).
    - Identify structures of communication and action that works.
    - Where are the intermediary routes?
- The future of information to action for EPA:
    - Increase the involvement with STEM education.

- STEM education is important to produce a change and is a structure for the future. It is defined by the formal education approach.
- Remember that the already-formed adult also is part of the future of citizen science where STEM is not necessarily the tool.

The workgroup members summarized the core of information to action in the following table:

| Who has the information? | Who can move action? | What is the desired action? |
|---|---|---|
| NGOs | Legal courts | Policy |
| Researchers | Media | Behavior change |
| EPA | Foundations | Enforcement |
| Communities | Policymakers | STEM education |
| | The public | Dissemination |
| | Individuals | |

The following additional comments were offered by the workgroup members.

- EPA has engaged in approximately 1,700 projects with partners, such as those by the Community Action for a Renewed Environment program.
  - What happened with these? What, if any, action did EPA take? How did the community respond? What was achieved? Did the projects produce action? What models produced action? If they did not produce action, why not?
  - The information in these projects may inform the process: What are they doing? Did they continue even without additional EPA funding?
- It is necessary to know what EPA and citizen science groups need from each other.
- The gathered information should bring together EPA and the citizens collecting the data.
  - Need to define who is producing the data and where the information is coming from.
  - Need to define how to use the data.
- Data have many purposes and origins; the role of data must be defined:
  - To change policy.
  - To change conduct.
  - To complement information.
- Other ways exist of "seeing" data, and data about what makes people act when they hear that information is needed. The member cited the example of smoking laws being enacted in the 1980s. The information should be pertinent and produce an emotional change for the action to take place. During that time, Joanne Vining was cited; in a book, she proposed that societies and communities behave like the individuals in them, and the society reflects the emotional tools of their individuals in decisions about risks.
- Social scientists analyze and use science in other ways to communicate with others.
- Some scientists produce papers to advance science, not necessarily to apply their research toward specific solutions or to produce an action. Members discussed various ways to produce actions:
  - Make suggestions about how to use published data.
  - What is the responsibility to the public of the researcher who collects data as a scientific exercise? A gap exists in terms of taking action.
  - Scientists do not necessarily feel responsible for actions when they collect data. Scientists who produce data as an academic exercise might not know how to use the data for action. This translates to not getting involved in the dissemination of the data or the action other than through the peer review. It might not be that they are not interested in using the data to

produce action; it might be that they do not know how to do that, where their involvement is needed, or where it is usable for action.

- There is a role of baseline data for action.
- It is necessary to know the information source and how to use the data.
- EPA uses citizen science data for regulatory purposes (e.g., Candidate Contaminant List). These examples should be used to educate EPA about citizen science and ease any negative reaction to the term.

Workgroup members posed the following questions:

- Is there a plan for NACEPT members to disseminate the previous report? How will members report any dissemination and how people are using the report?
- What is the purpose of interviews and their role in the report writing?
    - What information should be obtained from the interviews?
    - Who is the audience or the target?
    - How are these interviews going to be set up (e.g., as a study)? Is everybody asking the same questions?
    - Are these interviews going to be designed by the workgroup? Are these interviews based on the goals of the workgroup or the NACEPT charge?

<u>NGO and Academia</u>

Lead: Dr. Gallagher
Members: Dr. Coronado and Mr. Konecny

The key points of the workgroup discussion follow.

- Communities and NGOs, rather than academia and government agencies, should take the lead on research projects and propose solutions.
- An internship program in which students spend 1 to 2 weeks at several varied organizations (e.g., EPA, Google) could be established.
- The report should focus on EPA's mission to protect human health and the environment.
- Being proactive rather than reactive is important (e.g., water example in Flint, Michigan).
- EPA is not thought of as a resource for teachers and other community members performing citizen science. The Agency must be more visible, provide more outreach and become a citizen science resource.
- STEM citizen science is driven by local teachers; workshops to help them include citizen science in their curricula would be beneficial.
- Many tribes are interested in citizen science and administer summer youth citizen science programs.
- Opportunities for nonregulatory actions (e.g., STEM education, community actions to improve the environment) and Agency responsiveness to citizen needs will resonate with the new administration.
- EPA can use the Gold Star Program as a model for others to replicate.
- As a whole, people lack a vision of how, when and where to apply citizen science; the report could identify opportunities to apply citizen science.

- Sustainable agriculture groups and agricultural extension services are engaging in citizen science effectively.
- Many individuals engaged in citizen science are not aware of the term "citizen science."
- Many NGOs have a significant role in citizen science that supports EPA's mission.
- EPA could facilitate partnerships between environmental groups and community youth organizations so that each serves as a resource for the other, particularly in terms of assisting with administrative issues that are difficult to navigate.
- This workgroup focus may merge with the information to action focus in the future.
- The workgroup members will conduct interviews throughout their networks to determine what resources already exist, how NGOs and academia think that EPA can help facilitate citizen science, and barriers to EPA implementation of citizen science. Potential interviewees include:
    - Individuals (e.g., teachers) engaged in citizen science.
    - Community groups (e.g., YMCA, Boys & Girls Clubs of America) engaged in citizen science.
    - Local chapters and national headquarters of NGOs engaged in citizen science.
    - Tribes interested or engaging in citizen science.
    - Individuals and organizations that downloaded the first NACEPT report (if this information is available).

State, Tribal and Local Governments

Lead: Mr. Joerke
Members: Ms. Bannerman, Dr. Liban and Mr. Trahan

The key points of the workgroup discussion follow.

Overarching points:

- Recommendations should build on previous NACEPT charges (integrate sustainability and science literacy).
- Local government must be the point of intersection between EPA and communities.
- EPA should serve in the role of defining citizen science data quality parameters for intended use (with a focus on the right side of the citizen science spectrum in the first NACEPT report: community engagement and education).
- EPA should generate "proper response action" to citizen science input received by state and local governments.

EPA's "image problem":

- Many state and local governments perceive EPA as obstructionist.
- Efforts should be made to improve EPA's image (New York City community policing is a potential model).
- Emphasis should be placed on job creation and business development.

Every community, region, state, tribe and so forth is different:

- Whether the effects are positive or negative, local government is involved.
- The workgroup should consider those who see themselves as regulators versus the regulated.

- EPA (nationally) often looks at the state of California as a model; how can this dynamic be replicated in other regions?
- Some groups choose to oppose local government (e.g., Mr. Wilson's community) because of past injustices and relationships.
- How can one state, tribal or local government learn about efforts in other locales?
- EPA can serve to communicate and translate local success stories into templates for other states, tribes and local governments to use.

Additional notes:

- EPA should serve as a convener.
- Citizen science implementation may take a form similar to volunteer partnership programs.
    - ENERGY STAR®.
    - States can demonstrate how regulatory programs can provide benefit.
    - "More carrot, less stick."
- Local government should facilitate participation in the citizen science process.
- Sustainability should be defined in the lens of citizen science.
- The report should recognize the advent of smart cities. How can EPA help to ensure that data are shared with citizens?
- Citizen science input can be connected to elected officials through state/regional websites.

Potential audiences for contact, interviews or feedback:

- Associations tailored to states and tribes.
    - Environmental Council of States.
    - EPA tribal partnership groups (www.epa.gov/tribal/tribal-partnership-groups).
- Local jurisdictions.
- Volunteer partnership programs.

Technology

Lead: Mr. Woods
Members: Ms. Dosemagen, Mr. Howard and Ms. Kim

The key points of the workgroup discussion follow.

- Key questions to consider are:
    - What is the relationship of EPA and open data?
    - What is the relationship between EPA and data users and providers, especially in the context of privacy and business confidentiality?
    - What role does EPA play in getting the "latest and greatest" technology to citizen scientists and ensuring that it is reliable?
- The lightning talks indicated that technology is a big wave and EPA must be able to ride the wave or at least keep its head above water.
- Developing a model citizen science Quality Assurance Project Plan will be important.
- The recent EPA Sensor Challenge was not an appropriate model for fostering innovation.

- EPA could consider setting up "lending libraries" with NGOs and other institutions until the cost of sensors is driven down.
- Many of EPA's peer-reviewed articles are not available to the general public. Unless a good reason exists, taxpayer-funded research should be published in open-access journals. Scientific research should be presented in a way that the public understands it and can best use it to support citizen science efforts.
- Visual monitoring is easy to use in litigation; analog systems can be used until sensors are developed further. EPA should be promoting the use of visual monitoring (e.g., Method 22 training).
- The workgroup should view its work through the lens of the citizen science spectrum presented in the first report.
- Weather Underground provides a good model for EPA to emulate, and the Agency should be encouraged to follow this model.
- Open software and hardware will be the next wave, and EPA must consider this.
- Value-added mapping is an area to explore.
- Potential major topics of focus of the workgroup are:
    - EPA's role in facilitating technology (e.g., fostering open data) for use by citizen scientists in the context of a growing enterprise.
    - A recommendation about current legislation enacted to open federal science to the public (e.g., Data Access Act).
    - Potential technology partners (e.g., Google) and any associated legal issues.
    - Accelerating the Federal Equivalent Methods and Federal Reference Methods processes through a third-party certifier (e.g., NSF International).
    - EPA's role in promoting data obtained through publicly funded grants to ensure the openness of data and the potential public benefit.
    - Lending libraries.

**Public Comments**
*Eugene Green, NACEPT DFO, FACMD, OARM, EPA*

Mr. Green called for public comments; none were offered.

**Plan for the Year**

Mr. Benforado asked NACEPT members to identify short topics of importance for the next report. The suggested topics are listed below.

- Dr. Gallagher and Mr. Kerr: Nonregulatory aspects of citizen science.
- Mr. Joerke and Ms. Bannerman: Local government.
- Mr. Konecny: A focused report.
- Ms. Boles: Existing research and responsiveness to research data.
- Ms. Cavalier and Mr. Kerr: Defining EPA's role.
- Mr. Rejeski: Learning how to design impactful projects.
- Dr. Liban: "Power to the people."
- Mr. Trahan: Managing expectations and defining appropriate uses of citizen science.
- Ms. Luther: Obtaining feedback from the first report.
- Mr. Howard: Operationalizing the report.

- Mr. Woods: The need to empower states.
- Ms. Dosemagen: Focus on the recommendations in the context of the current administration.
- Dr. Coronado: STEM education.
- Mr. Ross: The power of partnerships.

Dr. Parker explained that the second report did not need to be the same as the first report. She described the schedule for writing and finalizing the second report:

- *Mid-June 2017*: Identify core topics and processes and begin interviews.
- *July 2017*: Develop top-level recommendations and a high-level summary.
- *Mid-September 2017*: Complete first draft.
- *Late October 2017*: Consolidate draft.
- *Mid-December 2017*: Develop final draft.
- *February 2018*: Hold a teleconference to approve the report.
- *April 2018*: Transmit the report.

In response to questions regarding disseminating hardcopies of the first report, Mr. Benforado explained that printing is costly, and there are not sufficient funds for it in NACEPT's budget. Dr. Parker added that a graphic one-pager about the first report is available and can be distributed. Mr. Green will discuss with his management the possibility of printing more copies of the first report. Dr. Parker instructed NACEPT members to contact her with the names of groups and individuals who should receive copies of the first report, and she will distribute it.

Mr. Woods asked whether NACEPT would meet in person again to discuss the report. Mr. Green explained that the Council is allotted one face-to-face meeting per fiscal year. The group could meet early in 2018 but would need to provide justification for doing so. He added that those NACEPT members who were unable to attend this face-to-face meeting would be placed into the workgroups.

**Closing Remarks and Wrap-Up**

Mr. Ross thanked the NACEPT members for a productive meeting and EPA staff for their efforts in planning it. He adjourned the meeting at 12:20 p.m. EDT.

## Action Items

- NACEPT members will provide to Mr. Green any comments for the letter to accompany the *Final Report of the Assumable Waters Subcommittee* no later than May 16, 2017, so that the Council can submit the letter and formatted report to the Administrator no later than May 19, 2017.

- Mr. Joyce will send links to NACEPT's previous report series to Mr. Green, who will forward them to the NACEPT members so that they have an example of how the Council has handled report series in the past.

- Mr. Green will determine whether it is possible to track the number of times the first NACEPT report on citizen science has been downloaded and who has downloaded it.

- NACEPT members will consider how and where the second report will be disseminated.

- Mr. Green will discuss with his management the possibility of printing more copies of the first citizen science report.

- NACEPT members will provide Dr. Parker with the names of individuals and groups to whom she should distribute copies of the first report.

- Workgroups will complete their interview and writing tasks as discussed within their groups.

# Appendix A: National Advisory Council for Environmental Policy and Technology (NACEPT) Meeting Participants

**NACEPT Members**

**Ms. Erica Bannerman**
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**Dr. Giovanna Di Chiro**
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# Appendix B: National Advisory Council for Environmental Policy and Technology (NACEPT) Agenda

**North Carolina Museum of Natural Sciences, Nature Research Center**
**121 W. Jones Street, Raleigh, NC 27601**
**William G. Ross, Jr. Environmental Conference Center, Fourth Floor**
**Raleigh, North Carolina**

**May 10 – 11, 2017**

Additional information and parking maps may be found here: naturalsciences.org/visit/directions-parking and naturalsciences.org/docs/Directions_and_Parking_map_2013.pdf

**Wednesday, May 10**

| | |
|---|---|
| 8:30 – 9:00 a.m. | Arrive/Registration |
| 9:00 – 9:45 a.m. | *Welcome, Introductions, and Overview of Agenda*<br>Eugene Green, Designated Federal Officer, Federal Advisory Committee Management Division, Office of Resources and Administration, EPA<br><br>Bill Ross, NACEPT Chair |
| 9:45 – 10:00 a.m. | *Opening Remarks*<br>Dr. Emlyn Koster, North Carolina Museum of Natural Sciences |
| 10:00 – 10:30 a.m. | Clips From *The Crowd and the Cloud* |
| 10:30 a.m. – 12:00 p.m. | *Collaboration and Networks in Citizen Science*<br>Initial Presentations and Panel (15-minute talks followed by panel discussion)<br>Caren Cooper, North Carolina Museum of Natural Sciences<br>Gretchen Gehrke, Public Lab<br>Omega Wilson, West End Revitalization Association |
| 12:00 – 1:00 p.m. | Lunch (on your own) |
| 1:00 – 1:10 p.m. | Introduce Afternoon Sessions |
| 1:10 – 1:30 p.m. | *Citizen Science at EPA: Operational Issues*<br>Chet Wayland, Office of Air and Radiation, EPA |
| 1:30 – 3:15 p.m. | *Citizen Science at EPA: Operational Issues And Followup From First Report*<br>Presentations and discussions hosted by EPA staff. EPA staff will present feedback on the first report and outline any specific areas of interest. Lightning talks (5–10 minutes) will be followed by small group discussions, organized around themes in the NACEPT report. |

**EPA Lightning Talks:**
Tim Barzyk, Office of Research and Development
Kristen Benedict, Office of Air and Radiation
Dave Lehmann, Office of Research and Development
Ron Williams, Office of Research and Development
Amanda Kaufman, Office of Air and Radiation
Deborah Ortiz, Region 4 Office of Environmental Justice and Sustainability

**Questions to Address:**
1. What is the impact of the NACEPT report?
2. What EPA work is happening related to the content of the NACEPT report?
3. How can NACEPT provide feedback on EPA products?
4. What are the implementation issues?

Note: To access the Zoom virtual meeting room and call-in information for the Public Comment Period and Assumable Waters Subcommittee presentation, please follow these instructions:
Time: 3:00 p.m. Eastern. Join from PC, Mac, Linux, iOS or Android: cbuilding.zoom.us/j/651129294. Or join by phone: +1 408 638 0968 (U.S. Toll) or +1 646 558 8656 (U.S. Toll) Meeting ID: 651 129 294

| | |
|---|---|
| 3:15–3:30 p.m. | *Public Comments* |
| 3:30–5:00 p.m. | *Final Report of the Assumable Waters Subcommittee*<br>Barry Rabe, NACEPT Subcommittee Chair<br>Laureen Boles, NACEPT Subcommittee Liaison<br>Patrick Field, Consensus Building Institute |
| 5:00 p.m. | *Recess* |

**Thursday, May 11**

| | |
|---|---|
| 8:30–9:00 a.m. | Arrive/Registration |
| 9:00–9:30 a.m. | *Proposal for 2017–2018 Work* |
| 9:30–10:00 a.m. | *Workgroup Organizing* |
| 10:00–11:30 a.m. | *Workgroup Discussions* |
| 11:30–11:45 a.m. | *Public Comments* |
| 11:45 a.m.–12:45 p.m. | *Plan for the Year* |
| 12:45–1:00 p.m. | *Closing Remarks and Wrap-Up* |
| 1:00 p.m. | *Adjournment* |

# Appendix C: Chair Certification of Minutes

I, William G. Ross, Jr., Chair of the National Advisory Council for Environmental Policy and Technology (NACEPT), certify that this is the final version of the complete minutes for the face-to-face meeting held May 10–11, 2017, and that the minutes accurately reflect the discussions and decisions of the meeting.

July 18, 2017

**William G. Ross, Jr., NACEPT Chair** **Date**