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2019 NATIONAL TRAINING WORKSHOP FOR CWA 303(d) LISTING & TMDL STAFF

ADVANCING THE PROGRAM AND COMMUNICATING THE RESULTS

National Conservation Training Center
Shepherdstown, West Virginia
May 29 - 31, 2019

FINAL PROJECT REPORT
&
TRAINING WORKSHOP PROCEEDINGS

This project is made possible through a cooperative agreement with the United States Environmental Protection Agency

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ELI staff contributing to this project are Adam Schempp, Sandra Nichols Thiam, Amy Reed, Sam Koenig, Anna Beeman, Lovinia Reynolds, and Kathryn Goodwin.

Except where specifically noted, the views expressed in the materials prepared and assembled by ELI should not be attributed to U.S. EPA, or to other federal or state agencies, nor should any official endorsement be inferred.

ELI maintains a companion website for this project: our CWA 303(d) Program Resource Center (http://www.eli.org/freshwater-ocean/state-tmdl-program-resource-center).

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I. INTRODUCTION

From May 29 through 31, 2019, the Environmental Law Institute (ELI) convened the *2019 National Training Workshop for CWA 303(d) Listing and TMDL Staff: Advancing the Program and Communicating the Results*. This event, supported through a cooperative agreement with the U.S. Environmental Protection Agency (EPA), brought together Clean Water Act (CWA) Section 303(d) listing and TMDL officials from 49 states, the District of Columbia, American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands as well as water quality professionals from the Confederated Tribes of the Umatilla Indian Reservation, the Eastern Band of Cherokee Indians, the Fond du Lac Band of Lake Superior Chippewa, the Iowa Tribe of Oklahoma, the Kalispel Tribe of Indians, the Lac du Flambeau Band of Lake Superior Chippewa Indians, the Meskwaki Nation, the Miccosukee Tribe of Indians of Florida, the Red Lake Band of Chippewa Indians, and the Shinnecock Indian Nation. The assembled participants learned and discussed lessons from implementing tools and trainings, and from communicating and engaging with partners and stakeholders. They presented on and discussed methods for improving communication with stakeholders and the public; supporting and incorporating citizen science data; developing and implementing "alternatives"; and using, managing, and interpreting continuous monitoring/sensor data, among many other specific issues in breakout sessions. Participants also gained greater personal familiarity with colleagues from other jurisdictions, representatives of EPA Headquarters and the EPA Regions, a representative of the Association of Clean Water Administrators (ACWA), and a representative of the New England Interstate Water Pollution Control Commission (NEIWPCC).

As with similar CWA 303(d) events of national scope convened in the spring of most years since 2008, ELI intended for this training workshop to provide a forum for program officials to learn about current best practices in listing, TMDL development, and TMDL implementation; to interact with one another; and to share their programmatic ideas and concerns. To ensure a planning process that would culminate in a training workshop attuned to the needs of program implementers in the states, tribes, and territories, ELI assembled a Workshop Planning Group (WPG). For six months, the WPG worked through a highly participatory process to develop, shape, and refine the workshop objectives and agenda, the structure and focus of workshop sessions, and the course materials.

The three-day training workshop was successful by the metrics of sharing useful information, generating new ideas, and building new relationships. Distinct takeaway messages emerged and are identified in Part II of this report. The bulk of the report, Part III, contains detailed summaries of the plenary sessions and brief overviews of the breakout sessions. Appendices to the report include the training workshop agenda, a list of participants, a full compilation of participant evaluations and comments, and information about ELI's companion website.

II. THEMES AND OTHER TAKEAWAYS

From the perspective of ELI staff in attendance, the following are significant themes, points, and observations that emerged over the course of the training workshop. They are not presented in a specific order, nor are they intended to reflect complete agreement among participants.

Effective communication is vital to the CWA 303(d) Program.

- It is important to have support for, what in many cases are, very complicated restoration activities.

- Implementation depends on engaging people in a way that empowers them to make good decisions and builds trust between the community and government.

As 2022 nears, there are important stories to tell, and it is important to tell them well.

- Simple and compelling ways to tell the state stories and motivate others to tell those stories are needed.

- The value of the CWA 303(d) Program's work should be communicated effectively.

Collaboration is key.

- Telling stories requires cooperation, and it is incumbent upon each person to make that happen.

- EPA has built various data systems, but state, tribal, and territorial participation in the development of those systems made them better and more responsive to the many needs they meet.

- The Regional Monitoring Networks are a volunteer, grassroots effort to document current conditions and detect long-term trends at a regional scale.

- The CWA 303(d) Program has been working closely with EPA's Water Data Integration Branch on how best to use technology to communicate water quality and success.

Technology is opening many new possibilities

- Open source software is creating an unprecedented opportunity to not only build tools that simplify many aspects of the Clean Water Act process, but to easily share those tools.

- Advancements in apps and mobile devices are allowing for simpler data collection processes and data contributions from a wider array of sources.

- The Water Data Collaborative strives to improve and simplify each step of the citizen water science data process, ultimately supporting greater access to and use of citizen science data.

- Remote sensors allow for, among other things, the collection of large amounts of instream data with only periodic check-ins, the evaluation of wet-weather impacts, the capture of diel water quality changes due to photosynthesis and respiration, and assessments of other pollutants as derived through modeled relationships with continuously monitored pollutants.

- The architecture for sensor data sharing is under development and will be a catalog or index that references easy-to-create data appliances across the country.

- *How's My Waterway* is intended to be a "one-stop-shop" for water data, informing the public at local, state, and national scales about the problems, the progress being made, and how to be engaged.

- Information can be entered into ATTAINS as part of the water quality assessment process, which makes Integrated Report submissions easy.

- Microbial source tracking and tools for modeling bacteria are improving, as is the scientific understanding of the fate and transport of bacteria, all of which can lead to more implementable and effective bacteria TMDLs.

The CWA 303(d) Program can and should continue to adapt

- Adaptation, particularly when it comes to prioritization and implementation of the Vision, is needed across all levels.

- How audiences are reached and how stories are told is evolving, with an increasing significance of social media, short videos, infographics, interactive maps, and other means.

- While experience and valuable lessons inevitably are lost in retirements, new energy and ideas for different ways to do things can continue to move the Program forward.

"Alternatives" are an opportunity

- "Alternatives" can be quicker and less resource intensive than TMDLs, if existing partnerships can be leveraged. They also can involve more upfront investment, with the goal of more engagement/integration and ultimately being much more effective in restoring water quality in the near term than TMDLs.

- Potential questions to ask when deciding whether to pursue an "alternative" can include, among others:
    - Are there good local partners?
    - Are there grants or dollars in the watershed that can help?
    - Are there other, related CWA 319 efforts?

Success depends on the dedication and determination of individuals in the Program

- The CWA 303(d) Program is fueled by passion and commitment to making the environment better.

- There has been significant turnover in terms of staff and expertise, a challenge on which EPA is focused.

- To continue success, younger staff must be positioned to carry the torch forward.

- The individual and group exploits of the people of the CWA 303(d) Program may not be written up in an adventure story in 50 years, but ultimately the work is just as important because it is protecting clean water; restoring rivers, lakes, coasts, and wetlands; and protecting the places people enjoy.

III. WORKSHOP PROCEEDINGS: SESSION-BY-SESSION DISCUSSION

The following is an overview and detailed discussion of the training workshop, presented session by session. The full training workshop agenda appears in Appendix 1 of this report.

Welcome

Adam Schempp of ELI opened the eleventh *National Training Workshop for CWA 303(d) Listing and TMDL Staff*, and simultaneously the second *National Water Quality Data Management Training Workshop*, by welcoming the many participants from across the country, including staff from 49 states, the District of Columbia, all 5 territories, 10 tribes (and 5 more for the data workshop), all 10 EPA Regions, EPA Headquarters, the New England Interstate Water Pollution Control Commission (NEIWPCC), and the Association of Clean Water Administrators (ACWA). Mr. Schempp emphasized that engagement among the participants, both inside and outside the classroom, is at the heart of the training workshops, and he urged everyone to make the most of the opportunity. A complete list of participants of this training workshop, including their affiliations and contact information, is provided in Appendix 2 of this report. Mr. Schempp concluded by expressing thanks to the many people who helped plan the *National Training Workshop for CWA 303(d) Listing and TMDL Staff*.

Sandra Nichols Thiam of ELI then introduced herself and expressed thanks to the various people who helped plan the *National Water Quality Data Management Training Workshop*. Ms. Thiam then introduced John Goodin for his opening remarks.

John Goodin, Director of the Office of Wetlands, Oceans, and Watersheds at EPA Headquarters, began by expressing his appreciation for the opportunity each year to see everyone, and he added his thanks to the individuals involved in organizing the training workshops. He noted the significance of having so many concurrently running sessions, suggesting that it is a testament to the interest in the issues and good work being done, and that it is a far cry from the early years of the training workshop, when all sessions were in plenary form.

Mr. Goodin set up his comments by detailing the experience of the English explorer Ernest Shackleton and the crew of the *Endurance*. He explained that, 150 years ago, Shackleton set out with 27 crewmembers from London to sail across the Atlantic Ocean with the goal of making a land crossing of Antarctica, which was the last unexplored continent at that time. After months at sea and only one day's sail from landfall, Mr. Goodin continued, the *Endurance* became trapped in pack ice, and their mission changed considerably. He enumerated the amazing challenges that they overcame, including: 10 months locked in pack ice before the *Endurance* was crushed, another 6 months negotiating three rowboats and some dogsleds loaded with gear across the pack ice that was starting to break up, and several weeks of travel in the rowboats, finally making it to a small uninhabited island. Mr. Goodin said that, from there, Shackleton assessed his resources and crew and picked five men to join him in an open rowboat to travel 800 miles to the one known place where they could connect with the outside world: a whaling station on South Georgia Island. They hit this 10-mile island, one of the greatest feats of oceangoing navigation, he added, and they were then able to make it back to get the rest of the crew. Mr. Goodin credited the creativity,

leadership, and other amazing characteristics of the crew for all of them surviving the three-year ordeal.

For a few moments, Mr. Goodin, shifted the focus of his comments to managing water quality data and the CWA 303(d) Program. He started with the fact that the Program is more than halfway through the Vision enacted in 2013, with the target of attaining certain important goals by 2022, which will be the 50th anniversary of the Clean Water Act. Mr. Goodin deemed the current moment as "full implementation mode." He recapped the six goals of the Vision, which he described as highlighting fundamental aspects of what the Program does:

1. Prioritize so as to pursue what matters most to states and the public;
2. Assess and learn about progress that has been made, and adaptive management that needs to be employed, and understand the state of the country's waters;
3. Integrate: find strategies and synergies to work with other programs to achieve the water quality results sought;
4. Engage: seek buy-in and look to the energy and efforts of other organizations and the public for help;
5. Look to "alternatives" in cases where they may be the best way to achieve results; and
6. Go beyond restoration, highlighting the benefits of protection where an investment is worth the work required.

Mr. Goodin explained that the Vision outlines this framework in a flexible manner, allowing resources to be directed in ways that can achieve the best outcomes for the long term. He noted that some of the recent data associated with the progress is heartening: 15 state programs have "alternatives" underway, including roughly 200 waterbodies; 15 state programs have started to develop and implement protection programs, including roughly 7,000 waterbodies; and the ability to track progress has improved. On that last point, Mr. Goodin acknowledged a somewhat mixed track record when it comes to specific measures that the administration is following, in particular the timeliness of EPA's approval of TMDLs and CWA 303(d) lists. Over the last few years, he added, EPA has made some good progress, having acted on over 4,000 TMDLs, cutting the backlog by 90 percent and, at the moment, having fewer than 2 dozen TMDLs that exceed a 30-day review period, and having acted on over 70 CWA 303(d) lists, cutting that backlog by over 80 percent and, at the moment, leaving only 5 lists that have been at EPA for longer than 30 days. Mr. Goodin said that EPA is not where folks would like the Agency to be yet, and there is still a lot of work to be done on the state side, but, based on where the Program was a few years ago, these achievements are remarkable. He clarified that EPA's goal is to get caught up, particularly with the CWA 303(d) lists, by 2022, and to do that, EPA is asking states to use list combinations and other techniques to help get the Program there.

Mr. Goodin then turned his attention to data management, noting that EPA has been putting resources into its data management systems. He referenced the *How's My Waterway* presentation that would be following the welcome and added that 2018 is the first cycle to only use electronically-submitted data. Mr. Goodin gave special recognition to the states that have been able to do that. He acknowledged the difficulty of the transition for some states but also the really good efforts that they have put forth to move into the digital era. Mr. Goodin emphasized the importance of collaboration. He focused on the various systems built by EPA and the value of state, tribal, and territorial participation to making those systems better and more responsive to the many needs they meet.

Addressing communication, Mr. Goodin identified many of the agenda items that pertain to that topic, including Water Words that Work, Creative Ways to Visualize Complex Data, and Engaging Your Public. He added that effective communication is vital to the Program, as it is important to have support for, what in many cases are, very complicated restoration activities. Mr. Goodin declared that, as 2022 nears, there are important stories to tell, and it is important to tell them well.

Pulling the threads of the Shackleton story and the CWA 303(d) Program together, Mr. Goodin recounted four things that made him think of the Program as he read the account of the *Endeavor*:

1. Adaptive management: at every stage, Shackleton and his crew had to make decisions about how to pursue their new goal and pursue it in the most effective way. Mr. Goodin likened this to taking a hard look at priority waters and figuring out how to address them effectively. He added that, sometimes this means changing things regarded as fundamental to the Program.
2. Resource management: the expedition was planned to be as long as eight months, and that essentially was the amount of food that they had brought. They needed to make it last three years. Mr. Goodin explained that much of the account deals with the crew's reaction to getting certain limited rations every day, and the repetition of those food items, occasionally supplemented by surprise seal meat or something else to refresh their diets. He added that they also were required to re-purpose their sleds into tents that could survive the Antarctic winds, and even parasitize their ship for the lumber for decking in their rowboats. Mr. Goodin said that these measures made him think of the meagre rations sometimes dealt to program budgets and personnel and how it must suffice, year after year in some cases, occasionally getting a surprise windfall to help do even greater work. He applauded the participants for making those rations work, for the creativity in leveraging those funds and turning them into good work.
3. Tracking and measurement: the crew had limited ability to understand where they were and where they were headed. With all their maps, if the sun was not out and they had no other means of getting their bearings, they could not locate themselves on the map. Mr. Goodin emphasized the importance of understanding not just where one is, but where one is heading. He alluded to taking stock of where everyone is on the path of the Vision, and to keep an eye on the very clear objective in mind.
4. Using the skills and capabilities of the people: *Endurance: Shackleton's Incredible Voyage* by Alfred Lansing opens with just a list of each of the men on the expedition, and what their duties were. Originally, Shackleton had picked them for certain skills—a cook, a navigator, a boat captain, someone who could do the work with the dogsleds they needed, and more. Over time, he had to reorganize and reuse the different available skill sets people had, deploying them in ways that made the best use of their skills for the changing tasks. Mr. Goodin deemed this perhaps the most important lesson. He reiterated his amazement with the variety of attendees: so many states, tribes, territories, commissions, and regions as well as multiple programs being represented, a wide breadth of experience that is brought to work every day. He acknowledged the "cagey veterans" who have experience from the past that they can bring to bear on the challenges of today, and new folks who bring energy and ideas for different ways to do things as the Program moves forward. There also are specialists, he added, in tools for particular data outlets, or in policy areas; everyone is essential to the mission.

In closing, Mr. Goodin expressed his excitement for what lies ahead. He reiterated the recent success: using "alternatives" and protection plans; leveraging others; and figuring out how to get

out the message in the best possible way. Mr. Goodin said that what the CWA 303(d) Program has accomplished keeps him motivated to figure out how to deal with the challenges of many other programs.

Mr. Goodin charged the participants with reaching out during the week to someone they had not met before, getting to know them and understand what they do. He noted that a future trusted peer is someone in the room whom they may not have met yet; someone they not only will want to go to, but who will be happy to help them. Mr. Goodin acknowledged that the individual and group exploits of the people of the CWA 303(d) Program may not be written up in an adventure story in 50 years, but ultimately the work is just as important because it is protecting clean water; restoring rivers, lakes, coasts, and wetlands; and protecting the places people enjoy.

Jim Havard, Chief of the Watershed Branch of the Office of Wetlands, Oceans, and Watersheds, began his comments by thanking Mr. Goodin for his remarks and charge, and by thanking the Workshop Planning Group for their efforts in crafting the training workshop. He expressed his excitement at being back with the assembled group of people.

Mr. Havard reiterated Mr. Goodin's focus on the Vision, adding that there are a few particular areas of emphasis for the CWA 303(d) Program. The first one that he listed is Vision implementation. Mr. Havard noted that the 2013 framework still guides the Program today, and that there are six goals, with notable attention having been placed on communication and engagement in the agenda for the training workshop. Mr. Havard also referenced individual events centering on communication and engagement in recent years, including presentations at WEFTEC and River Rally as well as a small meeting with stakeholders on *How's My Waterway*. Mr. Havard added his applause for the number of protection plans being pursued and noted that integration is reflected well in "alternatives," with many of them being done in coordination with the Nonpoint Source Program and other programs. He explained that "open season" was an opportunity for states to submit revised priorities, which many states did, after which nutrients and pathogens remained the top two pollutants of focus.

The second area of emphasis that Mr. Havard identified was measures. He referred to them as a second priority for the Program, and a particular focus of the acting deputy administrator. Mr. Havard said that reducing the number of impaired waters is the big measure relating to surface water quality, but something that requires contributions from all Clean Water Act programs. He noted that several measures focus solely on the CWA 303(d) Program, and that the Program pushed to keep the Vision as an aspect of those measurements. Mr. Havard said that one of those measures is state progress in putting priority TMDLs, alternative restoration plans, and protection approaches in place, adding that the measures give partial credit where a plan is in progress. He noted that three additional measures track the timeliness of EPA action on state submissions. Mr. Havard highlighted the reduced EPA backlog for TMDL and CWA 303(d) list actions. The two additional state-oriented measures, he added, concern the electronic submission of state Integrated Reports and outstanding state submission of CWA 303(d) lists. For the latter, Mr. Havard suggested opportunities for improvement, including submission strategies like combining the 2018 and 2020 list process so as to be timely in 2020 or even 2022. He added that EPA is trying to improve its capacity to work with states in advance of receiving CWA 303(d) lists and TMDLs, to work on some of the more difficult issues early. In addition, he encouraged states to continue developing annual commitments for what priority TMDLs they will work on each fiscal year.

The third area of emphasis identified by Mr. Havard was capacity building. He explained that, while there are still some Program veterans, there has been significant turnover in terms of staff and expertise, a challenge on which EPA is focused. Mr. Havard announced that EPA is in the beginning stages of developing a TMDL Academy and will be consulting state staff on its development and roll-out. He noted that it would be like the Water Quality Standards Academy. Mr. Havard added that EPA seeks to train new staff; build a communication toolbox for the Program; and develop improved means of sharing expertise, particularly on modeling, like the workshop run by ACWA in 2018.

Mr. Havard concluded his remarks with a focus on communication and engagement. He identified a few common themes of the CWA 303(d) Program, including the importance of protecting and restoring water quality and the importance of protecting the uses of water, to sustain those uses and for long-term economic success. Mr. Havard also emphasized the importance of clearly articulating the issues and getting buy-in from stakeholders. He referenced a session from the 2017 training workshop, in which 11 individuals from a diverse array of stakeholder organizations participated on a panel. Mr. Havard recalled that the panelists were asked: "What would be your one or two principles for stakeholder engagement?" He added that the individual answers were remarkably similar and still very valid:

1. It takes time to develop effective solutions, to talk to people, attend meetings, and build relationships;
2. It is important to develop local partners who already have relationships with the communities, so they can advance the charge;
3. It is important to give everyone a voice, even if it takes extra time, as it helps with buy-in;
4. Identify the best messenger; it is not always the federal or even state government;
5. Focus on tangible problems, as it helps people rally and see the value of the work;
6. Educate on the importance of the issue, explaining the environmental and financial implications; and
7. Provide stakeholders a role in implementation, so that they can help people see changes and encourage and sustain engagement.

Mr. Havard also emphasized the importance of the data system and *How's My Waterway* to communication and engagement, adding that the CWA 303(d) Program has been working closely with the Water Data Integration Branch on how best to use technology to communicate water quality and success.

Dwane Young, Chief of the Water Data Integration Branch of the Office of Wetlands, Oceans, and Watersheds, began his comments with a story about hiking with two of his kids. He explained that, a few years ago, they trekked to a small mountain lake in Southeast Idaho, what he referred to as one of the most beautiful places on Earth. He noted that there are two ways to get there, hiking or driving, adding that the elevation gain is roughly 8,000 feet.

Mr. Young described the start of the hike as being flat and shaded, next to a stream, the portion of the hike that his 11-year-old son later called "the beguiling beginning." As they continued, he narrated, it got warmer and a little hilly, a stretch that his son named "the grasshopper hill." They then reached a forested part, he continued, which his son named the "forest of doom." Mr. Young added that it was easy to get a picture of how his son envisioned the experience. As they went on, there were many switchbacks, with beautiful scenery, wildflowers, and mint. His son referred to

this area as "the wildflowers of death." Upon arriving at the summit, he explained, there was a pile of rocks made into a little monument, which his son called "the altar of hope."

Mr. Young said that one of the things that he discovered on that hike, as it took all of his willpower as a father to get the two kids up the mountain, was the value of taking the time to look back at how much progress had been made and to continue to keep the ultimate goal in mind, in this case, a beautiful glacial lake with a rope swing that extends out over the middle of the lake. Mr. Young applied that lesson to ATTAINS. He noted that, at the 2018 training workshop, only two states had submitted their Integrated Reports via ATTAINS, South Dakota and Tennessee. A year later, he added, there had been 37 such submissions. Mr. Young acknowledged that it is not the finish line, that the Program is still in the "wildflowers of death," but they are making progress. He also highlighted the development of ATTAINS, noting that there had been six iterations, new functionalities, a survey module, and a new home screen to keep track of measures, not to mention numerous bug fixes. He acknowledged the extensive work that had gone into the repeated development, review, and revision of ATTAINS, including feedback from many of those in the audience.

Mr. Young transitioned to *How's My Waterway*, saying that there had been extensive work accomplished on planning calls and that the system would not be what it is without the insights stemming from those calls. He also highlighted the eight trainings conducted by the data staff at EPA Headquarters since May 2018, emphasizing their willingness and ability to visit to help. In addition, Mr. Young said that there had been three rotations of data management coordinators through EPA Headquarters, helping Headquarters staff learn more about what goes on in the regions and the states, and better informing the data management coordinators as to what is going on at Headquarters.

Mr. Young identified his favorite metric as being the fact that the training workshop agenda included 24 individual courses, providing a tremendous opportunity to learn. What is really neat, he added, is that 13 of those courses are being taught or led by state or tribal staff, which he labeled as wonderful and exactly where the program should be. The last number that Mr. Young listed was "1," explaining that, while there are two training workshops occurring simultaneously, there is 1 group of people present. He said that there are not CWA 303(d) people and data people, just people trying to protect the environment, and it takes both groups to make that happen.

Mr. Young concluded by thanking ELI for making the events feel like one workshop and charged participants with thinking about how to better communicate with each other. He noted that he and Jim Havard talk all the time about solving problems together, and that it should be equally doable for everyone in the room.

Session 1: How's My Waterway?

The intended outcomes of the first session were:

- Participants will have received updates to *How's My Waterway*, including the new responsive web design for mobile devices.
- Participants will be more familiar with the app and future plans regarding it.

Kiki Schneider of the U.S. EPA opened the session with a brief overview of the history and functionality of *How's My Waterway*. She explained that Version 1 of the app was deployed seven years earlier, and that version 2.0 had been in development for a couple of years, with still a few months to go before its public release. Ms. Schneider identified the objective of *How's My Waterway* as a "one-stop-shop" for water data, informing the public at local, state, and national scales about the problems, the progress being made, and how to be engaged. She noted that a search can be made based on a zip code, watershed, or community, with information coming from ATTAINS and other systems within and outside EPA, all via web services. The main topics, she continued, are drinking water, fishing, and swimming.

Ms. Schneider then focused on the Community portion of *How's My Waterway*, which is distinct from the State and National sections. She demonstrated the app's content and functionality, adding that it is compatible with different types of devices—phones, tablets, and computers. Once a location is entered, Ms. Schneider explained, the geospatial database shows all waters that are assessed and have ATTAINS data, as well as those that have not been assessed. She demonstrated how the layers of information can be turned on and off, and she highlighted the summary information, such as the number of waterbodies and monitoring locations. She noted that, eventually, users will be able to download monitoring data directly.

Ms. Schneider walked participants through the different tabs on the page, starting with drinking water. She explained that *How's My Waterway* accesses data from the Safe Drinking Water Information System (SDWIS) at EPA, providing the drinking water sources and information on any health violations, with more details to come. Moving to the swimming tab, Ms. Schneider highlighted how good, impaired, and unassessed waters are reflected on the map and noted that more information about the waterbody and the pollutants will be available later. As for fishing, she said that the main questions that have been asked are whether the fish are safe to eat and the status of the aquatic life, adding that it is easy to see on the app which waterbodies are impaired, the status of the fish, and the health of other aquatic species.

For the monitoring tab, continued Ms. Schneider, the data are drawn from the Water Quality Portal; users can select all categories or specific categories of pollutants to view; and clicking on a monitoring station provides more information about that station. She explained that the tab for identified issues helps to answer questions like: "What should I be concerned about?" and "What are the impacts in my watershed?" She added that the map can show who has been discharging and who has had permit violations, and it provides links to the EPA compliance and enforcement database. Ms. Schneider described the restore tab as an informational and geospatial representation of restoration activities and projects, including CWA 319 grant restoration programs. She noted that users can toggle between waterbody restoration and point source projects, and that there is a separate actions page with more information for each action. As for the protection tab, she said that it will display all nonprofits in the watershed, with their websites and contact information, and provide details as to how the user can get involved as a citizen.

Ms. Schneider concluded the session by requesting that jurisdictions label waterbodies with their names, and not just their codes, when submitting data in ATTAINS, to make *How's My Waterway* more helpful to the public. She then reiterated that it would still be several months before the app would be ready for public distribution, and she would welcome feedback on how to make it substantively better and more user-friendly.

Key Points Raised:

- *How's My Waterway* is intended to be a "one-stop-shop" for water data, informing the public at local, state, and national scales about the problems, the progress being made, and how to be engaged.
- *How's My Waterway* can be accessed by phone, tablet, and computer.
- The main topics are drinking water, fishing, and swimming.
- *How's My Waterway* is populated by information from ATTAINS and other systems within and outside EPA, all via web services.

Session 2: Breakouts

This session consisted of five breakout groups, each focusing on a different topic. Prior to the training workshop, ELI, with the help of the Workshop Planning Group (WPG), assembled a list of issues and trainings that would meet relatively common needs. Through the registration materials, participants indicated their preferences from among these topics. ELI, again with the help of the WPG, then selected the most popular five topics and developed their respective agendas, including speakers, facilitators, and discussion questions. Presentation slides from each of the breakouts can be found here.

- "Freshman Orientation"
  An introductory overview of the CWA 303(d) Program, from structure to responsibilities, contacts, resources, and the Vision, followed by an introduction to these training workshops and the community of practitioners
- Litigation
  A summary of recent and pending federal TMDL and listing litigation
- Bacteria
  An overview of modeling bacteria and the science of fate and transport, microbial source tracking, and risk assessments, along with examples from practice, providing the foundation for a discussion of addressing bacteria impairments and effective TMDL development and implementation
- Nutrients – Narrative
  A discussion of approaches and outcomes, lessons learned, and expectations for future efforts (via TMDLs and "alternatives") to address nutrients with narrative criteria and other provisions of state water quality standards, as applied to different waterbody types, including wadeable rivers and streams, lakes, ponds, and marine estuaries/embayments
- Nutrients – Numeric
  Examples of how CWA 303(d) listing and TMDL programs have managed the change from narrative to numeric nutrient criteria (challenges faced, how they were overcome, lessons learned, etc.), leading into discussion about how to approach that transition

In the weeks leading up to the training workshop, ELI sought the preferences of each registered participant from among the five options and then assigned participants to groups according to those expressed preferences. The overarching objectives of this session were to: (1) train participants who were newer to the CWA 303(d) Program, or otherwise less familiar with it, on its core

responsibilities and procedures; and (2) provide more experienced participants information about key aspects of successful CWA 303(d) Program implementation.

Session 3a: Citizen Science in Practice

This session featured three presentations, followed by a brief facilitated discussion. The intended outcomes of the session were:

- Participants will be more familiar with methods for identifying and effectively engaging citizen scientists, means of ensuring that the data are usable, and various purposes for which citizen science data have been used.
- Participants will have learned about new and emerging tools for citizen scientists and data program stewards that simplify data transfer and management.

(1) James Beckley, VA: The Value of Citizen Volunteer Data

Mr. Beckley began his presentation by noting that the Virginia Department of Environmental Quality (DEQ) began to solicit citizen volunteer monitoring data in 1998, adding that he was in college at the time and received one of the very first volunteer grants. He explained that volunteers were following all of the sampling protocols, but the state did not know how to use the data because they were not collected by state scientists. Mr. Beckley said that, in 2002, the Virginia General Assembly approved § 62.1-44.19:11, which formalized a citizen water quality monitoring and technical assistance program. It required DEQ grant recipients to meet certain monitoring requirements and limited how citizen data can be used by the state.

Mr. Beckley explained that DEQ developed a three-level system to review and use submitted data: Level 1 data has no quality assurance or is not measured under water quality standards, and it could be used for education, pollution red flags, and baseline data; Level 2 data has some quality assurance and was gathered with methods similar to those used by DEQ, and it could be used for the aforementioned purposes and to prioritize areas for DEQ sampling and to track improvement; and Level 3 was gathered with the same methods as those used by DEQ, and it can be used for all of the aforementioned purposes as well as to assess waters and to list or delist waters. Mr. Beckley then noted that citizen data is never used by DEQ for enforcement or similar "regulatory" actions, by itself to develop TMDL Implementation Plans, or for assessment if it is collected from permitted mixing zones or discharge pipes.

Mr. Beckley then detailed Virginia's support for citizen monitoring. He said that the DEQ citizen monitoring program is provided 1.5 FTE staff time for training and to review citizen data, and that they annually give out $88,000 in grants. He added that the grants are typically $1,000 to $5,000 awards and cover coordination, training, and monitoring costs. Mr. Beckley listed the benefits of the program as increased water quality assessment, improved identification of pollution "hot spots," better TMDL and BMP performance monitoring, and a huge return on investment of DEQ funding and staff time. He then provided examples of each benefit.

Mr. Beckley roughly quantified the monetary value of citizen data. He said DEQ distributed a survey in 2012 in an effort to estimate monitoring costs, adding that it was a high-level survey with limited detail in cost breakdown, but the results suggested at least $750,000 worth of

volunteer data. Mr. Beckley explained that the figure was very useful when informing the General Assembly of the return on investment. A 2018 survey, he continued, sought more detailed financial information, and they received 227 responses from 60 monitoring groups, representing 1,293 volunteers sampling at 867 sites, roughly ¾ of known volunteer groups in the state. Mr. Beckley noted that the majority of responding groups indicated that half or more of their monitoring budget comes from grants, and nearly ¾ of responding groups operate with a monitoring budget of $5,000 or less per year. He also detailed the costs in volunteer monitoring, from paid staff to coordinate volunteers or in highly technical tasks (an estimated annual total of $439,159 across the responding groups) to driving miles (roughly $63,647) and out-of-pocket expenses (roughly $115,646). Mr. Beckley then walked the participants through DEQ's calculation of the value of volunteer time: 5.28 hours worked monthly by the average volunteer multiplied by 1,293 volunteers represented in the survey multiplied by an in-kind volunteer hourly rate of $24.69 (www.independentsector.org/), for a total estimated equivalent wage cost of $2,022,715. Adding all of the costs and values together, he concluded, the total annual value of the volunteer water quality monitoring is around $3.25 million, a return on investment of nearly 1,500 percent.

(2) Holly Brown, CO: Colorado River Watch – Citizen Science Data Used in Decision Making

Ms. Brown began her presentation with a brief history of Colorado River Watch, noting that it was founded in 1989 with the goal of filling data gaps for improved water quality decision-making. She explained that the organization focuses on citizen science and education; leverages resources of Colorado Parks and Wildlife, citizens, teachers, and students; and is funded primarily by Colorado Parks and Wildlife through federal and Colorado lottery money. Ms. Brown said that 20 percent of the state's water quality data comes from Colorado River Watch, making it the third largest data provider. She then detailed their breadth and depth of monitoring, including that their stations are monitored monthly for temperature, DO, alkalinity, hardness, and 13 different metals, and that they perform high and low flow nutrient monitoring and fall macroinvertebrate and physical habitat assessments.

Ms. Brown explained that Colorado River Watch uses the state's data collection methods and has a SOP Manual, QAAP, data management plan, and required annual training. She added that the organization uses a 20 percent QA/QC, rather than 10 percent. Ms. Brown noted that Colorado River Watch submitted data directly through the Water Quality Portal for the first time in 2019 but had previously used the Colorado Data Sharing Network (CDSN) and submitted data directly to the state in response to its annual data call, as well as making the data available on its own website. She elaborated on the CDSN, describing it as a customized version of the Ambient Water Quality Monitoring System (AWQMS) that uses the same format as the Water Quality Exchange (WQX).

Ms. Brown listed the uses of this water quality data in Colorado as including: assessments and CWA 303(d) listing decisions, for which the state has an annual data call; TMDL development, for which data is pulled from the Water Quality Portal, CDSN, and assessments; permitting, for which data is pulled from the Water Quality Portal and CDSN; and CWA 319-funded projects and watershed plans, for which Colorado River Watch data is used for watershed characterization.

Ms. Brown concluded by highlighting the stigma often associated with citizen science data but noting that Colorado River Watch goes to great lengths to ensure data quality, including fixing and not repeating documenting issues and correcting site names and descriptions. She added that not all citizen science groups are created equal, but Colorado River Watch is a leader in the state and helps other volunteer groups.

(3) Adam Griggs, River Network: The Water Data Collaborative: Empowering Community Water Science

Mr. Griggs started his description of the Water Data Collaborative by displaying the logos of the groups involved, including River Network, The Izaak Walton League, Waterkeeper Alliance, Colorado Parks and Wildlife, the Nicholas Institute at Duke, CUAHSI, Colorado River Watch, the Conservation Innovation Center, Chesapeake Commons, and the Pisces Foundation. He also clarified that the Collaborative is a non-profit, non-partisan entity. Mr. Griggs explained that its objective is to gather technological data and further develop the ability to deliver tools that better integrate data.

Mr. Griggs noted that technology is changing how people interact with the Internet, referencing the use of navigation apps rather than atlases and the simplicity with which health records and other files can be digitally accessed. He lamented that most water data are not connected and accessible. Mr. Griggs briefly described the Internet of Water and how it and the Water Data Collaborative are working together: participating on each other's advisory boards, sharing in the development of data management resources and data catalogues, and coordinating on community water science value demonstration projects.

Mr. Griggs began his explanation of the goals, strategies, and work to date of the Water Data Collaborative by depicting the existing resources and technologies that compose the community water science framework. He referenced many online science web services, including for analysis, graphing, modeling results, and sharing data. Mr. Griggs walked the participants through the steps of the citizen water science data process: (1) preparing for data collection; (2) data collection by monitors; (3) local data storage; (4) analyzing and visualizing the data; (5) informing action through the data; and (6) data sharing – all interspersed with evaluation and adaptive management. He added that the Water Data Collaborative is cataloging water science resources.

Mr. Griggs said that the Collaborative is starting by standardizing the first two steps of the process, as well as improving collaboration and building capacity, noting that they presently are working on study design guidance modules. Storing and saving data will be next (steps 3, 4, and 6), he added, with the eventual goal of a repository with everyone's SOPs, QA/QC plans, and data, everything needed to submit to WQX, all available to the public. Mr. Griggs noted that the first iteration of this concept is a distributed Access database being developed by the North Carolina Aquatic Data Hub. He also described the Izaak Walton League's Clean Water Hub as another relevant example.

Mr. Griggs concluded by detailing how the Water Data Collaborative will be aiding step 5, data informing action, with data-driven watershed applications. He exhibited several examples of free applications for analyzing, visualizing, and communicating data. He added that the Collaborative will be tracking regions and programs to show where NGO data is and is not

connected and available, working with existing on-the-ground efforts to support greater access to and use of NGO data, and fostering network development to fill gaps.

A participant asked about the challenge of standardizing data in order to house it in a single system, specifically with WQX in mind. Mr. Griggs responded that, although the needs are different in different places, if WQX does not change, the form of the data should not be a notable difficulty. Another participant said that many groups are submitting data to them, and they would like for the sources to be noted on these types of maps. Mr. Griggs responded by explaining that nonprofit organizations can upload data to the Water Data Collaborative and be identified by their unique ID. A third participant asked whether a volunteer group should submit data to WQX or the Water Data Collaborative, to which Mr. Griggs said that the objective of the Collaborative is to provide opportunity to groups for whom submitting to WQX is too high of a bar, effectively meeting those groups half way.

A participant expressed to the panel her concerns regarding the quality of data that might come from citizen science, especially if key volunteers leave. Mr. Beckley noted that many volunteer groups have trainers, and if the trainers are good, the data should be consistently good. Another participant added that, in her state, Blue Thumb is run by five state staffers, is dedicated to volunteer monitoring, and is verified with four quality assurance checks each year.

Key Points Raised:

- Defining tiers of data, based on the methods used to collect them and other quality assurances, can help with clarifying their acceptable uses in practice.
- Virginia estimated the monetary value of its citizen data received, from a survey of monitoring groups that provided data on volunteer hours, miles driven, and out-of-pocket expenses, to demonstrate return on the state's investment (nearly 1,500 percent).
- Not all citizen science groups are created equal, but some go to great lengths to ensure data quality, including using the state's data collection methods; developing a SOP Manual, QAAP, and data management plan; and requiring annual training.
- Most water data are not connected and accessible, but many tools have been created and are in development to foster better networks and fill gaps.
- The objective of the Water Data Collaborative is to provide opportunity to groups for whom submitting to WQX is too high of a bar, effectively meeting those groups half way by improving and simplifying each step of the citizen water science data process, and ultimately supporting greater access to and use of citizen science data.

Session 3b: "Alternatives"

This session centered around a panel of CWA 303(d) staff from four states, each with experience developing and implementing "alternatives," moderated by Chris Hunter of EPA Headquarters. The intended outcome of this session was:

- Participants will have learned how other jurisdictions decide whether to pursue an "alternative" and what factors have notably affected the success of development and implementation.

Mr. Hunter began the session with a brief overview of "alternatives." He clarified that the term "alternative" in this context relates back to the CWA 303(d) Vision, which sets as a goal the use

of the most effective tool for water quality restoration and protection in a given situation. Quoting the Vision, he said: "alternatives" "incorporate adaptive management and are tailored to specific circumstances where such approaches are better suited to implement priority watershed actions that achieve the water quality goals of each state, including identifying and reducing nonpoint sources of pollution." Mr. Hunter emphasized that there is more than one way to meet water quality standards, adding that TMDLs are a long-term tool, and might be the most prevalent tool, but they are not the only tool. He explained that "alternatives" can include Category 4b plans, for which regulatory requirements are reasonably expected to result in the attainment of the water quality standard, but the focus of the session will primarily be on 5-alts, which are waters in Category 5 where a plan has been designed to restore water quality and with the goal of eliminating the need for a TMDL.

Mr. Hunter recalled the two sessions focusing on "alternatives" at the 2018 training workshop, a general one and one specifically focused on nutrients. He identified two of the takeaways from those sessions as: (1) flexibility by EPA and states/territories as well as the involvement of stakeholders are vital to a sound "alternative;" and (2) "alternatives" should have a plan that explains how water quality standards will be attained, with milestones and good documentation. Mr. Hunter then ceded the floor to each of the four panelists in turn.

Barbara Kickham of the Massachusetts Department of Environmental Protection explained that development of their first "alternative" began in 2017, in the Mystic River watershed. She added that the watershed encompasses 22 communities located within greater Boston. Ms. Kickham noted that it is a heavily developed area with significant development pressure. The Mystic River Watershed Association, she continued, requested that the state develop a phosphorus TMDL; however, completing a traditional TMDL would be very difficult, given the complexity of the watershed, the associated costs, data needs, and lack of available staff time.

Ms. Kickham said that EPA stepped forward with the idea of developing an "alternative." She clarified that the work involved more than just developing an "alternative," as the Department of Environmental Protection and EPA learned from the communities on how to approach municipal stormwater problems. As part of a pilot program, EPA and the Department of Environmental Protection worked with select communities in the watershed to address key issues raised by the communities, such as appropriately locating low-cost stormwater BMPs, incorporating green infrastructure, and encouraging low-impact development. Ms. Kickham added that, for the pilot outreach phase, they chose communities considered to be forward-thinking, that had stormwater champions on staff, and that would dedicate the time necessary for the project. She explained that the Department of Environmental Protection and EPA would work with more communities in the next phase of the project, using the information, communication tools, and lessons learned from the first phase. She said that, since they have a regulatory hook, the stormwater permit, this direct-to-implementation approach would save time and money.

Bill Brown of the Pennsylvania Department of Environmental Protection then described how Pennsylvania had been engaged in some form of "alternative" since the Vision went into effect, initially having viewed it as a rebranding opportunity. He explained that they were previously under a consent decree and had rankled some stakeholders in the course of meeting its obligations. Mr. Brown said that they saw the Vision as a chance to revitalize those

relationships and the perception of the program, prioritizing people in the process, increasing public engagement. In disseminating public notice of draft TMDLs, he continued, they learned that the Vision contained various elements that were enticing to stakeholders and previously lacking in the program. He noted that the state was unable to do all of those things, but expressed appreciation to EPA Region 3 for its guidance and assistance.

Mr. Brown said that two Category 4b "alternatives" were short-lived, as the engagement and data collection thought to be necessary did not occur as expected. So, he added, they pursued 5-alts for nonpoint sources, working with stakeholders who can benefit from transparency in the process and from the state collecting data to support their goals. He noted that one of those "alternatives" had been accepted by EPA; the state thinks highly of another one; and two more are new.

Ben Rau of the Washington State Department of Ecology began by providing a quick description of the structure of their water quality program, housing both the TMDL and nonpoint source programs and having multiple TMDL and nonpoint source staff members at each of the headquarters and regional offices. He added that they have state authority to regulate nonpoint sources and were actively advocating for TMDLs and to address nonpoint source pollution in general. With all of those resources, continued Mr. Rau, they have had many people who could work on TMDL implementation and "alternatives," and they have had a long history with them. He explained that "alternatives" in the state go back 15 years, when staff in the eastern region office, who were more a part of the nonpoint source program than TMDLs, began addressing some impaired streams directly through implementation. Since then, he added, they used that approach elsewhere and considered other "alternatives."

Chuck Berger of the Louisiana Department of Environmental Quality said that the main reason they use "alternatives" was the interest, around the time of the Vision, in doing something more meaningful than a set number of TMDLs. With that in mind, he continued, the idea from their surveillance staff was to address the unpermitted discharges in some of the state's more rural areas as well as to help permitted dischargers that were not meeting their limits do so. Mr. Berger added that TMDLs provide little help in addressing pollution from individual homes, a significant challenge of theirs. He said that they have had success fixing individual home units as well as small facilities that need permits and updating. Mr. Berger emphasized that "alternatives" have provided a means of more directly addressing problems, primarily in the Lake Pontchartrain basin and other developing areas.

Mr. Hunter then turned to the first of his questions for the panel. He asked why they found "alternatives" to be more useful in certain instances than TMDLs. He acknowledged Mr. Berger's point that, in cases where the regulatory tool would not be as useful, "alternatives" could get more boots on the ground. Mr. Hunter asked for Mr. Rau's view.

Mr. Rau noted that they had been discussing how to make the decision of when to pursue an "alternative." He said that the state developed an internal guidance document for working through that process. He invited anyone interested in seeing it to contact him for a copy. Mr. Rau acknowledged the availability of nonpoint source permits in their state, but deemed "alternatives" a better tool for those sources. He added that they find TMDLs to be the better tool in watersheds where there are point sources. Mr. Rau referenced a checklist for this decision: Are there good local partners? Are there grants or dollars in the watershed that can

help? Are there other, related CWA 319 efforts? What is the regulatory backstop? He said that they find that last question to be an important part of the decision. He added that local ordinances can influence the decision as well.

Mr. Berger noted that, if they fix 75 to 80 percent of the problems in a watershed and it still is not meeting standards, they will then develop a TMDL. He said that they have come to realize that some of the steps for the "alternative" can be initial steps for future TMDLs. Mr. Hunter emphasized Mr. Berger's point, that the decision is not definitive and a TMDL can be made simpler as a result of initial "alternative" efforts.

Mr. Brown also agreed with that point, noting that their decisions as to what to address, and how, concern where they can add value. It is not an either-or decision, he continued, but opportunities seen with people already starting to invest. He said that they model BMPs, identify various phases of the process, and highlight where different grants could come in, which often is very helpful to those involved in addressing the problem.

Ms. Kickham noted that, this being their first "alternative," the reasoning behind pursuing an "alternative" to date is not particularly generalizable, but they hope that it will be informative for nonpoint source-impaired waterways going forward. She added that they are learning many practical lessons for towns, like small, inexpensive BMPs are much more helpful for nutrients and bacteria than larger, bigger-scale BMPs.

Mr. Hunter segued into his next question for the panel: what has the stakeholder reaction been to the "alternatives," generally positive, confused, concerned?

Ms. Kickham responded by saying that the Mystic River Watershed Association was very excited, as were the municipalities. Yet, she added that the communities they pursued wanted to be involved; they chose the two that seemed like they would have the most people involved, and then they would work with the other five communities.

Mr. Brown echoed a similar sentiment, that people generally were positive about it. He explained that they gave presentations to nonpoint source stakeholders, received an invitation from the Chesapeake Bay Foundation to present, and received calls asking to be considered to be involved and volunteer.

Mr. Rau said that they also received general support in the state, adding that, in the nonpoint source-dominated watersheds, a significant amount of time and effort is spent just getting to the implementation phase, so people tend to be supportive of making that leap to implementation. He noted that they received one comment from a local conservation district manager asking, "Why are we doing this?" Mr. Rau also recalled some concerns from an environmental group, which surprised him, but he felt that it was largely born from discomfort for working outside the usual Clean Water Act process, even though the group recognized that TMDLs might not address much of the nonpoint source problem. Mr. Rau suggested that the group was defending the value of the process and the information-gathering aspects of TMDLs.

Mr. Berger relayed that all of the feedback that they had received about "alternatives" had been positive. He noted that some of the watershed associations are more like partners and some are more adversarial, but the partners had given good feedback, and the others had not said

anything. Mr. Berger explained that they had conducted an initial round of public outreach, meeting with parish presidents and councils, and their feedback was positive as well. He added that, with all new staff trained and data collection started, they began the second round of public outreach: recording video and audio in support of the Vision activities for the state website, social media, and the parishes. One of the videos created, he continued, was "How to maintain your home sewage system," which was well-received.

Mr. Hunter then took a moment to field questions and comments. One state participant provided an update on her presentation from the prior year's workshop, noting that they had completed eight "alternatives" and had three more in process, and all of them had worked out well. Another state participant posed a question to Mr. Rau, asking whether he could open an "alternative" plan for public comment to quell the negative feedback, adding that they do that even though they are not required to do so. Mr. Rau said that there are some that they likely will put up for public comment, but others that likely will not be due to the workload that would be involved. He noted that the staff working on them had been focused on how to address the watershed at issue and how to use their regulatory authority as a backstop, elements that are in the plans but not necessarily elements to put out for comment. That being said, he continued, the plans can be obtained through public disclosure.

A state participant asked the panel to talk about the time and resource savings they see with "alternatives." She explained that, because hers is such a large state, the common sentiment is to just get a TMDL developed when they are in a watershed because it might be a long time before they are back in that watershed. But, she added, if the cost and resource savings were significant, it could be motivation to do an "alternative." Mr. Berger responded by suggesting that, if a TMDL solves the problem, do that. But, he noted that they find TMDLs to be more data intensive and time consuming than running the model, and they find facilities and get things corrected in the modeling process. Mr. Berger noted that their "alternatives" sometimes take longer and cost more than developing a TMDL, but the "alternatives" fix the problems and educate the public on water quality. He added that many parishes are starting to understand the importance of balance between environment and economy, and see this as a way of being subjected to fewer TMDLs in the future. Mr. Brown agreed, indicating that "alternatives" do not necessarily offer resource savings, rather a "if you are willing to invest, then we are willing to invest" scenario. He said that, working with both the regulated community and stakeholders, they have 25 macroinvertebrate sites to demonstrate progress, noting that it is much more investment, but much more engagement. He praised the Vision for being about more than just volume, that EPA sees that they are cleaning up the waters better than with a TMDL. Ms. Kickham also agreed, indicating that they had developed TMDLs that were not being implemented, making the direct-to-implementation approach appealing in the right situations.

Mr. Hunter thanked the panelists, adding that, when he started working on "alternatives," he conceptualized them as being quicker and less resource intensive than TMDLs, but, from these descriptions, the appeal is that they can be more effective. The participant who originally had asked the question added that they do a two-to-three-year data collection process before developing TMDLs, and then a two-year TMDL process that heavily involves the community, so it may be similar to what other states are doing as "alternatives," but getting the bean counted. She added that she was having a hard time convincing her management that "alternatives" might be the way to go, so she was looking for experiences to share with them.

Mr. Hunter used this request as a segue to the next question for the panel: TMDLs and "alternatives" have the same goal, restoration of water quality standards, and if the goal is the same, the criteria for success should be the same, but a common element of "alternatives" is varying ways of showing success—so, aside from restoration of water quality standards, how has "success" been defined for some of the "alternatives"?

Mr. Rau explained that they view "alternatives" as allocating more resources to being on the ground, working with partners and talking with people about what needs to be done about the problem on their property. The difference, he added, is beyond water quality; it is a reallocation of how they do things day in and day out. Mr. Rau said that their metrics tend to be around the actions being asked of staff—engagement metrics, the number of people (property owners) contacted, and ultimately whether effective BMPs are being implemented. With temperature, he continued, the focus is largely on buffers, so that is the metric that they consider when determining whether progress is being made or not. Mr. Rau noted that they have a separate database for it, and metrics line up for how they are approaching and implementing "alternatives" as well as TMDLs, adding that many of the same metrics are used for TMDL implementation, that they try to track the work of both.

Mr. Berger said that, when they started developing their new vision, everything was on the table, not just TMDLs. Whether it was the possibility of new TMDLs, helping parishes develop ordinances, enforcement actions, monitoring, or inspection, he added, everything was considered. Mr. Berger said that, in a similar manner, many things were on the table for determining success. He noted that the ultimate goal is to get a waterbody to meet standards, but Louisiana has 500 different sub-segments, each with one assessment site monitored on a rotational basis (although some are monitored every year). Therefore, he continued, they are looking at all sites from which they collect data to show improvement. Mr. Berger explained that they look at how many facilities were inspected, found to have been improperly maintained, and fixed. He provided several examples, including water quality improvement resulting from repaired wastewater infrastructure in a rural part of the state.

Mr. Brown noted that many of their efforts concern narrative criteria, for which measurement can be different anyway. It can take a long time for macroinvertebrate populations to recover, he added, so the state demonstrates improvement through nutrients levels. Mr. Brown explained that, when they have continuous data, they can see that some things are working, but it is a long-term investment.

Ms. Kickham added that, as Mr. Berger mentioned, they have seen that passive education (flyers, etc.) has limited reach. She expressed their desire to train the trainer, working with champions in a town to really beef up the education and get the message out to the community.

Mr. Hunter then asked the panelists about any challenges or advice they would like to share.

Ms. Kickham said that their biggest challenges had been getting over TMDLs, recognizing what an "alternative" is, and identifying how to clear it with EPA. She noted that they could put it in the Integrated Report, but then they would have uncertainty as to when to develop a TMDL, because that is never off the table. She added that they would like to use "alternatives" more moving forward, to get more impairments addressed.

Mr. Brown explained that their nonpoint source "alternatives" had gone very well, but difficulties arose when bringing in the regulated community. He noted that, once the regulated community realized that there was not a relaxation of responsibility—no lesser permit requirements, no pot of money earmarked—there developed a level of mistrust. Mr. Brown elaborated by adding that the sediment portion of the "alternative" coincided with a new requirement for permits, and, even though the permit requirement and not the "alternative" was the source of the regulated community's concerns, they took their frustration out on the "alternative."

Mr. Rau identified their biggest challenge as being getting people, including their own staff, to think of "alternatives" differently. He suggested that having effective advocates for water quality and meeting standards is key to success. He also added that a regulatory backstop and local partners are very helpful.

Mr. Berger said that the mechanics of the transmittal and review process with the region, especially with a watershed-based plan, were the biggest challenge. But, he added, they worked out those details and were moving forward. He advised others to believe in themselves and their vision and persevere. Mr. Berger concluded with two quotes: "Those who are afraid to fail may not deserve to succeed;" and "Success is not final; failure is not fatal; it is the courage to continue that counts."

Mr. Hunter then opened the floor to questions. A state participant said that they had faced challenges between reasonable assurance plans and reasonable "alternatives" and asked whether any of the panelists had to allocate to prove that projects would meet the load, adding that her state had to demonstrate that for nutrients by modeling. Mr. Brown said that their "alternatives" are BMP- or performance-based, acknowledging that it would be difficult for effluent limits. Mr. Rau added that most of their "alternatives" are in watersheds with multiple individual projects to be implemented, and so they are not doing a detailed modeling exercise for "alternatives." He noted that part of the reason that they go down the "alternative" route is to not have to do the upfront work before implementation.

The same state participant asked whether anyone had tried to do an "alternative" where there is an older, established EPA TMDL. A regional participant referenced a watershed within the region for which EPA had developed a nutrient TMDL and a sediment TMDL at the time of a consent decree. He acknowledged the haste with which the nutrient TMDL in particular was developed, with an endpoint based on DO. Since the TMDL would not resolve the algae issues, he continued, EPA said that it would redo it at some point, but doing so was complicated by ongoing lawsuits. As a result, he added, they pursued the problem using an "alternative," with some degree of success: $1 million for more data collection and modeling, $250,000 from the municipalities, and an interagency agreement to work together and get the most bang for the buck by combining resources. He explained that reservations as to whether the water quality standard could be met led to hesitation about doing anything, which is a bad approach, but put more focus on the 2003 sediment TMDL, non-pollutant pollution, and flooding. He concluded by saying that, if communities can work together to address sediment better than with a TMDL, there are some pros to it, but his inclination was just to redo the nutrient TMDL at a later point.

Another state participant asked whether any of the jurisdictions that had done "alternatives" with point sources had issues with enforceability, as far as using an "alternative" instead of a TMDL,

making sure that "alternatives" are applied to the permit as envisioned. Mr. Berger replied that a facility was referred to enforcement for longtime issues discovered through the "alternative" approach, and the facility got the treatment it needed, and the issue was resolved. He added that doing an "alternative" allowed the state to better set its priorities, investigating again and again and letting inspections continue as necessary, rather than one-and-done. Mr. Rau noted that they were in the course of such an "alternative" with point sources, but they were not far enough along to have lessons from it.

Key Points Raised:

- TMDLs are a long-term tool, and might be the most prevalent tool, but they are not the only tool.
- In certain cases, "alternatives" have provided a means of more directly addressing problems than TMDLs.
- Category 5-alt consists of impaired waters still in Category 5 but for which a plan is designed to restore water quality and eliminate the need for a TMDL.
- Having a regulatory backstop, such as a permit or permitting authority, is not critical to the success of an "alternative," but it can be very helpful.
- Having effective advocates for water quality and for meeting standards is key to the success of "alternatives."
- Potential questions to ask when deciding whether to pursue an "alternative" can include, among others:
    - Are there good local partners?
    - Are there grants or dollars in the watershed that can help?
    - Are there other, related CWA 319 efforts?
- Some of the steps for the "alternative" can be initial steps for future TMDLs; that early work is not necessarily lost if a TMDL is ultimately necessary.
- "Alternatives" can be quicker and less resource intensive than TMDLs. They also can involve more upfront investment, with the goal of more engagement/integration and ultimately being much more effective in restoring water quality in the near term than TMDLs.

Session 4: Concurrent Trainings I

This session consisted of seven trainings, each focusing on a different topic. ELI, with the help of the WPG and staff of EPA's Water Data Integration Branch, selected the topics based on responses in the registration materials and then developed the respective agendas, including speakers, facilitators, and discussion questions. Participants were assigned to a training based on their respective preferences, expressed in the weeks prior to the training workshop. Presentation slides and materials from each concurrent training can be found here.

- Engaging Your Public in Water Planning Part I

  From design, to implementation, to analysis, this two-part training provided participants with concrete steps and tools for engaging citizens in water planning and decision-making, increasing the chance that their plans will not just end up on a shelf; in Part I, the facilitators introduced participants to a Public Engagement Plan, identified the critical elements of planning

engagement, detailed how to better know the intended audience, and provided tips for getting people to show up.

- Water Words that Work

  A communications expert detailed how to translate professional-level information into clear and compelling messages for a target audience.

- "How-To" Develop a Story Map

  This training provided a step-by-step introduction to ESRI Story Maps, with an overview of the skills, software, and resources needed to create one.

- Introduction to the IR Process

  EPA staff gave an overview of the roles and responsibilities, development and submission requirements and recommendations, and tools and materials of integrated reporting.

- Water Quality Portal Data Discovery and Data Analysis Tools

  This training provided an overview of tools for retrieving, filtering, and analyzing water quality data from the portal in R Shiny.

- WATERS GeoViewer

  EPA staff introduced participants to the WATERS GeoViewer tool, including a demonstration of how to find linked geospatial data and search upstream and downstream on the NHDPlus network, and then offered support with using the tool.

- Processing Benthic Macroinvertebrate Data in R

  This training outlined the basics of building Rmarkdown reports for benthic data sets, showcasing the power of combining interactive analytical tools (Shiny) with automated reports (Rmarkdown) using probabilistic monitoring data to inform the benthic stressor analysis process in Virginia.

Session 5: Concurrent Trainings II

As with the prior session, this one consisted of seven trainings, each focusing on a different topic. Again with the help of the WPG and staff of EPA's Water Data Integration Branch, ELI selected the topics based on responses in the registration materials and then developed the respective agendas, including speakers, facilitators, and discussion questions. Participants were assigned to a training based on their respective preferences, expressed in the weeks prior to the training workshop. Presentation slides and materials from each concurrent training that had them can be found here.

- Engaging Your Public in Water Planning Part I

  This training was a repeat of the one offered in the prior session, due to its popularity and class-size constraints; again the facilitators introduced participants to a Public Engagement Plan, identified the critical elements of planning engagement, detailed how to better know the intended audience, and provided tips for getting people to show up.

- Storytelling

  Examples employing different media across four states and a tribe prefaced discussion of how to effectively tell water quality stories, including problems, what is in good shape, why people should care, what is being done and what people can do, and restoration/protection successes, to different audiences.

- Interactive Mapping

  As interactive maps become a staple in communicating water quality information to stakeholders and the public, this training showcased a diverse array of platforms, data layers, and general complexity in maps created by different states.
- CWA 303(d) TAS

  A detailed explanation of the process for obtaining CWA 303(d) Treatment in a Similar Manner as States preceded discussion about implementing the authority.
- ATTAINS User Interface 1: Assessment Units and Assessments

  EPA staff trained participants on how to enter assessment units and assessment decisions in the ATTAINS User Interface through direct data entry and batch upload spreadsheets.
- Open Source Discussion

  An introduction to R and Python, including training resources and code sharing, led into a discussion about organizing a user community.
- Hands-On with *How's My Waterway*

  EPA staff provided an overview of *How's My Waterway*, including what is next for the app, and then answered questions and assisted participants with using the app.

Session 6: Concurrent Trainings III

As with the prior two sessions, this one consisted of seven trainings, each focusing on a different topic. Again with the help of the WPG and staff of EPA's Water Data Integration Branch, ELI selected the topics based on responses in the registration materials and then developed the respective agendas, including speakers, facilitators, and discussion questions. Participants were assigned to a training based on their respective preferences, expressed in the weeks prior to the training workshop. Presentation slides and materials from each concurrent training can be found here.

- Engaging Your Public in Water Planning Part II

  Building on the information from Part I, the facilitators explained innovative and effective engagement practices, how to use qualitative data analysis techniques and strategy mapping to identify and prioritize strategies for moving forward, how to use feedback loops for transparency and buy-in, and how to keep the community engaged.
- "How-To" Develop Web Maps Using Open-Source Software

  This training provided a step-by-step introduction to Open Source Code Reports, with a particular emphasis on the skills, software, and resources needed to create a digital Integrated Report.
- Mobile Data Entry

  This training was structured around four examples of apps and other programs developed for different types of water quality data and for mobile data collection by different types of users; it included explanations of the costs and timeframe for development, how well they worked, and lessons learned.

- Tribal Data, Shared Waters, and the IR

  An overview of the recent guide for Oklahoma Tribes on submitting data and assessments for the state Integrated Report led into a discussion of tribal-state data sharing and the listing of waters crossing or fully within trust boundaries.
- ATTAINS User Interface 2: Actions and Promotion of Assessments

  EPA staff trained participants on how to enter actions (TMDLs, 4Bs, etc.) in the ATTAINS User Interface through direct data entry and batch upload spreadsheets, and they explained the promotion (Integrated Reporting submission) process for assessments.
- Water Quality Portal Data Discovery and Data Analysis Tools

  Due to its popularity, this training was a repeat of the one offered in Session 4; it provided an overview of tools for retrieving, filtering, and analyzing water quality data from the portal in R Shiny.
- Measures

  EPA staff provided an overview of FY19 core performance measures that relate to the CWA 303(d) Program, demonstrated how these measures results are generated in ATTAINS, and explained how state data are used to report on measures to senior EPA management.

Session 7: Regional Meetings and Additional Trainings

This breakout session consisted of five regional meetings, one for each of EPA Regions III, V, VI, IX, and X, each with the state, tribal, territorial, and EPA participants from that region. Participants from EPA Regions I, II, IV, VII, and VIII participated either in the data meeting for their region, which occurred at the same time as part of the 2019 National Water Quality Data Management Training Workshop, or one of the following trainings based on their respective preferences expressed prior to the training workshop:

- Engaging Your Public in Water Planning Part II

  This training was a repeat of the one offered in the prior session, due to its popularity and class-size constraints; again the facilitators explained innovative and effective engagement practices, how to use qualitative data analysis techniques and strategy mapping to identify and prioritize strategies for moving forward, how to use feedback loops for transparency and buy-in, and how to keep the community engaged.
- Stressor ID for Biological Impairments

  An overview of CADDIS and the stressor ID information and tools that it provides, an update on the nutrient stressor-response systematic review being conducted by EPA, and explanations of state approaches to identifying stressors to aquatic biology preceded discussion of how to make stressor-response information and tools more useful and accessible.
- Measures

  Due to its popularity, this training was a repeat of the one offered in the prior session; EPA staff again provided an overview of FY19 core performance measures that relate to the CWA 303(d) Program, demonstrated how these measures results are generated in ATTAINS, and explained how state data are used to report on measures to senior EPA management.

Presentation slides and materials from each of these trainings can be found here.

Whether a region convened during this session was determined by popular vote of the state, tribal, territorial, and EPA participants from each region in advance of the training workshop. Prior to the training workshop, ELI collected discussion topic preferences from each of the state, tribal, and territorial participants, as part of the registration process. ELI created distinct lists of identified topics for each of the five regions that would be convening and used those lists as the basis of discussion with EPA regional participants in the development of an agenda for each convening. ELI staff also worked with the presenters for the three trainings to ensure that they were organized and sufficiently prepared. The intended outcomes of the seventh session included:

- Participants will be more familiar with the needs, challenges, and views of others in their respective regions.
- Participants will have resolved, or at least advanced conversation on, issues important to the states, tribes, and territories of the region.
- Participants will better understand issues, procedures, and tools that are of particular importance to the successful implementation of their respective programs, and to achieving their goals for 2022.

Session 8: Continuous Monitoring/Sensors – Using, Managing, and Interpreting Temporally Dense Data Sets

This session featured four presentations. The intended outcomes of the session were:

- Participants will be more familiar with the benefits of continuous monitoring; challenges to storing, managing, and using the data; and strategies for overcoming those challenges.
- Participants will have learned about recent and ongoing tool development and pilots regarding continuous monitoring.

Bill Richardson, EPA Region 3: Introduction

Mr. Richardson began the session with an overview of its structure and content, followed by a brief synopsis of continuous monitoring. He defined continuous monitoring as water quality data collected via unattended instruments on a frequent basis, such as every 15 minutes. He noted that sondes can measure pH, DO, temperature, conductivity, turbidity, and depth. Mr. Richardson explained that these tools generate large data sets, collecting several thousand measurements per month. By comparison, he added, the more conventional discrete monitoring provides a snapshot of a short time frame and far smaller data sets, and it involves different sampling, calibration, and quality assurance methods than continuous monitoring does.

Mr. Richardson then identified several of the challenges associated with continuous monitoring. He started with challenges to collecting continuous data, including timing the deployment when it will capture critical conditions, ensuring a battery life adequate for the full deployment of the device, probe fouling and the hours of cleaning it can require, and the difficulty in assuring and controlling the quality of the data. Mr. Richardson then listed several of the challenges in assessing waters using continuous data, including storing and managing the large data sets; processing the data, as most of the software designed to handle it is very expensive; the lack of national standards for screening continuous data; the fact that criteria do

not always align well with continuous data (e.g., the applicability of the ten percent rule); the lack of assessment methodologies and EPA guidance for continuous data; and the time required to collect and work with the data.

Mr. Richardson then shifted to the benefits associated with continuous monitoring, which he suggested greatly outweigh the challenges. He explained that continuous monitoring allows large amounts of instream data to be collected with only periodic check-ins, facilitates the evaluation of wet-weather impacts, captures diel water quality changes due to photosynthesis and respiration, improves the calculation of averages as well as the assurance that certain criteria are consistently met, aids stressor identification processes, and allows for derived assessments of other pollutants through modeled relationships with continuously monitored pollutants like conductivity and turbidity.

Dwane Young, EPA Headquarters: New Approaches for Sharing Continuous Monitoring Data

Mr. Young started his presentation with a challenge to all who collect and manage water quality data: make it interoperable, so that the data from one entity can be published in the same format as others' and data sets can be easily combined. He said that the Interoperable Watersheds Network began as a demonstration project, completed in 2016, that focused on evaluating approaches to improving sensor data sharing, specifically what data standards exist, what metadata would be needed to describe the sensors and quality of their data, and what the architecture of the system would be.

Mr. Young explained that standards for sensor data, from the data elements, to the fields used, to the terms used, already existed, so new ones were not necessary. He noted that the Open Geospatial Consortium had developed two of them: the Sensor Observation Service and the Water Markup Language 2. Moving on to metadata, Mr. Young said that further work was necessary on that topic; standard ways were needed to clarify what data are available and for what parameters, what data can be used, and what the quality of the data is. He explained that they developed a report focusing on a sensor's GPS location, the parameters it is monitoring, and the period marker for those parameters, but many other important details remain to be covered. Mr. Young then inquired as to the architecture of such a connected system, how to link multiple data providers with large amounts of data that have the potential to change every 3 to 15 minutes. He explained that pushing data to a central repository every few minutes would not work; rather, like Google, the center of the architecture is a catalog or index that references every data owner's assets with the corresponding metadata for each sensor. When a user requests data, he continued, the search index can identify the appropriate data appliance or server, reach out to it, and provide the user with the desired data. He added that the approach has worked very well, and they currently are building out each of the different pieces to make them more robust.

Mr. Young said that the pilot started with two partners in two HUC-8 watersheds and spread to eight partners: the U.S. Geological Survey; EPA Regions I, VII, and X; EPA Office of Research and Development; New Jersey Department of Environmental Protection; New Jersey Meadowlands; and Clermont County, Ohio. He noted the recent availability of a data appliance component in EPA's GitHub that allows a user to ingest data and have those data published using the common standards. Mr. Young explained that CUAHSI was developing the central

search index, and he estimated that it would be completed by the end of 2019, at which point the Interoperable Watersheds Network would be operational.

Mr. Young concluded with a brief list of what was next. He noted that the demonstration catalog was still available, but downplayed its value as a long-term solution. He also said that EPA had begun discussions with CUAHSI for them to take ownership of the catalog, and EPA was completing their 'Authority to Operate' in Amazon Web Services for the data appliance, which would make the tool available for any EPA office to publish their data. Mr. Young solicited additional functionalities in Python for incorporation, should anyone have ones to share. He also highlighted their interest in figuring out how to best integrate the Interoperable Watersheds Network with the Water Quality Portal. Finally, Mr. Young ran a live demo of a sensor funneling data into a Google sheet, which would later be used to set up a data appliance, to show participants how easy the process can be.

Mark Hoger, PA: Pennsylvania's Continuous Physiochemical Assessment Method

Mr. Hoger highlighted Pennsylvania's experience with continuous monitoring, having had collected such data for 12 years. He noted that his presentation would cover their process for collecting and managing continuous data as well as how they had begun using those data for assessment purposes. Regarding collection, he continued, Pennsylvania has very few long-term continuous monitoring sites and does not use telemetry; in most cases, staff collect a representative data set for a year or two and then move to another site. Mr. Hoger noted as advantages of this approach the ability to have unique deployments, such as sensors off rock outcroppings that would be scoured during high flow events; they spend less time and resources establishing stations; and they are able to collect representative data at many sites over a few years with just 30 to 40 sensors being deployed at a time.

Mr. Hoger emphasized the importance of quality assurance and quality control in collecting continuous data, including regular fouling and calibration checks, discrete readings with an independent meter, corrections and removal of "bad" data, and cross-section transects to ensure data are representative of the larger waterbody. He said that these processes are used for all of their continuous monitoring data. Mr. Hoger then turned to the use of continuous data, noting that it had evolved over the prior decade. He explained that the data were first used to characterize background conditions; later the state began using continuous monitoring for cause-and-effect studies, regarding municipal and industrial discharges and endangered mussels, in cooperation with the U.S. Fish and Wildlife Service; and more recently, the state began assessing waters for aquatic life use and water supply criteria as well as determining the causes of eutrophication using continuous monitoring data.

Mr. Hoger then explained how they aligned some of the unique characteristics of continuous data with the state's water quality standards. He noted that the state has pH and DO criteria as well as model-derived parameters such as osmotic pressure and total dissolved solids, which help account for uncertainty in the model when making assessment decisions. Mr. Hoger also referenced the state's rule that "[criteria] shall be achieved in all surface waters at least 99% of the time." With discrete samples, he clarified, if a sample represents one day, four samples in excess of the criteria would constitute not attaining the criteria (4 days / 365 days = 1.1%). He said that they use a year, rather than a different time frame, because it has the greatest consistency with biology when applying the 99 percent rule. Mr. Hoger described the way that

they apply this rule to continuous data as identifying the number of readings that would constitute an exceedance of the criteria 1 percent of the time, for example, at 60-minute intervals would be 88 readings in the year, at 30-minute intervals would be 176 readings in the year, and at 15-minute intervals would be 351 readings in the year. Once the quality assurance of the data is complete, he continued, the criteria exceedances are tabulated, the 1 percent impairment number (above) is multiplied by the fraction of the year covered by the data set, and that resulting figure is compared against the number of documented criteria exceedances.

Mr. Hoger suggested that knowing certain things about stream conditions, particularly critical time periods for different water quality problems, can save resources. For example, he added, if one is looking for low DO conditions, the middle of winter is not the best time to find them. He also noted that different years can have different-looking data, for reasons such as precipitation amounts and timing during critical periods, and that this helps to inform what one must look for when doing re-assessments.

Mr. Hoger then detailed how continuous monitoring of a few parameters can support the analysis of many other parameters. He referenced U.S. Geological Survey studies that revealed strong relationships between certain parameters and the value of models in developing data sets for many parameters that were not directly monitored. Mr. Hoger expressed his gratitude to EPA Region 3 for its assistance when the state was writing its assessment methodology for using model-derived data sets when making assessment decisions. He also highlighted U.S. Geological Survey guidelines on developing and evaluating such models. Mr. Hoger offered some advice to these ends as well: take a sample directly over the sensor, so as to accurately represent the conditions being monitored by it; include a large range of values (e.g., from all times of the day), so as not to build a model extrapolated from a subset of conditions; and review the record to anticipate critical periods for sampling. He emphasized the importance of models being site-specific, unless a great deal of effort is put into proving the similarity of conditions across sites. Mr. Hoger also cautioned participants that every model has a level of uncertainty, and that such should be accounted for when making assessment decisions, adding that Pennsylvania follows the U.S. Geological Survey approach, with the uncertainty measures of the model determining the probability of exceedance of criteria (e.g., if the probability of exceedance is greater than 90 percent, then it is considered an exceedance).

Mr. Hoger pivoted to the spatial applicability of a continuous monitoring record. Through an example, he explained how to connect sensor readings to water quality higher in the watershed. He emphasized the importance of the first step, to review the record and take discrete measurements over the top of the sensor at critical times, so as to confirm the values from the sensor. The next step, continued Mr. Hoger, is to collect discrete measurements from tributaries to see where the exceedances can reasonably be thought to originate. He noted that this information allows for the extrapolation of the sensor data to other parts of the watershed, spatially extending the assessment without deploying more sensors. Another value of this analysis, he added, is better understanding water quality in poorly mixed systems. Finally, Mr. Hoger highlighted the value of characterizing conditions for future reference and reassessment, to understand what is recorded and how it fits into conditions typically expected at the site.

Britta Bierwagen, EPA Headquarters: Tools to Tame the Continuous Data Beast: Examples from the Regional Monitoring Networks

Ms. Bierwagen began her presentation by describing the Regional Monitoring Networks as a volunteer, grassroots effort to document current conditions and detect long-term trends at a regional scale. She added that they collect biological, thermal, hydrologic, water quality, and habitat data one or more times a year, for ten or more years, at a set of targeted sites, using regional protocols. Ms. Bierwagen said that sampling efforts began in the Northeast in 2012 among states who wanted to collect baseline data; they then spread to the Southeast in 2013, the Mid-Atlantic in 2014, and the Midwest in 2016-2017.

Ms. Bierwagen emphasized that baselines change and that it is important to know how they change and how to respond to the changes. She noted the gaps in contemporaneous biological, thermal and hydrologic data, especially in smaller, headwater, minimally disturbed sites, adding that these gaps from discrete samples, as opposed to continuous data, impede identification and analyses of natural variability and long-term trends. Ms. Bierwagen explained that some of the parameters on which the Regional Monitoring Networks collect data are harder to continuously monitor than others. She said that temperature is easy to monitor continuously. She added that, with game cameras, they have been able to compile images that complement flow and other data, for example, visualizing extreme weather events while registering their impacts on the biota and how recovery occurs.

Ms. Bierwagen clarified that her part of the Office of Research and Development (ORD) at EPA Headquarters supports the Regional Monitoring Networks partners with technical information that they may need, more the back-end work, such as which tools to use in analyzing the data, whereas the states, regions, and regional lending programs get the instruments into the field. Ms. Bierwagen noted that the Regional Monitoring Networks are trying to get consistency across the partners, through products like a generic Quality Assurances Project Plan that encourages consistent quality and methods. She added that they also developed a best practices report on methods for year-round sensor deployment, to increase data comparability and quality across participating entities.

Ms. Bierwagen portrayed the Regional Monitoring Networks as a bottom-up effort, saying that no one has it in the budget to do all the data management, but people want to contribute on a regional basis to better understand things like seasonal variations. She said that many things remain to be done beyond the monitoring itself: developing the tools to support biomonitoring programs in working with continuous thermal and hydrologic data; making biological data preparation and metric calculation faster and easier; ensuring that a minimum level of quality control is performed; formatting data consistently to facilitate reporting and analysis; and exploring ways to evaluate biological, thermal, and hydrologic data in combination without losing the richness of the continuous data set. Ms. Bierwagen highlighted a couple of tools to meet these needs, the development of which was funded by EPA ORD: ContDataQC and BioMon Tools packages. She provided an overview of the functions of each package, adding that the beta version of an R Shiny online interface that performs the basic functions of the ContDataQC R package was available, skipping the need for users to download R software onto their computers or work with R code.

Ms. Bierwagen concluded with reference to the forthcoming EPA webpage dedicated to the Regional Monitoring Networks, noting that it will seamlessly link with the architecture described by Mr. Young, as the goal is to make all of the data available for use.

Prior to questions, Mr. Young took the stage to demonstrate the simplicity of setting up a data appliance. He accessed the Google sheet that had been collecting sensor data during the session, identified the different categories of data, and then quickly registered the sensor and each parameter. Mr. Young then revealed the results and its continual functioning. A participant asked Mr. Young whether either of the following exist: a list of ways that data can be posted, other than Google sheets, for connection to a data appliance; and a list of ways by which one can connect and download the data, other than Excel. Mr. Young responded by noting that Internet resources (http, ftp, etc.) can be used for ingestion, and a XML file is generated in the download, so it can go anywhere. Mr. Richardson suggested that people contact their regional data coordinator if they need help with any of it.

Another participant asked Mr. Hoger whether Pennsylvania had a methodology for eutrophication and, if so, to explain it and how it had been used with DO and pH. Mr. Hoger responded by saying that the methodology concerns continuous parameters as well as grab samples and suggested looking at the state's protocol for the details. He added that the methodology considers changes in DO, temperature, and pH, to make sure that changes in DO are indeed related to photosynthesis and respiration rather than another parameter.

Key Points Raised:

- The benefits associated with continuous monitoring greatly outweigh the challenges:
    - Benefits include: large amounts of instream data can be collected with only periodic check-ins; wet-weather impacts can be evaluated; diel water quality changes due to photosynthesis and respiration can be captured; the calculation of averages can be improved, as can assurance that certain criteria are consistently met; stressor identification processes can be better supported; and assessments of other pollutants can be derived through modeled relationships with continuously monitored pollutants.
    - Challenges include: probe fouling; ensuring a battery life adequate for the full deployment of the device; timing the deployment when it will capture critical conditions; assuring and controlling the quality of the data; storing and managing the large data sets; processing the data; the lack of national standards for screening continuous data; criteria not always aligning well with continuous data; the lack of assessment methodologies and EPA guidance for continuous data; and the time required to collect and work with the data.
- Reviewing the continuous monitoring record, taking discrete measurements over the top of the sensor at critical times, and taking discrete measurements from tributaries higher in the watershed allows for the extrapolation of the sensor data to other parts of the watershed.
- Knowing certain things about stream conditions, including critical time periods for different water quality problems, can save resources and help to inform what one must look for when doing re-assessments.
- The Interoperable Watersheds Network began as a demonstration project focused on evaluating approaches to improving sensor data sharing.

- Standards for sensor data exist, but progress is needed on standardizing ways of clarifying what data are available and for what parameters, what data can be used, and what the quality of the data is.
- The architecture for sensor data sharing is under development and will be a catalog or index that references every data owner's assets with the corresponding metadata for each sensor.
- Setting up a data appliance is easy.
- The Regional Monitoring Networks are a volunteer, grassroots effort to document current conditions and detect long-term trends at a regional scale.
- Many things remain to be done beyond the continuous monitoring itself: developing the tools to support biomonitoring programs in working with continuous thermal and hydrologic data; making biological data preparation and metric calculation faster and easier; ensuring that a minimum level of quality control is performed; formatting data consistently to facilitate reporting and analysis; and exploring ways to evaluate biological, thermal, and hydrologic data in combination without losing the richness of the continuous data set. Some solutions to these challenges are in development.

Session 9: Creative Ways to Visualize Complex Data

This session was intended to be a presentation by Thomas McCall of Infographics.com about various methods for conveying complex data through visually appealing and easy-to-understand graphics. Unfortunately, due to his flight being cancelled and no options being available that would get him to Shepherdstown on time, the session was cancelled. Mr. McCall gave the presentation a few months later via a NEIWPCC webinar.

This timeslot was used instead to explain and discuss current and upcoming CWA 303(d) projects at ELI and EPA Headquarters. Adam Schempp of ELI began by noting that ELI's first compendium product was The Compendium of Water Quality Restoration Approaches, a spreadsheet organizing examples of successful water quality restoration efforts by the problem(s) addressed and the method(s) used to solve them. He emphasized that the spreadsheet is a living document and solicited updates and additional examples. Mr. Schempp then briefly turned to the effectiveness monitoring compendium, stating that it was in draft form and that they hoped to release it for comment in the near future. In describing the 2018-2019 compendium, on protecting healthy waters, he said that it will be more map-based, visually reflecting which states are doing what with regard to protection, adding that the objective is to facilitate communication between staff from different jurisdictions. Mr. Schempp also referenced two white papers developed by ELI as part of the protection compendium, one on the ways that money from the Clean Water State Revolving Fund can be used for protection projects and a similar paper regarding the Drinking Water State Revolving Fund.

Mr. Schempp indicated that the next compendium would focus on communication. He referenced the Storytelling session from earlier in the training workshop and encouraged the participants who were not in that training to look at the materials and presentations from it on the app and workshop website. For example, he added, a summer intern from Nebraska developed a short 1 Second Everyday video on the life and work of a water quality staffer, providing engaging insights into the job. Mr. Schempp applauded the innovative communications work that so many people in the program are doing and relayed one of the comments from a panelist in the Storytelling session: "after seeing what everyone else is doing, I just want what everyone else has."

Rosaura Conde of EPA Headquarters then took the stage to introduce and discuss the concept of a CWA 303(d) Program communications toolbox. She described the project as the development of tools and templates that state, territorial, and tribal staff would be able to easily modify to suit their communications needs. She noted that Sara Schwartz of EPA Headquarters will be leading this project and invited participants to reach out to her with ideas, examples, and questions. Ms. Conde also highlighted the question in the evaluation form focused on communication materials that participants would like to see the EPA develop, and encouraged them to complete it.

Ms. Conde then emphasized what she had heard as one of the major themes of the training workshop: the leaps and bounds of technology. She noted the R Shiny interfaces and other tools that simplify sharing data with the public but also asked how to best turn the data into information for partners and even the public, giving them something to grasp. Ms. Conde then focused on social media, saying that she heard several participants mention it as a way to draw people to program webpages. She asked whether there are specific tools regarding social media presence, from language to strategies, that would be helpful to have or that participants had used and found productive.

A state participant noted that social media is challenging to use, as the handle is usually the agency's as a whole. Thus, she continued, one is working through the state agency to communicate with it. She also took the opportunity to mention that a common discussion over the prior two years had been rebranding and how to explain TMDLs, adding that it is a task that might require a communications expert. Another state participant supported the rebranding suggestion, saying that using preferred language internally can help the terminology to spread. She added that, in the Storytelling session, it was stated that good products are blasted out on social media, the site gets many hits, but then traffic dies down. She asked what can be done to keep people coming back. She added that she had been thinking about evergreen content, and while re-posting old content every six months may seem repetitive and old news, it is not old to new followers.

A state participant asked whether any jurisdictions had developed videos without in-house staff or the budget for outside contracts? Ms. Conde turned the question into a show-of-hands poll of how many participants do <u>not</u> have communications staff to help. The answer was that most people in the room did not. Ms. Conde then noted as another key point from state participants during the week was the importance of internal communication and communicating with stakeholders. A state participant emphasized her interest in the open source Integrated Report, adding that it would be helpful to have an easy way to craft an Integrated Report like that from ATTAINS. Another state participant said that collaborative work with the U.S. Geological Survey and U.S. Forest Service is important, and it is critical to support each other's work. Ms. Conde returned to the issue of templates, to which a state participant lamented that their struggles are in getting the resources to be able to do the useful things that others are doing.

Mr. Schempp concluded the discussion by highlighting the importance of understanding the cost, the role of collaborators, and other critical factors of a communications project when analyzing it for potential adoption elsewhere. He added that technology, including a wide range of free or inexpensive apps, are making basic videos and other products far less expensive to create. Mr. Schempp highlighted the presentation in the Storytelling session by Josh Jones from the Red Lake Band, where he showed a video that he created with a little drone, to capture the beauty and quality of the area's aquatic resources.

Training Workshop Wrap-Up

(1) Dwane Young, EPA HQ; Jim Havard, EPA HQ; and Adam Schempp, ELI: Summary and Next Steps

Mr. Young began his remarks by noting how great of an experience it was to spend the week with the assembled group. He emphasized his enjoyment in hearing casual conversations around the campus covering topics from Integrated Reporting categories to the birds in the woods. He asked where else that mix of issues could be overheard. Mr. Young said that he hoped many conversations focused on data, CWA 303(d), the Vision, communication, and how to work together better.

Mr. Young took a brief moment to recommend that data folks not be referred to as "IT." He said that they may know how to fix a computer monitor, but that is not what they do. Mr. Young then acknowledged the regional data management coordinators who were in attendance, adding that they are critical to the efforts of the Water Data Integration Branch. He noted that many of them were not data people when they took on that role, so they have had to learn a lot and work through frustrations, but they keep trying and have been wonderful. Mr. Young also expressed his gratitude to the representatives of tribes who participated in the training workshop, explaining that they brought perspectives that often are missing from the discussions, which was a tremendous benefit to the entire event.

Mr. Young then highlighted several items for the week. First, he said that there was significant discussion regarding open source software, including requests for more tools and support, something that he was pleased to hear given that the Water Data Integration Branch viewed this training workshop as the beginning of developing open source communities. He identified Shelly Thawley, noting that she would be facilitating that effort, and encouraged people to participate. Second, Mr. Young expressed his appreciation to the many people who tested out and provided feedback on *How's My Waterway*. He added that the comments, thoughts, and ideas were tremendously helpful, and that he and his staff will continue to adapt and adjust. He welcomed additional input as the process continues.

On that note, Mr. Young concluded with a focus on continuing the conversation. He said that the Water Data Integration Branch has a number of calls that focus mostly on how they design their data systems, but that there are other opportunities for different kinds of collaboration, including who is doing cool things and how-to's for ATTAINS. Mr. Young noted that they will look into quarterly webinars with a rotation of topics, and he emphasized that everyone is invited. He indicated that those webinars would start later in the year. Mr. Young also reiterated the effort of the Water Data Integration Branch to get out to the regions, to get a better understanding of the challenges there and how EPA Headquarters can be of more help. He then ceded the remainder of his time to Richard Cochran of Tennessee.

Mr. Cochran thanked Mr. Young for the time and professed his appreciation for the training workshops, noting that it was his third time attending. He alluded to the lengthy drive ahead of him and his colleague and that they always spend it talking about how to implement what they heard during the week. Mr. Cochran highlighted the value of hearing what everyone else is doing, and while every state is different, a common, unspoken challenge is scientists against the IT staff. Anything that can be done to avoid IT involvement, he added, is a success because

it would otherwise be an IT project, with a contractor, additional costs, and less of a chance of getting finished.

Mr. Cochran explained that, for this reason, Tennessee enters information directly into ATTAINS during the water quality assessment process. He acknowledged that this is a different way to use ATTAINS, but that it has worked well for them. He said that they made segments and added a lot of information. Mr. Cochran recounted that, when they do an assessment, the data analysis tools identify criteria violations, and then he and his staff put it in context and make notes while they paint the picture that is the assessment, all the while entering the data into ATTAINS live. He said that they use the comment fields liberally to give breadcrumbs for people to re-create what was done and why certain choices were made. When they delist, they include the rationale so that they are not starting from scratch later.

Mr. Cochran reiterated that ATTAINS is his tool for doing assessments. Where others see it as a tool to navigate in order to deliver information to EPA, he added, all he has to do is push a button. He was quick to clarify that neither approach is right or wrong, but he wanted people to know that, if they choose to think about it in this way, it does work. Mr. Cochran did identify two problems: if ATTAINS is down, it is hard to make progress; and Internet access is required. He noted that one of their field offices has very slow Internet, but ATTAINS worked while GIS did not. Mr. Cochran concluded by suggesting that anyone having serious difficulties integrating with ATTAINS should consider using ATTAINS directly. He added that Tennessee had never made the April 1 deadline before, and now he guarantees that they will not miss it again. He invited anyone with questions to contact him.

Mr. Havard then took the stage and began his remarks by expressing his appreciation to all of the presenters and participants, as well as the ELI staff, and Jeff Berckes, Traci Iott, and Frances Bothfeld for their leadership with ACWA. He also thanked Rosaura Conde for her work in leading the EPA Watershed Branch's efforts in developing the training workshop, and Dwane Young, Cynthia Johnson, and the rest of the Water Data Integration Branch for their extensive efforts and collaboration.

Mr. Havard then recalled John Goodin's opening remarks, about the *Endurance* and Shackleton and the four parallels to the CWA 303(d) Program—adaptive management, resource management, tracking and measuring, and the importance of individual character and abilities. He noted that all of those elements were on display over the week. Mr. Havard said that the people in the room, and the programs generally, are well-equipped for successful implementation well into the future.

Mr. Havard listed a few themes from what he heard over the week: a great willingness to share information and materials and to help generally; many new and creative ideas; emerging technologies for analysis and communication; and excitement about new ways to achieve and communicate successes. He also said that he heard that adaptation, particularly when it comes to prioritization and implementation of the Vision, is key, adding that how the Program moves forward after 2022 will be important, and it will be a collaborative process.

Mr. Havard highlighted that many tribes are establishing and adding to sound water quality program building blocks, including data management and assessments, and he applauded the work of Laura Shumway on the ATTAINS tribal pilot. Mr. Havard also reiterated the demand

for trainings for staff from tribes, adding that they will be delivering on that need for both data and CWA 303(d). In addition, he noted that several tribes are enthusiastic about attaining CWA 303(d) TAS, and some are on the cusp of doing so. Mr. Havard said that they want to help interested tribes with tools to make that possible, and EPA Headquarters will be working with the regions and tribes to that end.

Mr. Havard then highlighted a few key take-home messages: it is important to maintain and build on the connections made or advanced over the week; telling stories and defining what happens after 2022 requires cooperation, and it is incumbent upon each person to make that happen; and communication within the CWA 303(d) Program, especially regarding how it can improve, is needed across all levels. Mr. Havard also emphasized the importance of trust in the community, explaining how vital it is to implementation to engage people in a way that empowers them to make good decisions and builds trust between the community and government. He added that communications tools will be an important factor moving forward, and EPA is working with ELI on a communications compendium. He noted that states, tribes, and territories will be a key source of information and ideas for that product.

Mr. Havard concluded by returning to Mr. Goodin's parallels to the lessons of the *Endurance*. He said that the CWA 303(d) Program has a strong Vision and is in a position to develop TMDLs and other plans that suit the needs of implementing entities and are driven by state priorities, adding that this is the position in which the Program should be. Mr. Havard noted that the Program has the ability to adapt, and that it is important to communicate the value of the Program's work and to integrate with other programs. He also highlighted the importance of the comradery within the Program. He likened it to the music from the evening before, with talent and leadership coming from many different places as song follows song. Mr. Havard applauded the diversity of skills, variety of educational and experiential backgrounds, extensive creativity, and willingness to share among the people of the Program. The unifying objective, he added, is restoring and protecting water quality, providing places for folks to recreate and for aquatic life to flourish. Mr. Havard declared that the Program is set up to charter the course and endure into the future.

Mr. Schempp then provided a few closing statements before turning the microphone over to Allen Bonini of Iowa for the send-off. He started by reiterating his appreciation to the participants for taking the time from work and home, and in many cases traveling great distances, to be a part of the event. He acknowledged the hard work of some of the participants to get approved to attend, and thanked them for those efforts. Mr. Schempp emphasized that their participation makes the training workshop what it is, that none of the objectives listed in the agenda could be accomplished without their contributions. Echoing a point raised by Mr. Young, he added that, the conversations outside the classroom might be as beneficial as the time spent in class, and that value is lost without the widespread participation, and willingness to get to know new people, from which the week had benefitted. Mr. Schempp then concluded by welcoming Mr. Bonini and thanking him for his help in developing the training workshops from their infancy, making them the large, integrated events that they are.

(2) Allen Bonini, IA: Send-Off Remarks

Mr. Bonini began by noting that he had spoken from prepared remarks only one other time, when he gave the eulogy at his mother's funeral 20 years earlier. The reason for doing so, he

continued, was so that people could understand exactly how he felt, and this would be the second time.

Acknowledging that most of the people in the room did not know him, Mr. Bonini provided a brief background on himself. He explained that he had been in the business of environmental protection for 40 years, and that he had worked in three Midwestern states: Illinois and Minnesota, then Iowa for the preceding 15 years. Mr. Bonini noted that he had spent over half of his career in water quality, being in recycling and solid waste before that. He emphasized his passion and commitment to making the environment better and to leaving a legacy for his children and grandchildren.

Mr. Bonini praised the comments and reflections on the training workshop that had just been delivered, adding that he could not have said them better, but noted that he would take a different approach in his remarks. He reiterated that he has "been here for a while," noting that he served on the Workshop Planning Group before passing the torch to Jeff Berckes, and emphasized his gratitude for the opportunity to come back at the waning of his career. Mr. Bonini conjectured that he was the oldest person in the room, and while he and people like him have historic knowledge and experience, it is time to pass the torch. He noted that he has spent a lot of time trying to prepare his staff to become the next leaders within the organization, recognizing that, to continue success, they must position people to carry the torch forward.

Mr. Bonini explained that, as he thought about what he would say to this group, how he would use the opportunity, he asked himself how he would characterize his career. Two phrases came to his mind: "We've come a long way, baby"—for those old enough to remember the Virginia Slims commercials—but also Yogi Berra's "deja vu all over again," adding that some of the challenges and questions facing the program are the same as they were 20 to 30 years ago, especially with regard to nonpoint sources. He confessed that he was not sure which phrase was more accurate, perhaps both, but that they were the foundation from which he was reflecting.

Turning to his prepared remarks, Mr. Bonini echoed the thank-yous to the staff of ELI and EPA and to the Workshop Planning Group for another excellent program, adding that his one frustration, as is true of all good programs, is that he was not able to attend multiple sessions at the same time. He then thanked the participants for their active involvement.

Mr. Bonini said that he would start with reflection and challenges. He clarified that he spoke solely for himself, not for his agency or state, adding that those who know him know that he has spoken truth to power for years, and that he would not stop now. Referencing a quote by Howard Beale from the movie *Network,* Mr. Bonini said that there have been too many times in recent years where he is "…as mad as hell."

Mr. Bonini noted that the NCTC campus highlights the legacy of some of the greatest conservationists, including two Iowa natives, Ding Darling and Aldo Leopold. In the Ding Darling rooms, he continued, there is a sampler with 20 pages dedicated to his editorial cartoons on conservation, dating back 100 years. Mr. Bonini said that he was struck by the relevance of Ding Darling's pointed commentary to today's issues; the same fights are being fought 100 years later. He pondered "whether we are living up to the collective legacy of the

conservation giants." How many generations will re-learn the problems and solutions? When will we, in the words of Nike, 'just do it'?"

Mr. Bonini continued with a few personal insights: first, EPA is actively trying to get the Ninth Circuit to reject the constructive submission doctrine, which could set the stage for states to reject the TMDL obligation. Mr. Bonini added that EPA would not be able to boast of the tens of thousands of TMDLs created if not for it. Second, he continued, EPA's improvement and new performance measures are amazing in two ways: (1) process improvement should be continuous – things should not get so broken that an elaborate scheme is needed to find a better way to do them; and (2) having all 56 Integrated Reports submitted at the same time is nonsensical. Mr. Bonini elaborated on each point, as a manager, his job is to ask his staff each and every day how to make things better. He added that these training workshops are a great example of continuous process improvement. As for the Integrated Reports, he likened them to orders placed by customers, and approving them as fulfilling the orders, and no company would prefer to receive all orders over a 30-day period every two years. He suggested staggering the reports, so that EPA can better direct its workforce.

Shifting his focus, Mr. Bonini reflected on public support for environmental projects. He reiterated the comments from earlier in the morning about simplifying the message, and he quoted Abraham Lincoln from the first Lincoln-Douglas debate: "With public sentiment, nothing can fail; without it, nothing can succeed. Consequently, he who molds sentiment goes deeper than he who enacts statutes or pronounces decisions. He makes statutes and decisions possible or impossible to be executed." Mr. Bonini explained that Abraham Lincoln was talking about slavery, but suggested that the point applies well to the state-EPA relationship; in many ways, the states are part of EPA's public. Thus, he recommended that EPA first get state buy-in if it wants to enact successful changes.

Mr. Bonini added that the general public is on the side of the program and water quality, and has been for decades. While this is not evident from news reports and pundits, he noted, Gallup has polled the public on environment versus economy since 1984, and the March 2019 survey showed more Americans believing environmental protection should take precedent over economic growth, when they conflict, by the widest margin since 2000. Sixty-five percent chose environment, he explained, up eight percent from the prior year; other than during the Great Recession, environment has always been on top. Even more importantly, continued Mr. Bonini, the public "created our institutions and trusted us to preserve, protect, and enhance our environment." He suggested that, for everyone in the room, it is a moral and ethical obligation as environmental stewards to do what is right.

Mr. Bonini then reflected on an event at the Harkin Policy Institute at Drake University earlier in the year; it was a discussion session between Eric Holder and the former Chief Justice of the Iowa Supreme Court. He said that they covered many topics, but one thing that resonated with him as a public servant was when Mr. Holder explained that, when he became Attorney General, he continually reminded himself that he was only there a while, but the people who do the job are the professionals. Mr. Bonini said that such is how he tries to look at it at his agency, and he encouraged everyone else to do the same.

He added that, after listening to Eric Eckl, what are needed are simple and compelling ways to tell the state stories and motivate others to tell those stories. He referenced a quote from the

final episode of Game of Thrones: “There is nothing in the world more powerful than a good story.”

In closing, Mr. Bonini encouraged everyone to enjoy their summer, family and friends, and the natural resources they have committed to preserving and protecting, adding: “To transform, you need to be transformation; be bold; be strong; be brave – do it for your community, children, and grandchildren.” His final quote was one from the movie Bohemian Rhapsody: “Good thoughts, good words, good deeds.” Mr. Bonini then thanked the staff at ELI and EPA and expressed his appreciation for the opportunity to contribute to improving the environment for 40 years.

APPENDIX 1: TRAINING WORKSHOP AGENDA

ENVIRONMENTAL LAW INSTITUTE®

AN INDEPENDENT, NON-PARTISAN ENVIRONMENTAL EDUCATION AND POLICY RESEARCH CENTER.

2019 NATIONAL TRAINING WORKSHOP FOR CWA 303(d) LISTING & TMDL STAFF

ADVANCING THE PROGRAM AND COMMUNICATING THE RESULTS

National Conservation Training Center
Shepherdstown, West Virginia
May 29 - 31, 2019

TRAINING WORKSHOP AGENDA

This project made possible through a cooperative agreement with the United States Environmental Protection Agency

PURPOSE OF THE TRAINING WORKSHOP

To provide an opportunity for staff from state and territorial Clean Water Act Section 303(d) listing and TMDL programs and tribal water quality programs to learn and discuss lessons from implementing tools and training, and from communicating and engaging with partners and stakeholders

WORKSHOP OBJECTIVES

- Learn about state, tribal, and territorial **approaches to common challenges** in the CWA 303(d) Program.
- Learn about **tools, frameworks, and strategies for communicating** water quality information.
- Learn **techniques for engaging** stakeholders in planning and implementation efforts.
- Learn how states are **incorporating new sources of data** into CWA 303(d) Program functions and products.
- Receive **updates on research, products, and legal developments** relevant to the CWA 303(d) Program.
- Enhance the **network of listing and TMDL professionals** by expanding and improving communication among the states, tribes, and territories and with EPA regions and headquarters.

OUTPUT

A final report summarizing presentations and discussions from the training workshop. The report will include a summary of individual input from workshop participants and may serve as a reference for program personnel implementing their responsibilities consistent with the Vision.

AGENDA

Tuesday, May 28 ***Arrival, Check-In, and Registration***

2:00 pm – 8:00 pm	NCTC Check-In and Training Workshop Registration Main Lodge
5:30 pm – 7:30 pm	Dinner Commons Dining Room
8:00 pm – 9:00 pm	Informal Welcome Murie Lodge, Lounge Area

Wednesday, May 29 ***Training Workshop Day 1***

6:30 am – 8:30 am	Breakfast Commons Dining Room
8:30 am – 9:30 am	**Welcome*** Auditorium
	Greeting *Adam Schempp, ELI* *Sandra Nichols Thiam, ELI*
	Opening Remarks *John Goodin, EPA HQ*
	Introduction *Jim Havard, EPA HQ* *Dwane Young, EPA HQ*
9:30 am – 10:00 am	**Session #1** **How's My Waterway?*** Auditorium
	What's New? *Kiki Schneider, EPA HQ*

Session #1 Outcomes:

- *Participants will have received updates to How's My Waterway, including the new responsive web design for mobile devices.*
- *Participants will be more familiar with the app and future plans regarding it.*

10:00 am – 10:30 am Morning Break

10:30 am – 12:00 pm **Session #2**
Breakouts
Breakout Rooms, Various Locations

This session will consist of five breakouts, each focusing on a different topic. Each participant is registered for a training based on his/her topic preference expressed prior to the training workshop.

- "Freshman Orientation"
- Litigation
- Bacteria
- Nutrients – Narrative
- Nutrients – Numeric

Session #2 Outcomes:

- *Participants who are newer to the CWA 303(d) Program or otherwise less familiar with it will have learned about its core responsibilities and procedures.*
- *More experienced participants will have learned more about key aspects of successful CWA 303(d) Program implementation.*

12:00 pm – 1:00 pm Lunch
Commons Dining Room

1:00 pm – 2:00 pm **Session #3a**
Citizen Science in Practice
Auditorium

The Value of Citizen Volunteer Data
James Beckley, VA

Colorado River Watch – Citizen Science Data Used in Decision Making *Holly Brown, CO*

The Water Data Collaborative: Empowering Community Water Science *Adam Griggs, River Network*

Session #3a Outcomes:

- *Participants will be more familiar with methods for identifying and effectively engaging citizen scientists, means of ensuring that the data are usable, and various purposes for which citizen science data have been used.*
- *Participants will have learned about new and emerging tools for citizen scientists and data program stewards that simplify data transfer and management.*

2:00 pm – 3:00 pm **Session #3b**
"Alternatives"
Auditorium

Panelists *Chuck Berger, LA*
Barbara Kickham, MA
Bill Brown, PA
Ben Rau, WA

Facilitated Discussion

Session #3b Outcome:

- *Participants will have learned how other jurisdictions decide whether to pursue an "alternative" and what factors have notably affected the success of development and implementation.*

Potential Discussion Questions:

- Why have you pursued "alternatives," and through what process or in what instances have you decided to do so?
- What responses have you received from outside groups regarding "alternatives" (positive or negative)?
- What are some of the biggest challenges you have faced in developing and implementing "alternatives"? How did you overcome them?
- While the goal of any 5-alt is restoration of the relevant standard (just like a TMDL), "success" can come in stages and take many forms. How has "success" been defined in some of your "alternatives," and what successes have been achieved?
- What have been critical elements of successful "alternative" development and/or implementation, in what circumstances?

3:00 pm – 3:30 pm Afternoon Break

3:30 pm – 5:00 pm **Session #4**
Concurrent Trainings I*
Breakout Rooms, Various Locations

This session will consist of seven distinct trainings. Each participant is registered for a training based on his/her topic preference expressed prior to the training workshop.

- Engaging Your Public in Water Planning Part I
- Water Words that Work
- "How-To" Develop a Story Map
- Introduction to the IR Process
- Water Quality Portal Data Discovery and Data Analysis Tools
- WATERS GeoViewer
- Processing Benthic Macroinvertebrate Data in R

5:30 pm – 7:00 pm Dinner
Commons Dining Room

7:00 pm – 10:00 pm Bonfire

Thursday, May 30 *Training Workshop Day 2*

6:30 am – 8:30 am Breakfast
Commons Dining Room

8:30 am – 10:00 am **Session #5**
Concurrent Trainings II*
Breakout Rooms, Various Locations

This session will consist of seven distinct trainings. Each participant is registered for a training based on his/her topic preference expressed prior to the training workshop.

- Engaging Your Public in Water Planning Part I
- Storytelling
- Interactive Mapping
- CWA 303(d) TAS
- ATTAINS User Interface 1: Assessment Units and Assessments
- Open Source Discussion
- Hands-On with How's My Waterway

10:00 am – 10:30 am Morning Break

10:30 am – 12:00 pm **Session #6**
Concurrent Trainings III*
Breakout Rooms, Various Locations

This session will consist of seven distinct trainings. Each participant is registered for a training based on his/her topic preference expressed prior to the training workshop.

- Engaging Your Public in Water Planning Part II
- "How-To" Develop Web Maps Using Open-Source Software
- Mobile Data Entry
- Tribal Data, Shared Waters, and the IR
- ATTAINS User Interface 2: Actions & Promotion of Assessments
- Water Quality Portal Data Discovery and Data Analysis Tools
- Measures

Sessions #4, #5, and #6 Outcomes:

- *Participants will have new skills in communication, engagement, and/or data management.*
- *Participants will be more familiar with certain aspects of the CWA 303(d) Program and its implementation.*
- *Participants will have learned of useful resources and have gained valuable contacts.*

12:00 pm – 1:15 pm Lunch
Commons Dining Room

1:15 pm – 3:00 pm **Session #7**
Regional Meetings and Additional Trainings
Breakout Rooms, Various Locations

This session will consist of five regional meetings, one for each of EPA Regions 3, 5, 6, 9, and 10, each with the state, tribal, territorial, and EPA participants from that region. Participants from EPA Regions 1, 2, 4, 7, and 8 will participate in the regional data meeting or one of the following trainings based on their respective preferences expressed prior to the training workshop:

- Engaging Your Public in Water Planning Part II
- Stressor ID for Biological Impairments
- Measures

Session #7 Outcomes:

- *Participants will be more familiar with the needs, challenges, and views of others in their respective regions.*
- *Participants will have resolved, or at least advanced conversation on, issues important to the states, tribes, and territories of the region.*
- *Participants will have learned more about key aspects of successful CWA 303(d) Program implementation or new skills in communication and engagement.*

3:00 pm – 3:30 pm Afternoon Break

3:30 pm – 5:00 pm Afternoon Activities and Data Management Office Hours

5:30 pm – 7:00 pm Dinner
Commons Dining Room

7:00 pm – 8:00 pm **Informal Evening Sessions I**

- *Feedback on the New Design of How's My Waterway*
  Rachel Carson Lodge, Lounge Area

- *Vision 2022*
  Murie Lodge, Lounge Area

8:00 pm – 9:00 pm **Informal Evening Sessions II**

- *Climate and the CWA 303(d) Program*
  Aldo Leopold Lodge, Lounge Area

- *Water Quality Trading and the CWA 303(d) Program*
  Ding Darling Lodge, Lounge Area

Friday, May 31 — *Training Workshop Day 3*

6:30 am – 8:30 am Breakfast
Commons Dining Room

8:30 am – 10:00 am **Session #8**
Continuous Monitoring/Sensors – Using, Managing, and Interpreting Temporally Dense Data Sets*
Auditorium

Introduction
Bill Richardson, EPA R3

New Approaches for Sharing Continuous Monitoring Data
Dwane Young, EPA HQ

Pennsylvania's Continuous Physiochemical Assessment Method
Mark Hoger, PA

Tools to Tame the Continuous Data Beast: Examples from the Regional Monitoring Networks
Britta Bierwagen, EPA HQ

Session #8 Outcomes:

- *Participants will be more familiar with the benefits of continuous monitoring; challenges to storing, managing, and using the data; and strategies for overcoming those challenges.*
- *Participants will have learned about recent and ongoing tool development and pilots regarding continuous monitoring.*

10:00 am – 10:30 am Morning Break

10:30 am – 11:30 am **Session #9**
Creative Ways to Visualize Complex Data*
Auditorium

Thomas McCall, Infographics.com

Session #9 Outcomes:

- *Participants will have a better understanding of alternatives to basic pie, bar, and line formats for visualizing data.*
- *Participants will have gained ideas for attention-grabbing, easy-to-understand graphics that could be developed from their data.*

11:30 am – 12:00 pm **Training Workshop Wrap-Up***
Auditorium

Summary and Next Steps

Dwane Young, EPA HQ
Jim Havard, EPA HQ
Adam Schempp, ELI

Send-Off Remarks

Allen Bonini, IA

12:00 pm Lunch
Commons Dining Room

APPENDIX 2: PARTICIPANT LIST

2019 NATIONAL TRAINING WORKSHOP FOR CWA 303(d) LISTING & TMDL STAFF

ADVANCING THE PROGRAM AND COMMUNICATING THE RESULTS

National Conservation Training Center
Shepherdstown, West Virginia
May 29 - 31, 2019

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APPENDIX 3:
COMPILATION OF TRAINING WORKSHOP PARTICIPANT EVALUATIONS

Fifty-three workshop participants completed an anonymous Participant Evaluation Form (provided in the folder materials). The combined numerical results from the evaluations indicate an overall event rating of "Very Good-to-Excellent," across all categories. In addition to the numerical responses, we received many written comments, which are reproduced here.

Participant Evaluation Form: Compilation

Scale: 5 = Excellent, 4 = Very Good, 3 = Satisfactory, 2 = Fair, 1 = Poor

A. The Workshop—Overall

Information Presented
5 (33) **4** (19) **3** (1) **2** (0) **1** (0) **AVG: 4.60**

Workshop Materials
5 (28) **4** (23) **3** (1) **2** (1) **1** (0) **AVG: 4.47**

Workshop Organization
5 (42) **4** (10) **3** (1) **2** (0) **1** (0) **AVG: 4.77**

Group Interaction
5 (37) **4** (14) **3** (2) **2** (0) **1** (0) **AVG: 4.66**

Session Facilitation
5 (35) **4** (16) **3** (2) **2** (0) **1** (0) **AVG: 4.62**

Conference Facility (NCTC)
5 (48) **4** (4) **3** (0) **2** (0) **1** (0) **AVG: 4.92**

Comments:

- ELI has continued to put on a great workshop!
- Love the app! Would be helpful to have room # for breakout sessions. Could also have a flashcard for how to download the app as part of welcome packet. Next year group photo to be done with a drone and folks stand in layout of states.
- Auditorium and classrooms were cold.
- Thanks for adding outlets. Temp hot/cold.
- As usual the workshop was excellent! Presenters were well-prepared and provided useful information. The materials, organization and facilitation were outstanding and ensured success. Group interaction was very good and opportunities to interact were many and frequent.

- Perhaps include some pointers on how to use guidebook app with the instructions to log in. I think there are a lot of good ways to use the app, but only if we all know how. ELI staff is awesome, thanks for all that you do.
- The meeting was run very well – great timing and organization. Microphones were very helpful and well-spaced!
- Excellent conference. Would have liked to attend vision 2.0, but room was packed, and I could not see or hear. Maybe a follow-up session for that would be good.
- Bonfire was fun! Loved the app – please add locations to all sessions and if possible a map of the whole NCTC campus (i.e.) all trails. It's a lot of travel for only 2.5 days of workshop. Not that it needs to be longer, but maybe offer a couple optional 1-day classes, or field trips, or something to make it easier to justify all that travel. I liked the location, but consider moving to the west coast once in a while, would be really nice for everyone from that side of the country.
- This workshop exceeded my expectations, as did the facility and the organization of the conference. There were a lot of overlapping sessions, where I would have liked to attend both sessions. That was the only issue.
- I have just returned to the program after being away 9 years. Everything was VERY helpful for me. Great job!
- Great facility! Great facilitation (Adam et al.). Great social/evening session, appropriate amounts of beverages, great food! Shared Data & Listing meeting is a great idea.
- Very useful topics. We've come a long way since we helped come up with the vision. Appreciate EPA is modernizing through ATTAINS and that many new measures will be outputted from ATTAINS. State's PPA's need to catch up. Issue new WQ measures summary and guidance. 303(d) guidance memo, please be sure to say EPA is now encouraging states to combine lists if they are behind.
- Adding room numbers to the app for breakouts would be awesome. More time this morning (5/31) to pack up and fill out this evaluation would have been helpful.
- If possible it is nice to have presentations beforehand. Some breakouts would be good to have several times or as a group session. Litigation should be full group session for the TMDL.
- Overall very informative – I learned new things and made new contacts. I'd like to see more presenters get out of the state's mindsets and be more inclusive of tribes & territories. I'd like to see tribal/territorial reps present to the whole group & not just in breakout sessions. States often have a blind spot to tribes, & unless EPA regional staff work directly with tribes, they are clueless about the level of technical expertise & capacity a tribe has. I didn't enjoy being spoken down to by an EPA Region 5 staff person who knew nothing about the tribe I work for.
- This year's workshop was better than the one I attended 2 years ago. The sessions were more useful and the attendance was good. My only criticism is that many sessions were only offered once but I couldn't attend some because it conflicted with another one I needed to attend ex. Litigation vs. narrative nutrients; regional sessions vs. stressor identification of bacteria.
- I was not able to attend freshman orientation, storytelling, and litigation breakouts. I think they were a great idea and would suggest having them as breakouts next workshop. Would like to see presentations on narrative nutrient TMDLs, water quality trading, performance measures, examples of multi-state TMDLs. I like the afternoon activities.

- App didn't provide room numbers for sessions otherwise I found it very functional.
- Great organization by ELI – facilitated an open atmosphere for communication. Great breadth of topics.
- A great breadth of topics. I'm not technical, so the more management-oriented topics are better for me but there is enough content to be very productive. And having the presentations available quickly will help me share it with technical staff at home. The NCTC is impressive!
- Love this workshop – always informative with topics relevant to today's issues. Wish we could bring all TMDL staff. Thank you for all the hard work that goes in to putting this workshop on & having it run so smoothly.
- Liked the app. NCTC is a great facility – leads to better networking. Very well organized. ELI support is critical to having such a great workshop. They do a great job.
- Excellent job ELI! Well organized. Great information. Please extend for extra half day/night.
- Great workshop! Having an increased number of breakouts was helpful & good diversity of topics. However, a couple of sessions made me realize that there is a lot of variation in skill levels, experience, and program familiarity, which can create difficulty in reaching a large percentage of the audience. I think providing "101" or overview breakouts can be helpful for new staff.
- Was frustrated that the 4-5 very interesting program/content-specific breakouts in session #2 were all held at the same time and consequently only one could be viewed by one person. Other sessions only had technical topics which might have not been as important to some attendees and would have provided a chance to have some more of the program-specific topics.
- Fantastic workshop. Got a lot of takeaways from this.
- The paperless option was a nice addition. The opportunities you create for me to interact with my colleagues from across the country is so valuable. I have stayed in contact with many of my colleagues over the years, and without this conference I don't think I would have met and had the chance to collaborate/learn/exchange info/grow and improve my work without this opportunity. Thank you ELI!
- Good topics which were generally well presented. Although I like the breakout sessions, I also value group sessions. Please keep both in the mix. Ok with transition to digital materials. I liked the app. It had good content. I only used schedule. Tried to use rating form but it wouldn't load in a timely fashion. I like having access to workshop materials to use as a reference for later. Good to have resource sheets even if no slides.
- As always, it was excellent! Thank you ELI for providing this amazing workshop.
- Very well organized with timely topics for the agenda.
- The app worked great!
- Liked the app. Facility was wonderful. Everything was really well done. I like that the materials are available online so we can bring what we learned back.
- Another wonderful, productive conference. While the data display theme isn't the most relevant to my highest priority work, the interactions and conversations with other states, EPA staff, etc. was impressive, helpful, and absolutely worth my time and travel. As always, the facility and food and ease of travel was lovely. It is great to have cell service and wifi more available. For future conferences, may I suggest more focus on

implementation, such as case studies and open discussions on how everyone is doing implementing TMDLs; anyone revising TMDLs; how to do the NPS, NPDES, and other programs interface. Also, would be good to focus on high-interest pollutants (eg bacteria, cyanoHABs, nutrients). For bacteria and cyanoHABs: what are the different indicators/parameters, lists of labs, state of science on DNA-based methods.

- Would like to see an "assessment coordinator" session, where methodologies and interpretation of WQS is the focus, especially getting information about how states have automated exceedance analysis to inform assessment.
- The breakout sessions were very good, I liked how it broke up the day and we got out of the auditorium more. Also thought that the breakout sessions were positive for fostering conversations with folks you may not have networked with without the breakouts.
- I think some of the topics especially bacteria/pathogens could have been turned into workshop, perhaps with all regions or less, depending on logistics. ELI does an awesome job organizing and coordinating.
- Would be nice to have a web version of the app that could be used on computers.
- App was a great addition!
- One of the best organized and paced meetings that I have ever attended. Good mix of small and large group sessions, good amount of breaks. Really nice job!
- Networking with many talented folks who are committed to the nations water quality.
- I liked the app, but it wasn't easy to get, and it didn't show my entire schedule. Thursday 10:30 schedule didn't show. And it didn't show room numbers. The location link just went to the map. I saw on other people's phones that the app showed the room number.
- I really liked the app. It was very convenient. Schedule had a good pace.
- For future workshop, create platform for young professional to gain network and career advice. Need more workshop for R and python coding. Climate change should be developed as a formal session. The laptop at the lab is not well equipped. More hands on lab learning opportunities. Should provide notes and notes pad for future.

B. Goals and Outcomes

How effective was the workshop in satisfying the stated goals and intended session outcomes?

5 (30) **4** (16) **3** (1) **2** (0) **1** (0) **AVG: 4.62**

How successfully did the workshop meet your own expectations?

5 (30) **4** (17) **3** (0) **2** (0) **1** (0) **AVG: 4.64**

Comments:

- I think overall my expectations were met. Some presentations were more useful than others; however, TMDLs and 303d listing involves such broad topics.
- I was informed of some developments in data, TMDLs, etc. I think case studies are always more valuable than research talks.
- I think the workshop was excellent. It was great to have the territories and tribes. I don't think however that I learned about their programs as much. That could have been done

differently. Also, I missed having ATTAINS collaboration with 303d (not a presentation).

- Many of the presentations have links but I'm not sure where these will be posted?
- Always tough to choose between breakouts.
- First time attending, look forward to coming again.
- I was hoping to get more ideas on how to overcome apathy/burn out to get more public to participate. Got some ideas to generate interest but when we are trying to get a demographic to participate that has kids in sports, a job for each parent, other committees they are already on, we only tend to get the 70+ crowd – not always interested in new info, technology, etc. ("not how I did it").
- Excellent agenda (eg. Bacteria, TMDLs, public participation, 5-alts, continuous data, vision).
- The breakout sessions on specific topics were great. I really got a lot out of the exchange of info in those more intimate/smaller group sessions.
- Nice balance between plenary and breakout sessions with enough time for networking. Guidebook app was difficult to download, took a lot of effort and not really that much help.
- Loved meeting new people!
- All of the presentations were excellent. I learned at least 1 or 2 new things in each of them. Great questions were asked and good participation all around.
- Vital to get programs together to share info and develop relationships.
- I love all the networking opportunities. Very well organized. Some of the breakouts ran short, which I thought was a detriment to the overall training.
- I think there are several good sessions on communication and engagement, but I'm not sure I saw a consistent "theme" tying the meeting together, nor a session at the end recapping the theme.
- Some sessions were great and provided good content; others with panelists were vague in content because of each panelists time constraints (eg. Alternatives to TMDLs panel).

C. Communication Assistance

Story Maps (31) **Infographics** (34) **Factsheets** (26)

What other communications materials, tools, trainings, etc. would you like to see EPA Headquarters develop?

- Success stories detailing implementation strategies and targeted stakeholders. Highlight WWTP/municipalities that invest in measures to improve WQ and nonpoint groups that are actively putting in practices that work.
- ATTAINS video training.
- Signage – for instance with lake/beach closures.
- Tools or training for developing interactive web report for the Integrated Report.
- I think we would all benefit from new branding, that's consistent throughout the country – ie replace TMDL with watershed management program or something more meaningful – same with the terms "303d," "nonpoint source program," "319." And look at terms like "impairment" and think of the best way to message those.

- In addition to creating templates, do webinars to demonstrate. Also, HQ should work with regions and states to make sure needs are met. Webinar on social meeting strategy?
- Keep working on the continuous data. We're collecting some and could use assistance with QA/QC and evaluation. We'd be happy to serve it.
- Provide a format for TMDL fact sheet. Templates would help (like 319 NPS success story format) because we have so little time to devote to this because states are so busy just doing the work.
- I like the TMDL Academy idea. What social media policies do other states have?
- We're always looking for new/better ways to communicate.
- Off the shelf videos/story maps/fact sheets. What is a TMDL? Pollutant specific videos (like Virginia's PCP video). Training materials for easy to use communications tools.
- Open source IR deployment (like PA) with linkage to ATTAINS. R and R Shiny analysis and visualization training.
- Storytelling in general. We still have a tendency to communicate in a fashion that is too technical and we need more examples that use plain language.
- Tools that we can use in Alaska – often they don't use Alaska data or we are left out in some way. Document templates for various IR docs.
- I think that story maps would be better to do on our own – but supporting materials (photos, gifs, graphs) would be helpful (library of sorts). Assistance with creating videos when you don't have money or access to a "video dept." How to make them look better than home movies. Anything on use of drones.
- Communication materials – social media and community engagement projects. Trainings – hydrology basics, water quality data analysis, CWA from a legal perspective/landmark CWA cases and their impacts on regulation.
- Short videos on critical topics. We used an EPA video on nutrient pollution in a story map. It was well done. Other short educational videos could be helpful.
- R tools for water quality data retrieval analysis and visualization especially for water quality portal.
- Complete "How's My Waterway" for all jurisdictions. FANTASTIC. We don't have IT staff to do this.
- For EPA regions, templates to help display regional information. State trends on water quality improvement overall, TMDLs in place vs. impaired waters, etc.
- I enjoyed the engaging the public session. Materials relating to scaling these engagement practices would be helpful. I prefer templates and how-to videos over things like webinars. A lot of these things are easier to understand by doing.
- Apps.
- Anything to do with modeling.
- Various software and apps for developing materials and videos.
- Continued training on effective public communication. This will require new staff since most of us are technical introverts and not outreach experts.
- Tutorials or open source code to develop apps for mobile data entry.
- TMDL templates, data tools (LDC's), facilitation tools, continuous data tools, water quality trading examples, case studies (benchmarking with other states).
- I'm glad a "TMDL academy" is in the works. Next – would be great if EPA would develop "Assessment Academy."

- Template for 305b/303d list with requirements built in and drawn from ATTAINS. ATTAINS basics training video for staff – YouTube!
- Info re: Vision post 2022 as soon as possible.
- Case studies that describe the managerial and resources necessary to successfully create these products. How were managers convinced to support and engage on these communication efforts?
- Communicating TMDLs to the public including rebranding; Many states are using R in really smart, efficient ways to display and communicate monitoring data for doing and communicating water quality assessments that other states could benefit from if they knew what all was out there and who to contact to obtain the scripts to tweak something already existing for their own use. Future of the Vision plan for 2022 forward; More discussion on meaningful measures for both EPA and states.
- Training on effective communication on climate change.

D. Specific Sessions

Responses labelled "Key Takeaways" are responses to the question: "Please identify up to three (3) key takeaways, opportunities, and/or solutions from this breakout" in the app.
Some sessions may include responses from both CWA and Data attendees as the app could not differentiate between the two.

Welcome

5 (24) **4** (15) **3** (4) **2** (0) **1** (1) **AVG: 4.39**

- I liked Dwane Young's son's story.
- Please identify yourself at start of talk would be my feedback for presenters. I enjoyed the Antarctic exploration metaphor but this session overall could be shortened.
- Location was loud due to so many people. Always great to see everyone and exchange info.
- Dwane did a great job engaging the audience and making the meeting theme personal.
- This was fine.
- Always great to hear from John. Session was a little long with so many opening speakers – but not sure what could have been done about that.
- A good foundation for meeting was set – I appreciated that the "higher-ups" took the time to give such a good message.
- Great job!
- Good overview.
- John is always a treat. Jim & Dwane did a great job summarizing the efforts of the last year. If possible, it would be nice to get a similar intro with states' perspectives, perhaps from ACWA with information gained via calls or surveys.
- Welcome was great. Would be good to get original motivation for 2022 vision and general overview for those who are new or unfamiliar before jumping into successes.
- It would have been helpful to spend time getting everybody to download the app and also to provide a brief overview of the week's program. But the content and speakers were very good.
- Loved the stories of hardship and the lessons learned for ourselves and our programs.

- Good cheering on by Dwane.
- Too long? This was my first time and I was so pumped to do the items they were talking about, but I felt like the main goals could have been summed up in five minutes, and we could get started. I think it would be good to have more audience interaction - like "stand up if this is your first time here" or "stand up if you've been in the program for 30+ years" - that way it can be a conversation starter, especially for new people to the program or to Shepherdstown. Or maybe a different format, like an ice breaker activity for facilitated white board activity to connect people before the sessions start.
- Key Takeaways - Number of ATTAINS submittals, encouraging. Excited to hear EPA will encourage combining IR. We plan to submit a 2018-20 list. excited for a TMDL academy.
- Key Takeaways - Remember your achievements.
- Key Takeaways - John Goodin was great.
- Key Takeaways - Get to the point - don't talk about all the connections you make, start making connections. Give the audience an idea of who is here and their experience level. A lot of new people who were here to learn expressed that they had no clue what was going on in the introduction, and the freshman orientation came afterwards. Just keep new folks in mind.

Session #1: How's My Waterway?

5 (18) **4** (26) **3** (7) **2** (1) **1** (0) **AVG: 4.17**

- When can we expect to see the new draft fully populated for review?
- Fine. Good presenter.
- Still digesting this tool that doesn't tell our state story accurately.
- I'm very excited by this new tool but would like a cheatsheet handout since the demo was too fast to take notes.
- I thought it was going to be same old, same old, but redesign is nice.
- Good demo.
- It will be great, once it's done, but it feels like we've been hearing "it's coming soon" forever.
- Excited to see states load in the new version.
- Good preview.
- Good to see demo and happy to have access to check out HMW. Would have been good to use session to ask states/tribes/territories what they need on state tab or how to tell state story. Less talking "at" us and more "with" us.
- We don't have data in this yet, but the new version seems promising. Good overview.
- Very interesting – a lot of work has been done!
- Cool updates!
- Too brief.
- Not sure of launch timeline? Comment period? During previous reviews, our state data was confusing.
- The phone/app hand out is great. Kiki explained things very well.
- Good to get an intro to the new format. Very excited to use this and possibly embed in our state website.

- Good to see the progress on this project and the wealth of data available.
- Lots of potential but also lots of data quality issues. Also, I couldn't find the app for Android/Google Pixel phone.
- Very useful tool for the public.
- Useful tool.
- Love to see this product completed.
- Have seen this presentation multiple times.
- Love this tool and how far it's come!
- Very cool app but needs to be completed.
- While the application wasn't fully functional, I think it will be a great tool for jurisdictions and the public.
- Informative.
- Key Takeaways - Puerto Rico is part of this effort??
- Key Takeaways - Many smaller watershed groups or associations who lack GIS will find this very useful.
- Key Takeaways - Very useful tool to allow the public to understand the water quality concerns at various levels (national, state, community). May need to consider what information is pulled from GRTS. Does the public need to know all the project status updates or comments entered?
- Key Takeaways - We won't have to recreate the wheel to make our data interactive. Easy for students and the public in general. Hope one day this can replace the written IR format.
- Key Takeaways - Michigan's data isn't ready. We've got work to do.
- Key Takeaways - Very cool but not an effective replacement for state level apps.
- Key Takeaways - Data from many areas will be presented in one area. The public will be able to see statewide data for an overview.

Session #2: Breakouts

5 (31) **4** (18) **3** (3) **2** (0) **1** (0) **AVG: 4.54**

Freshman Orientation

- 303d Freshman Orientation was very helpful.
- It was very useful. Could have done without the 40-minute Q&A session on Categories.
- The info about Shepherdstown was super helpful! Would have loved more time for that and less general info on 303d program.
- Good material, but time-management could have been better. I would have liked to hear from Jeff B.
- Eric and Selena provided a clear overview of the program with good discussion on the various categories of waterbodies in an integrated report. I appreciated this as a way of providing context for the week's sessions.
- Good intro to the subject.
- Key Takeaways - Thanks for referring newbies to the following resources: Perciasepe Memo, 2006 Integrated 303(d)/305(b) Reporting Guidance (IRG).
- Key Takeaways - I finally understand what an Integrated Report is, and what 305(b) is, compared to 303(d).

- Key Takeaways - I'm new so the "How to" TMDL concepts were valuable.

Litigation

- Excellent overview. Thanks for keeping the "admin record" part to a minimum.
- Very informative (and scary at times…).
- Jim Curtin does an excellent job. Maybe needed another 30min to cover more cases and discussion of future litigation topics he thinks will arise (e.g., reasonable assurance).
- Very helpful. Good summary of cases and discussion. Should have this every year.
- Jim is awesome, but always brings more to say than time, and doesn't leave time for questions. Details of cases are great, but we still need to hear how decisions affect the day-to-day for state and regions.
- Not enough time to get through all the cases. Would be nice to see a summary of how recent decisions have shaped the program.
- Always more information than time to cover.
- A lot of time on constructive submission.
- The session was great, but there was not enough time to explore the range of issues expected to be covered. More importantly, the direction EPA seems to be taking with respect to "constructive submission" is not a good idea at all. That direction may help EPA with one case, but it spells serious consequences for the future of TMDLs.
- Key Takeaways - Getting rid of constructive submission concept may be bad for states that have the political will to do TMDLs.
- Key Takeaways - A copy of the presentation ahead of the lecture would be useful.
- Key Takeaways - Takeaway #1 is that if constructive submission is overturned then citizens will have no recourse if states are unwilling to create TMDLs.

Bacteria

- Good discussion and as always too short – I know this topic comes up at most workshops but please don't get rid of it. With such a large population of impairments befalling bacteria – it is something all states have in common and as a parameter that is a living organism – new info is always coming to light.
- Would have appreciated more case studies on how bacteria is being reduced in regions.
- Too technical in a way. I enjoyed the Michigan implementation the best and found it most worthwhile.
- Very informative. Enjoyed the talks.
- Great presentations. Might make for a good webinar.
- Key Takeaways - Source tracking technology keeps getting better and more useful. One question that pops up from time to time, E. coli levels are high, but how much pathogens are actually present to warrant an impairment. Are other indicators better or more representative?
- Key Takeaways - Modeling bacteria, types of source tracking, using source tracking in the field and the solution used to try and resolve the impairment.
- Key Takeaways - No time for discussion.
- Key Takeaways - Learned how Molly used the media to bring attention to issues, forcing her agency to address bacteria issues. Also made me think more about E. coli die off rates.

- Key Takeaways - The example from Michigan was great, good content, storytelling and gave ideas how to apply in Colorado.

Nutrients - Narrative

- Excellent topic and group. I would have gone to Numeric Nutrient criteria as well, but they were scheduled at the same time. More versions on these next year, please.
- Was good to hear how other states approach the topic – may have been good to hear EPA's expectation for states.
- Great to hear what other states are doing with their narrative to move implementation.
- Good discussion.
- Great conversation during the session.
- Key Takeaways - I think we need to continue to try and think outside the box for innovative approaches to address nutrient issues in lieu of numeric nutrient criteria. Assessment methods that use the narrative to list nutrient-related impairments need to be clearly documented with public review process to help with future defensibility.

Nutrients - Numeric

- Excellent presentations and good to hear the challenges people have had in implementing numeric criteria and communicating the "rise in impairments."
- Examples were well fleshed out – seeing the impact of numeric criteria (WI) was more useful than understanding the history of their development (FL), so would be interested in seeing more numeric criteria impacts across the country.
- Would have been great if numeric and narrative were at different times, many would attend both if possible.
- Good presentations, excellent visuals.
- Erin was thorough, informative and funny. Wisconsin was interesting and thorough too.
- Great discussion.
- Good presentations but would have liked more dialogue and discussion.
- I liked how the states led this session vs. EPA; it is valuable to hear state perspectives on these topics.
- Informative session for a newbie.

Session #3a: Citizen Science in Practice

5 (12) **4** (22) **3** (10) **2** (1) **1** (0) **AVG: 4.0**

- Interesting to hear metrics about volunteer monitoring programs and how others are sharing data.
- Great info but how did states get interest from groups?
- So interesting! Need to continue to explore this topic as we will need this data more and more.
- The VA example, including the associated regulation is worth emulating.
- Good topic & presentations.
- I got the feeling the Internet of H2O people are duplicating efforts with How's My Waterway. Should really work together more.
- Good session, but not what I needed.

- Will reference resource documents to initiate citizen science project in our area.
- May have been a better breakout session.
- This was good, I enjoyed putting a $ value on citizen volunteer data as presented by James Beckley, VA.
- Good, like to see more focus on talks, esp. funding and uses.
- Very interesting how volunteer groups can get data into story while some states cannot. Thought-provoking talks.
- It's the first I've heard of the Internet of Water and I'm confused why we are developing multiple tools to share data when we already have WQX. I'd like a session next time on all the concurrent efforts to share/QC/analyze data and where they overlap and why each one is needed.
- Good presentations. Nothing new.
- Information was helpful. People are working on resources to let citizen science groups develop their own QAP and SOP. We need these resources sooner than later.
- Meh, ok but not that interesting for me.
- Not real relevant for the TMDL program.
- Would be good maybe to bring in a citizen science monitoring group to get their perspective on challenges to setting up a program, day to day operations, working with states, etc.
- Too many examples we covered in a "lightning talk" fashion, which made it a challenge to engage in any of the examples. I would have preferred a single, detailed example which provides info on the steps taken to design and implement a citizen science program.
- Really eye opening session about what CAN be done with volunteer monitoring.
- Liked learning about Internet of Water from Adam Griggs.
- Wahoo.
- Key Takeaways - It was difficult to hear some of the panelists due to technical issues. Some responses were long-winded.
- Key Takeaways - Have spoken to Jim Beckley in the past; they have an impressive program. The alternative data submittal discussion by River Network is not applicable to us but exciting to hear of this option for other states. We are telling volunteers to upload to our site using our excel format OR upload to WQX.
- Key Takeaways - New platforms for volunteers to share their data. Gave me ideas for engaging volunteers and making their efforts more worthwhile. Made me think about QA/QC more - having various levels of data quality and how that data will be used.

Session #3b: "Alternatives"

5 (10) **4** (18) **3** (8) **2** (1) **1** (0) **AVG: 4.0**

- Great to see so many states giving it a try. Hope this means they won't go away. I think it seems to be really useful when traditional TMDLs just don't work. Since we just do them as a cost/time saving measure it was good to hear how others use them for some of the more complicated impairments. Going to look at how we can expand their use.
- These are tough for me since a TMDL is ultimately required. MI doesn't do them. Maybe topic isn't relevant for every region/state.

- Excellent group discussion.
- Great to have examples now.
- Excellent examples of non-typical alternatives (permitting & straight to implementation).
- Generally, "alternatives" are viewed as only applicable to cases where there is no TMDL. However, it may be appropriate to expand the applicability to also include cases where a TMDL has been vacated by a court order – and state does not want to re-do or develop a new TMDL.
- Great to hear from new states on how they are using 5 alt. and how helpful the option is for them. Also good for Chris to continue to reiterate key points of the EPA perspective.
- Great info. Glad to hear alt-plans are being accepted across regions.
- Interesting to hear what other groups are doing and what is working for them.
- Good, I found last year's breakouts better but it was a good way to get the idea out to many people. Audio was bad for Barbara and Bill.
- Useful.
- Hard to follow some panelists in this session.
- Good session, but not what I needed.
- Maybe more explanation of what these alternatives were.
- It was a good presentation but it seems alternatives still have very limited applications.
- This was a great session and good way to open the topic. I think we could benefit from a follow up workshop to brainstorm and share ideas and approaches.
- Good discussion. We need to explore this option more often.
- Happy to see discussion but a few intro slides would have been beneficial. Providing factsheet of examples for states to look at.
- Good presentation – nothing new.
- I really liked the content but wish there had been some sort of visuals used. It made for a difficult time of retention for visual learners.
- Louisiana Guy was my favorite.
- Liked the examples from panelists but would have preferred more discussion with audience rather than watching panelists have a conversation.
- I wanted more specifics on how states decide to do this and how successful they really are. Maybe fewer panelists so that each could go more in depth within that allotted time.
- I'm new to most of this so most of it was over my head.

Session #4: Concurrent Trainings I

5 (39) **4** (10) **3** (2) **2** (0) **1** (1) **AVG: 4.65**

Engaging Your Public in Water Planning Part I

- Very helpful! I really enjoyed Pt. 1 & II – small groups facilitated better discussions.
- Great tips and ideas. Great presenters – good teachers.
- Useful ideas were presented!
- Great examples and ability to hear issues from different regions and work through them.
- Really loved this session. There were resources, etc., mentioned/used in the workshop that would be great to take back home.

- Excellent. Best part of meeting (along with Pt. 2). Liked real world examples, learning and trying techniques. It gave me strategies I think I will use. Presenters did a great job and were engaging.
- Similar to other engagement talks/workshops. Making the public feel important was a great idea.
- The instructors for this breakout session were excellent. Very helpful and gave valuable insight via their activities/presentations.
- I did get some new things out of this – could have been more focused.
- Some good lessons/stories. Will share this with staff.
- Good demo and lecture. Needed more time to really get in-depth knowledge of subject.
- Very useful for watershed planning.

Water Words that Work
- Really valuable and important.
- Needed more time, very engaging presentation.
- This was the best presentation/session I attended. Very useful information and material that I am already applying.
- Very engaging and informative.
- Very useful and the dynamic trainer made it a very interactive session. More time for this topic would be good – maybe 2 parts? Because he talked at how much more he could offer.
- Erik Eckl's presentation was much more useful this time (than 2 years ago). Less salesman like.

"How-To" Develop a Story Map
- Great job!
- Excellent – I made a story map! Now I have a better idea what questions to ask my IT Dept. Great step-by-step guide.
- The Story map workshop was great and straight forward.
- Great walk through.
- Great to have a hands on session learning how to create story maps.
- Story map session was well-organized and helpful. I feel ready to give this a try.
- Story maps – so cool – glad it was hands-on. Great solutions on when to and when not to use story maps.
- PA DEP provided an outstanding overview of what a Story Map is, and how to build one. The handout instructions were very helpful.
- Dustin was very effective and engaging in presenting the material.
- Key Takeaways - I know how to make a story map! And I will make some.

Introduction to the IR Process
- Very much needed session. I wish it had been around my first year. Should be mandatory for all first year attendees.
- Font was too small on presentation. EPA needs to recognize more that states and regions operate a little differently, so one state isn't wrong or right just different.
- Good session. Didn't know some regions still behind in submitting IRs.

- Good session for someone new to IR.

Water Quality Portal Data Discovery and Data Analysis Tools

- Didn't realize this was an old tool. Very glitchy and demo wasn't very useful. Utah presentation was interesting.
- Great tools for analyzing and displaying data. EPA WQ Data Tool is great and simpler to use. Expanding its capacity is a necessary update to catch up with the tool that Utah DEQ has or is developing.
- Key Takeaway - The data discovery tool has some QA-type functions. R Shiny has data download limitations. Really enjoyed Utah's Lake profile and continuous data tools.
- Key Takeaway - UT had a great tool, and something we would like in Colorado. There were some issues using the discovery tool, but it was great to work through it in a classroom setting and be able ask questions.
- Key Takeaways - Will bring back to work to our marine monitoring team for easier data uploads and consistent assessment. Love the literate programming to stop me from getting into an editing loop when writing the IR narrative. Great interactive Mapping applicability.

WATERS GeoViewer

- Seems that this application is very similar to How's My Waterway. Stream stats is already available to delineate watersheds. Redundant to have several applications for the same thing.
- Key Takeaways - This is a neat tool, but an hour and a half was too long and the tool was only partially working.

Processing Benthic Macroinvertebrate Data in R

- Really great. Presenter had strong background. Might have been too advanced for some. Could be a two-session training next time, there is so much information.
- Seemed the perfect person to give this talk/demo. Loved her enthusiasm and extensive knowledge.
- Great job presenting and teaching!
- Key Takeaway - It's hard for individuals who are not familiar with RStudio or something similar.
- Key Takeaways - I really liked the hands-on approach and would love a similar style to look at R Shiny!
- Key Takeaways - Already requested RStudio for my work computer. This is learnable material; my background is similar to Emma's and I'm looking to develop the same skills.
- Key Takeaways - I can do R markdown!, I can embed Shiny apps in Rmarkdown, I have the code!

Session #5: Concurrent Trainings II

5 (36) **4** (12) **3** (5) **2** (0) **1** (0) **AVG: 4.58**

Engaging Your Public in Water Planning Part I

- I loved the session. Presenters were excellent.

- The instructors for this breakout session were excellent. Very helpful and gave valuable insight via their activities/presentations.
- Gained some good tools to carry back to my state. Really liked the session and the tools.
- This was great! I gave it a 4 instead of 5 because more time was, or is needed to cover the material.
- Good presentations. Good interactive exercises.
- Excellent presenters. Good interactives….excited to practice method.
- This was beyond excellent! I wish it could have been a whole-day session. So many great ideas – real examples. Presenters were excellent as well.
- Parts 1 and 2 were very well organized in terms of room setup, activities, resources provided and content, supplemented with specific examples from Minnesota. This was the most engaging session of the week. Very well done!
- Very helpful, gave great resources and examples.
- Really helpful workshop with some useful ways to engage the public and hear back from more of the community.
- Key Takeaways - 1. Best way to organize a room, 2. Importance of intentional engagement, 3. How to ask the right questions.
- Key Takeaways – "Gallery walk, World café, Ways to make sure everyone has an opportunity to be heard."
- Key Takeaways - Great session provided example of using engagement and also some time working in teams to see how the engagement technique can work.

Storytelling

- Great examples.
- If templates of storymaps, dashboards, etc. could be shared, that would help states with fewer resources for communication efforts.
- I appreciated all the different and interesting ways states/tribes/commonwealths are showing what they're doing.
- Good examples, would be nice to have ways to use approaches other states have developed.
- Excellent panelists! This session should have been a full group session since the stories/examples were very good.
- Very good session.
- Very neat to see the different platforms.
- Excellent variety in the types of storytelling. I think this could have been shared with full group as data and TMDL folks would both be interested.
- Best session of trip for me. Really gave a lot of excellent work that other Agencies are doing. Really made my wheels turn.
- Key Takeaways - Look at whiteboard video app developer. Make a video using a second every day. Generally use creative and innovative methods and tools to tell our stories.
- Key Takeaways - Really liked the Red Lake Band video that showed the resources, inspired protection. Also liked seeing how other states are showing their work.

Interactive Mapping

- Great to see how other states approach mapping.

- Great to see many mapping options that states are utilizing. Many ideas will be brought home.
- Good examples and variety. Good to share examples and learn from peers.
- I learned a lot about how other states are using GIS online to display information for the public.
- The concept of "interactive mapping" is great. One problem is most stakeholders are not at a point where they feel comfortable using interactive maps. Beyond comfort, how to keep them interested is an important consideration.
- Excellent group of presenters with a wide variety of interactive tools.
- Got ideas on how to make our public maps better.
- Key Takeaways - I thought that it would be interactive. It was nice to see the cool things other states are doing but frustrating because our IT won't allow us the Esri storage required.
- Key Takeaways - Demos were really helpful in seeing different options for interactive maps.
- Key Takeaways - Including quick start guides. Story maps are useful for swim, beach and HABs. You can create custom URLs in ArcGIS online that can be linked in the 303(d) list.

CWA 303(d) TAS

- Jim did a great job handling a broad topic with a lot of questions.
- Great discussion – more question time next time.
- Session was very important. Our Region 5 reps seem a bit nervous/distrustful to take this on. It's clear we need to have more/better communication with them.
- Good handouts and discussion from tribes.
- Good discussion and presentation on TAS, since this is newer area with tribes starting to be interested in.
- Jim covered all the basics well, but most of the questions were very state/tribe specific and not applicable to the whole group. One suggestion would be to give some thought toward separating/being more specific about the IR process from ATTAINS from the reg. requirements. There was a lot of discussion about "when the 30-day clock begins" – which has different factors to consider depending on the purpose or context.

ATTAINS User Interface 1: Assessment Units and Assessments

- Would like to see examples of working with exports. Need a way to build 303d/305b table.
- Really good, useful and well done.
- More time on demo – moved too quickly through instructions and way too much time for activities/practice.
- Great presenters. Easy to follow. Very helpful.
- Key Takeaways - Learned how to make a cat 5 into a cat 4b. Bulk uploads.

Open Source Discussion

- Good discussion.

- A good way to get conversation started on how we're going to share open source data between partners.
- Not sure how I ended up in this session. There is a planning group? Calls? I was not aware.
- Didn't introduce R or Python. Very confusing for inexperienced users.
- Very informative.
- Key Takeaways - Basic takeaway was that I didn't know what people were talking about.
- Key Takeaways - Learn programming languages. Training is needed.

Hands-On with How's My Waterway
- It was a good idea to have participants work with the tool "hands on" and be able to provide immediate feedback.
- Seems like a lot isn't ready to use, but staff were open to suggestions.

Session #6: Concurrent Trainings III

5 (26) **4** (23) **3** (1) **2** (1) **1** (0) **AVG: 4.45**

Engaging Your Public in Water Planning Part II
- Would love to see more like this.
- Really strong facilitators, energizing.
- Loved that it was interactive.
- Again – limited time impacted how fast materials were covered. Part I and Part II could have been all day.
- Better demos & exercises. Audience was more interactive and allowed for better feedback and gains. Excited to research tools provided and apply them back at the office.
- I like the idea of breaking down qualitative data, but questioned some of the methods/suggestions. I did like the message to trust and empower your communities.
- Very insightful.
- Very useful for watershed planning.
- Key Takeaways - How to engage the community to attend meetings and the importance of them sharing their comments/concerns, how to disarm those who are focused on their own issue, how to use and consolidate everyone's comment to show their voice was heard and incorporated.
- Key Takeaways - Favorite session of the conference. Part 2 had the world cafe and is something I'd be excited to try in Colorado.

"How-To" Develop Web Maps Using Open-Source Software
- Awesome! Wish my state would use this tool to submit the IWQR as well.
- Very interesting and worth emulating.
- Great info. We may not use EPA github info presented, I feel confident we could develop similar for 2020 IR.
- Great job.
- This was helpful, but didn't quite need an hour and a half. Ran short.
- Good to get code.

- The title of the session didn't quite reflect the presentation. The open source IR delivery that PA presented was very interesting and would be useful to pursue.
- The session had very good content but went well too short of the 90 minutes allowed. The instructor (Gary) rushed through and finished in about 45 minutes, but it would have been more helpful to spend more time explaining who he is and what staff and resources were needed to develop the PA Draft 2018 Integrated Report. Having said that, I appreciate the content of the presentation and resources for graphics (highcharts, plotly, D3).
- Presenter wasn't the technical developer so didn't have some answers for the project. Also didn't fill time allotted, which was fine as it was before lunch, but could have had more info prepared.
- Key Takeaways - "Reduce printing of iwqr. Increase accessibility of information."
- Key Takeaways - Would have liked to see more technical details about open source mapping and programming the report. Also, this talk was labeled open source, but many of the programs used were not free.

Mobile Data Entry

- I want more sessions like this one on mobile data entry. I was hoping to learn more about how to implement mobile data entry but the session made me realize it will take lots of money, time, and expertise to implement. It would be helpful to have a mobile data entry tool for people to build single apps to use in the field.
- MARS would/could be a good longer future presentation.
- Key Takeaway - Connected with Danielle about how to use NLA app for state application. Saw how mobile data entry is used very effectively in AZ and how I could use it in SD. The system used by Mass is extremely expensive - not useful for budget-limited states.

Tribal Data, Shared Waters, and the IR

- Good presentation on how to get projects completed with the barriers of being outside the tribe. Now trust in regulatory, and tribes need to work together.

ATTAINS User Interface 2: Actions & Promotion of Assessments

- Wish it covered more info.
- Key Takeaways - You have to enter the TMDL and also connect that to the previous listing. Reviewed how to submit via ATTAINS. EPAs review clock starts when the state submits and restarts if it is resubmitted.

Water Quality Portal Data Discovery and Data Analysis Tools

- The Utah demo was extremely effective – wish it could be applied to other states.
- Plan to try these tools more.

Measures

- Miranda did very well presenting EPA process and handling questions. EPA needs to work more on making sure consistent info is coming from HQ and regions to states.
- Excellent discussion on measures – this probably should have been given to the larger group in the auditorium.

- Good discussion. Still some unresolved issues but this was a critical session for us.
- Workshop gave insight into the changes at EPA on how they're thinking/demonstrating meeting goals. However, there needs to be some more thought about how those goals are being met. For example, we're working on watershed implementation plans/guidance but it's not captured under our prioritization list. Maybe the other items are already under other metrics that perhaps we don't know about.
- More info on dashboard measures.
- Important conversation. Too much presentation. Needed more discussion. I liked knowing about EPA metrics but would have liked to discuss improvements to metrics.
- Miranda needed to slow down and explain more programs at EPA, e.g., ELMS. Also, the evening discussion was even better than the session because it was state led, so perhaps the session should have been structure to indicate that. I also wanted to hear EPA vs. state perspective on why points matter – i.e., what happens to the measures and results? who is the audience? How is it used? Are the metrics the intended goal? And how does vision relate to EPA and metric setting?
- Good info and good discussion. A bit too much feedback from one or two states. Would have liked to hear more feedback from others.
- This was kind of a brutal session mainly in terms of content. I am not convinced we are meaningfully measuring progress. I understand it is a work-in-progress but some more feedback loops should be considered.
- Good opportunity to get updated on metrics and ask questions in person.
- Informative until the end when discussion happened.
- Key Takeaways - "Very helpful!! Lean assistance!! Support for states combining IR lists. The WQ35 measure could be used against EPA and the states if we don't meet it. Also, when 2022 comes, the universe will change a lot, and it will look like we made no progress.
- Key Takeaways - Benefited from seeing how ATTAINS is calculating our state metrics.

Session #7: Regional Meetings and Additional Trainings

5 (22) **4** (15) **3** (4) **2** (1) **1** (0) **AVG: 4.38**

Region 3

- Very valuable – we resolved to do this more often.
- Great participation from all states.

Region 5

- The Region 5 staff focused solely on state concerns even though there were three tribes represented in the room. The session was useless for tribes.

Region 6

- Good to see R6 staff and to hear announcements together.
- Regional concerns discussed. Introductions of new staff. Covered issues in ATTAINS that were common among states. Was given helpful connection among state-to-state partners.
- Always great to meet in person with our region.

- Key Takeaways - Many states have the same resources issues.
- Key Takeaways - We all need assistance.

Region 9
- Really relevant exchange of information and about potential future collaboration.
- Key Takeaways - Collaboration with regional water testing. Conduct regional training opportunities by flying EPA trainers to one location and other territories will join.

Region 10
- Good discussion and sharing for cross-awareness, but not much strategic planning or looking to the future within this region.
- Useful conversation and relationship-building.
- The ATTAINS meeting for my region with the data coordinator was very productive including the data group with the TMDL staff was really productive, and I would advocate to have them with us again next year if possible.
- I look forward to regional meetings every year. One of my favorite sessions.
- It was great to meet face to face. This would be useful if it was moved up to earlier in this workshop.
- Our regional session was good, and I wished it had not conflicted with sessions I wanted to attend.
- Great to meet everyone and discuss regional issues.
- Engaging forum with representatives from our region. Shared projects and issues of concern - more collaboration and communication to be set up.
- Interesting to hear what other states in our region are doing.
- It would be nice to have more meetings with the region.
- Useful.
- Informal. Nice to meet face to face.

Engaging Your Public in Water Planning Part II
- Loved it. These two sessions made the conference for me.
- Excellent. Interactive. Practical. Presenters were engaging and well-informed. Well done.

Stressor ID for Biological Impairments
- Glad to see CADDIS is still moving forward, incrementally. Great to see modified CADDIS.
- Got out very early, could have covered other topics like automation of assessment. I was hoping for more nitty gritty.
- Kate did a great job – wish she had longer. Shawn explained MS process well; I have no idea what Sean was talking about.
- Key Takeaways - The skittle plot presentation was interesting, but not explained well.
- Key Takeaways - Overview of CADDIS and data inputs, how states used CADDIS to identify stressors in impaired waters, and how CADDIS is used to prevent impairments.
- Key Takeaways - I can use CADDIS for identifying stressors. I saw that many states are actively using these methods to address biological impairments.

Measures

- Helpful to have open discussion and excited to have access to tools being used to measure 303(d).
- Seems like we could report these out to states.

Informal Evening Sessions I

5 (11) **4** (16) **3** (2) **2** (2) **1** (1) **AVG: 4.06**

Feedback on the New Design of How's My Waterway

- It was nice being able to talk and give feedback in person.

Vision 2022

- Based on lessons learned from Vison 1.0.
- Nice to hear both state and HQ perspective. A few ideas were raised, e.g., having the history of the vision and why it was completed. It is important to keep vision flexible for the states to use and continue.
- Good to have this topic discussed openly.
- Again some unresolved issues but very valuable discussion. Good to hear what questions other states have.
- Great discussion. Keep the next vision state-centric.
- Excellent planning for future.
- Session was great and almost seemed too short.
- Traci and Rosaura represented perspectives well. It would have been good to have a longer session with more discussion from states (shocked to find out how little some states know about the vision – definitely need some sort of primer).
- A little rough in organization, but some good points. Definitely a case of a few more experienced staff dominating the majority – which were newer, less-experienced staff in the room. It made me realize that we talk non-stop about the vision, but not everyone knows what it is.
- Good discussion but lounge was too small and 45min was too short. Should move it into regular meeting time and larger room.
- Short forum to engage. Regions do best work to address impaired waters based on their resources and program situations. More feedback/communication from EPA needed.
- Frank discussion of what has worked and what is next. "State-led."
- Yes, that states need to be able to prioritize our goals but there needs to be a way to show other activities that take resources from the same program that are also going to improve water quality while not spending loads of time tracking.
- This should be discussed again next year.
- Needed more time, clearly a topic of significant interest.
- Hard to hear comments – some very quiet speakers. Should be interesting as we move to next vision. Still seems to be some strong difference of opinion.
- Room should better facilitate discussion but appreciated the refreshments!
- Not clear what the final outcome of this session is.
- This was way too brief.
- Tried vision. Needed a larger venue.

- Thank you for the opportunity to voice concerns. In the future, I hope for more inclusivity and flexibility when it comes to measured outcomes. I also hope for some measure of implementation be considered as an alternative to producing TMDLs. Although it is said this is already provided…not without a lot of hurdles. The requirements (or provisions) that need to be met to allow for 5alt needs to be reworked. As does legislation. Thank you.
- Vision 2022 could have been a longer session with more available seating. Would be a useful discussion to continue next year.
- Was good to hear about the changes coming.
- Very enlightening how the vision was created. Implementation and flexibility in measures is needed. Too short.
- Loved casual atmosphere.
- Regarding both sessions – these are getting too big for a discussion. Important topics were covered but it was hard to have a "discussion" with the amount of people that showed up. Not sure how to change. Maybe more presenters with all. Or somehow break into smaller groups during these sessions and then bring back together as a larger group in report back.
- Key Takeaway - Measures may not be well-aligned with program realities. May not do a good job of measuring progress.
- Key Takeaway - TMDL revisions will be given credit. "Managing for Results" concept. "Report Card" concept.

Informal Evening Sessions II

5 (9) **4** (16) **3** (1) **2** (0) **1** (0) **AVG: 4.31**

Climate and the CWA 303(d) Program

- Good to hear other states also struggle with addressing climate change. We came away with ideas how to change our temp. TMDL approach.
- Session was great and almost seemed too short. A lot of great discussion.
- A good topic – we don't really address it in our work, but it was a good sidebar.
- Good sharing of issues and current actions, but all very site-specific. Is and will be a growing issue, but not much room for strategy or suggestions between states.
- It was interesting to hear what other states are doing.
- Room should better facilitate discussion but appreciated the refreshments!
- Lively discussion.
- Good discussion.
- Good and well-facilitated. Looking forward to continued dialogue on this topic, including vision.
- Good start. Many wanted to talk/learn but few examples so far. Reminded me of alternatives a few years ago.
- Good talk - a topic to keep on the radar as more states start to look for ways to address climate change in their programs.
- A lot of interest! Helped to hear what has been done in other departments.

Water Quality Trading and the CWA 303(d) Program

- Important topic. Well presented. Engaging discussion.
- Similar to Vision comments. Make this a training session and panel discussion by states of the issues they are facing. TMDL people aren't as aware of issues as permits people are, yet it needs the TMDL to succeed and it's implementing a TMDL.
- It was entertaining. Good discussion.
- Great to hear other states with more experience discuss issues/pitfalls.
- There should be presentations on WQ trading examples at next year's workshop.
- Key Takeaway - Nutrient trading presentations and discussions were very good.
- Key Takeaway - This is an important issue regardless of state political affiliation. We had an impromptu state/region meeting.

Session #8 Continuous Monitoring/Sensors – Using, Managing, and Interpreting Temporally Dense Data Sets

5 (21) **4** (24) **3** (3) **2** (0) **1** (0) **AVG: 4.38**

- More of this please!
- Very well done and informative. Excited to see more about how con. mon. data can be shared and analyzed – glad that EPA is considering publishing more guidance.
- Very informative. Can't wait for Britta's site to be available on the web.
- Super useful! I really enjoyed this session and can't wait to check out more of the tools presented.
- Good presentations. Helpful. Would like to see how states use continuous data for listing.
- We use large data sets and have assessment protocols for the data. Interesting PA approach. Unaware of RMN until this mtg.
- Succinct! However: 1) the issue of using continuous monitoring data in assessment needs to be fleshed out a little bit more. 2) Dwane's presentation was great and high level. 3) Data collection of regional monitoring network was great: Distinguishing changing baselines from trends –very important. Combining visual data capture (camera images) and analyzing accompanying continuous data has implications for urban settings where baselines are constantly changing, flows are highly episodic – or extreme. Development of functional tools could help here.
- All good info and followed a good storyline. Can't wait to check out the RMN.
- Gave me lots of ideas for 303(d)/monitoring staff collaboration.
- Very useful.
- Great session – I think as climate change is altering weather events and parameters in ways we don't yet understand, continuous monitoring may be a way to better understand what is happening in our watersheds.
- Very informative. Complex…
- Good to see what others are doing with continuous data.
- Really cool tools! I am not the ideal audience; some of my co-workers are more involved in this.
- We just bought some con mon gear last week. This will be helpful.
- Cool real-world example from Dwane and really interesting challenges that occur when continuous data is available.

- Interesting to see what other groups are doing as well as the improvement in data sharing.
- Data demonstration was a great way of putting concepts in action – love hands on examples. Presentations that define tools are less effective than those that show how they're used.
- Good overview. Informational content.
- A little dry for first thing on Friday AM. Better as an afternoon session IMO.
- Interesting presentation and glad to see some monitoring info. Dwane makes all the tools look so easy, but still scratching our heads on how to do things as easily as he does.
- Glad we will have this presentation because of all the links.
- For data group would have been useful to have a more in-depth presentation on the interoperable watershed network.
- Informative.
- Key Takeaway - Bill Richardson covered very basic info. Maybe should have gotten into problems with deployment or selecting locations. Dwane - very interesting data appliance open software options for continuous data. Penn and EPA talks well done and informative.
- Key Takeaway - Very beneficial, some of the info was review. It would be good to understand how the states actually handle the data for assessment. Assessments are to be on ambient data, so how do you account for climate change and/or unseasonally extreme conditions - do you account or not count this information in the assessment. If you do count, how do stakeholders and/or others have concerns?
- Key Takeaway - Michigan uses a 10% exceedance rate, PA uses 1%. They have more data though. Interested in using turbidity data to model E. coli.
- Key Takeaway - I really liked that EPA is providing free tools to help people better deal with complicated data. I'd love to see this continue.
- Key Takeaway - Good input of QA/QC processes. Really hit home that our state's continuous data is not publicly available.
- Key Takeaway - PA has an option for assessing using continuous data that could be helpful to review, especially in terms of the derived parameters. Learned about some tools for QA and sharing cont. data.
- Key Takeaway - Availability of R tools for processing continuous monitoring data and bio data. Catalogue for continuous monitoring data. Use of continuous sensors to monitor for extreme events and site representativeness.
- Key Takeaway – QA/QC is vital for continuous data.
- Key Takeaway - Great session. Lots of good examples and information.

Session #9: Communication Tools; Originally Infographics Session

5 (3) **4** (3) **3** (2) **2** (0) **1** (0) **AVG: 3.30**

- Short videos about 303(d) listing and IR.
- Glad for the opportunity to speak about messaging. I do think a place to house templates, IR code, and methods is important, and that this place with material is <u>frequently shared</u>.
- My expectation in this regard was a "data" (e.g., GIS data) focused visualization; not necessarily "social media" type visualization. Maybe the title should have been "Creative Ways of Using Media (social media) to visualize data." Both foci are equally important

and separating them (traditional data analysis and visualization versus social media type visualization) would have helped a great deal.
- Bummed that the Infographics gentleman did not make it.
- I'm sorry this presentation didn't happen.
- Very sad this didn't happen! Please do this next year!
- So sad this didn't happen! Try again next year! Compendium = so glad you put this together- very useful.
- Good use of this session to promote compendia and talk about communication.
- Great job adjusting on the fly, given that the original planned discussion had to be cancelled.
- Informative.
- Key Takeaway - States really do appreciate EPA's efforts to share good practices and highlight state examples.
- Key Takeaways - Bummer that the speaker didn't show up.

Training Workshop Wrap-Up

5 (21) **4** (8) **3** (1) **2** (2) **1** (1) **AVG: 4.39**

- Dwane does a good job wrapping things up.
- The data person from Tennessee made a good point: this work can't go forward unless there's good Internet access. Poor Internet access is common for tribal nations, so many of these tools/apps are out of reach.
- Thanks, Alan. It isn't easy to say the hard thoughts.
- Good job!
- I really liked that Dwane asked someone from TN to give a few remarks. Consider asking one or more state reps to speak at opening/closing, in addition to EPA HQ. Since so many states lead breakout sessions, they should have a few words at start & close.
- Good wrap-up. I like hearing about the consistency in communications and tools that are forthcoming.
- Awesome job!
- Good closing from the Iowa speaker!
- Helpful to hear the dates for next year before heading out. The closing speech was fantastic.
- I'm only giving a 5 if it ends on time.
- Happy that we didn't go through statistics from this conference as closing.
- General comments: the Data officer hours were very useful and a great opportunity for in person help to resolve difficult issues. The app didn't include location information for sessions with multiple locations, so the hard copy was still needed.
- Other speakers could take lessons from Iowa.
- Again, get to the point. I'd even prefer notes after the conference to sitting and listening to an in-depth recap. I feel like the wrap-up is trying to fill time instead of communicating in effective ways. What is the point of the wrap up? What do you want the audience to come away with? How can we address that more effectively? I know ELI is creating communication tools - but I think we need communication training to help people more effectively get to their point.

- Key Takeaways - Disappointed we didn't get the last speaker no control over that. Speakers did well on the fly. Loved Allen B's talk.
- Key Takeaways - I really enjoy this workshop and learning what other states are doing and have an opportunity to talk directly with EPA HQ staff. I am glad to hear that EPA is developing tools for states to use. Many states are moving forward with 5-alt, but feel EPA still does not know what they want until they see it. How does or can the 5-alt fit within the 319 9-element planning efforts. Like to continue with trading discussions. I would love for EPA to streamline processing and reporting to reduce redundancy of entering information into EPA databases, then have to annually report it in a narrative document (e.g., 305b/IR, 319 annual report). This is the only workshop that allows the monitoring, assessment, TMDL and 319 to all come together at one workshop. I hope this can continue into the future. Thank you, ELI and the committee for all their efforts!!
- Key Takeaways - I think the app was really useful. This was my first time attending, and the app really helped me navigate. I think the only thing I would add would be room numbers for sessions. But overall really helpful!
- Key Takeaways - Communications trainings on more effective and efficient communication. Get to the point.
- Key Takeaways - There may be better ways to summarize the meeting. How much time really needs to be dedicated to a wrap-up? Identify goals of the wrap-up and there may be better options. Communications training would be beneficial - scientists, engineers, and lawyers have very little communications trainings. We communicate a ton, but is it the most effective way to communicate?

Other Comments or Suggestions

- We biked the C&O Canal yesterday. There is a pedal and paddle option ($80). They can outfit roughly 30 people. Would there be interest in this next year, maybe with concurrent sessions? I'd help organize.
- App still needs work: Thursday said no activities planned; some breakouts were personalized to me, some had a broken link.
- One of the activities would be to rent bikes and bike along trail. Had trouble with the app – maybe send it out beforehand.
- Thanks to ELI for organizing – conference was well-run. I didn't use the app – but I did use the website and paper agenda. I loved the closing remarks from the man from Iowa. He spoke important truths.
- Thank you!
- Keep the app! Full day of breakouts is great. Thursday afternoon break/activities help.
- Very informative and useful workshop. The organizers did a superb job!
- Consider varying time of year and location, if ELI continues to operate this workshop in the next grant cycle. Kudos to everyone from ELI who works on this! It appears seamless and smooth every year!
- This facility and meeting are inspiring and reinvigorating and confirms that environmental work is where I belong. Thank you for making this meeting effortless for the attendees.
- As always, ELI did a fantastic job putting on the conference. This is hands down the most productive conference I attend. The facility is top notch.

- Share code of where states have automated assessment (or as Rich said, exceedance calculations that relate to attainment decisions).
- The Guide app was a good experiment to try at this session but I never got my schedule to load, so I needed the paper to get around. Room arrangements need to be displayed more visibly in that paper schedule rather than the attached list. The field trip options on Thursday afternoon were also great breaks and opportunity to meet new people – thank you for a great conference!
- Very nice job to ELI and the planning committee! Take group picture in a shady spot or when we aren't looking right into the sun.
- Really love the informal social gatherings. It makes it easy to discuss ideas.
- The breakfast menu for cereal was sparse in terms of gluten free.
- Hold meeting during another week (not a holiday); possible meeting in the "islands." Kudos to Adam for always knocking it out of the park!
- Too cold in auditorium. Poor wifi speed/connectivity. Alan did an excellent job. Good choice. Nice to hear a different perspective. Adam and ELI staff did a great job AGAIN! I appreciate your dedication to making this workshop a valuable experience for all attendees.
- Keep the app! Love the more technology-based features like schedule app & materials online. Another feature to add, as we move towards even more tech-based workshop – photos by names of participants – I am terrible at names so that would help me post-workshop remember who I talked to about what. Also – microphones for evening sessions – cannot believe we have so many soft speakers in the group! Ideas for future: How to incorporate metadata. We collect temp, wind, condition data (flood, drought development), photo data, etc. How are states using this with their water chemistry to tell a bigger story. For communication compendium: any ideas from states making videos (training or information) without having an in-house media staff or finding fee contracts.
- Well-organized and very useful session. Glad to have been here. Networking is by far the most valuable compared to other conferences.
- I intend to take my TMDL staff here next year, very inspiring and valuable workshop!
- Good to see a lot of new faces. Networking time was great but seemed like a lot of the new people were less engaged – both states and EPA. Maybe a more engaging and formal ice breaker exercise would be good to get new staff comfortable and talking. Lots of cool tools using R. Would like EPA to coordinate R training with states to help crosswalk these tools, and open source programs.
- Missed having introductions. Takes some time but especially helpful for new folks to see other states in the region and EPA. May be good to make vision/program primers and reference materials in advance for those that want to prep before the meeting.
- Thank you!
- It would be nice if cookies were provided during the breaks for a more substantial and delicious snack.
- The app was interesting. I still used the paper schedules more often, but did use the app for the maps and other quick reference when I didn't have my bag with me.
- I would benefit from each state providing a generic org. chart of their agency and sister agencies for TMDL/listing/WQS/monitoring/305b programs. Including # of people in

each program. It's hard to relate my state to other states because everyone is set up differently.

- I learned a lot, new to my position and it covered a lot of the basics. Some of the sessions were too detailed into things I don't understand at all. I think it would have been better for me if the ATTAINS sessions were before the Intro to the IR session.
- Whole fresh fruit at the commons (bananas, oranges) not just snacks.

APPENDIX 4:
TRAINING WORKSHOP WEB PORTAL &
ELI'S *CWA 303(d) PROGRAM RESOURCE CENTER*

ELI continues to maintain and make publicly available a companion website for this training workshop and past training workshops. Materials and presentations from the 2019 training workshop are available at http://www.eli.org/freshwater-ocean/cwa-303d-training-workshops.

Other resources that are relevant to the mission and work of state and territorial CWA 303(d) programs and tribal water quality programs are available at the Institute's *CWA 303(d) Program Resource Center*, at http://www.eli.org/freshwater-ocean/state-tmdl-program-resource-center.