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2025 National Training Workshop on Water Quality Data, Assessment, and Plans

Building Capacity and Efficiency Through Shared Experience

June 2-5, 2025

Final Project Report
&
Training Workshop Proceedings

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

ELI maintains a companion website for this project: our CWA 303(d) Program Resource Center, which includes a page dedicated to this workshop (and those of prior years), with copies of the agenda, participant list, presentation slides, and other materials. You can access that page here: https://www.eli.org/freshwater-ocean/cwa-303d-training-workshops.

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I. INTRODUCTION

From June 2 through June 5, 2025, the Environmental Law Institute (ELI) convened the *2025 National Training Workshop on Water Quality Data, Assessment, and Plans: Building Capacity and Efficiency Through Shared Experience*. This event, supported through a cooperative agreement with the U.S. Environmental Protection Agency (EPA), brought together (virtually) Clean Water Act (CWA) Section 303(d) listing, TMDL, and other water quality staff from all 50 states; the District of Columbia; American Samoa; the Commonwealth of the Northern Mariana Islands; Guam; Puerto Rico; Catawba Indian Nation; Cherokee Nation; Chicken Ranch Rancheria of Me-Wuk Indians of California; Citizen Potawatomi Nation; Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians; Confederated Tribes of the Umatilla Indian Reservation; Confederated Tribes of Warm Springs; Coyote Valley Band of Pomo Indians; Delaware Nation of Oklahoma; Fond du Lac Band of Lake Superior Chippewa; Fort Belknap Tribe; Gila River Indian Community; Grand Traverse Band of Ottawa and Chippewa Indians; Hoopa Valley Tribe; Houlton Band of Maliseet Indians; Jamestown S'Klallam Tribe; Kalispel Tribe of Indians; Kootenai Tribe of Idaho; La Jolla Band of Luiseño Indians; Little Traverse Bay Bands of Odawa Indians; Makah Tribe of Indians; Meskwaki Nation; Miccosukee Tribe of Indians of Florida; Mooretown Rancheria; Navajo Nation; Nez Perce Tribe; Nisqually Indian Tribe; Nooksack Indian Tribe; Omaha Tribe of Nebraska and Iowa; Penobscot Indian Nation; Picayune Rancheria of the Chukchansi Indians; Pokagon Band of Potawatomi; Ponca Tribe of Nebraska; Prairie Band Potawatomi Nation; Prairie Island Indian Community; Pueblo of Isleta; Pueblo of Laguna; Pueblo of Sandia; Quileute Tribe; Red Lake Nation; Sac and Fox Nation of Oklahoma; San Felipe Pueblo; Sault Saint Marie Tribe of Chippewa Indians; Seminole Tribe of Florida; Seneca Nation of Indians; Shakopee Mdewakanton Sioux Community; Shinnecock Nation; Skokomish Indian Tribe; Snoqualmie Indian Tribe; Southern Ute Indian Tribe; Stockbridge-Munsee Community; Suquamish Tribe; Swinomish Indian Tribal Community; Table Mountain Rancheria; Upper Mattaponi Indian Tribe; Winnebago Tribe of Nebraska; California Indian Water Commission; Northwest Indian Fisheries Commission; Point No Point Treaty Council; Delaware River Basin Commission; and Ohio River Valley Water Sanitation Commission.

As with similar CWA 303(d) events of national scope convened in the spring of most years since 2008, ELI staff 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 staff 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 as well as the structure and focus of the workshop sessions.

Over the four days of the training workshop, participants learned about and further developed effective approaches to identifying impaired waters and restoring and protecting water quality, with an emphasis on effective communication. They learned about and shared approaches to various aspects of water quality assessment and TMDL development and implementation; learned about and contributed to approaches to protection planning; learned how innovations in technology

and process can achieve programmatic outcomes more efficiently; and learned about and contributed to approaches to communicating with and collaborating with a wide range of partners and audiences. Many participants gained technical skills and programmatic acumen in water quality data management, assessment, CWA 303(d) listing, and TMDL development and received updates on research, materials, tools, and legal developments relevant to the CWA 303(d) Program. 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 NEIWPCC.

The event was successful by the metrics of sharing useful information and generating new ideas, as demonstrated by the evaluation responses below. This report provides summaries of the plenary sessions and brief overviews of the breakout sessions. Appendices to the report include the training workshop agenda, a compilation of participant evaluations and comments, and information about ELI's companion website.

II. 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 welcomed participants to the *2025 National Training Workshop on Water Quality Data, Assessment, and Plans*, the seventeenth national CWA 303(d) training workshop. After thanking participants for taking the time to join this year's virtual workshop, Mr. Schempp noted its record-breaking attendance, with more than 750 registrants from all 50 states, over 50 Tribal nations, 4 territories, the District of Columbia, all 10 EPA regions, EPA headquarters, and several interstate and intertribal entities. He encouraged participants to make the most of the workshop by asking questions and sharing their experiences to support peer-to-peer learning and community building.

Mr. Schempp expressed gratitude to the EPA for its ongoing support of the training workshop, particularly to Jim Havard, Chief of the Watershed Branch, and Program Officers Rosaura Conde and Teagan Rostock. He also thanked the members of the 2025 Workshop Planning Group (WPG) for their six months of dedicated effort: Barbara Bennett of Colorado, Eric Bernsen of the Kalispel Tribe of Indians, Richard Cochran of Tennessee, Nicole Hall of Texas, Mindy Neal of West Virginia, Jason Jones of Arizona, Molly Rippke of Michigan, Amy King of EPA Region 8, Ivy Mlsna of EPA Region 1, Beth Malcolm of NEIWPCC, and Jasper Hobbs of ACWA. Mr. Schempp then invited Jim Havard and Mike Scozzafava of EPA Headquarters to provide opening remarks.

Jim Havard, Chief of the Watershed Branch at EPA Headquarters, began his remarks by thanking the Planning Group and participants and by welcoming everyone to this year's virtual "Cybertown." He reflected on the program's twelve years of implementation under the CWA 303(d) Vision, noting progress such as the development of more than 260,000 TMDLs, over 60 protection approaches in 13 states, and 125 advance restoration plans (ARPs) across 28 states. Mr. Havard also emphasized the future work to be done. He noted that some states have not submitted TMDLs recently. He also noted that roughly 70 percent of water/pollutant combinations assessed as impaired are lacking required TMDLs. Mr. Havard emphasized the importance of continued progress, especially in meeting FY25–26 metrics, improving watershed restoration tracking, and reducing backlogs. He underscored EPA's metric for watershed area restored nationwide (defined as watersheds impaired as of October 2018 that are now meeting one or more water quality standards). He reported that approximately 50,000 square miles of watershed area have been restored to date in FY 2025, an exceedance of the interim target. Mr. Havard also highlighted improvements in timeliness, with timely state list submittals increasing from 4 in 2018 to 22 in 2022 and 16 in 2024. The national TMDL backlog, Mr. Havard added, currently stands at just one, and the backlog for state lists stands at six.

Mr. Havard highlighted a decline in litigation related to CWA 303(d) actions, crediting early engagement, consistent messaging on program requirements, and efforts such as this annual CWA 303(d) training workshop and the TMDL Foundations training. Mr. Havard then previewed several key EPA initiatives: a draft Tribal water quality assessment toolkit, a revamped Restoration and Protection Screening (RPS) tool with a new online interface and additional forthcoming indicators, updated Watershed Health Index scores, and additional Healthy Watershed Program fact sheets. Mr. Havard concluded his remarks by highlighting the planned upcoming Protection Learning Exchange and expressing his hope that the community will be able to gather again in person next year.

Mike Scozzafava, Director of the Watershed Restoration, Assessment, and Protection Division at EPA Headquarters, echoed the appreciation for the planning group and the workshop's record-setting participation. He underscored learning the importance of integration across EPA programs and Clean Water Act tools, from effluent guidelines, to the nonpoint source programs, to monitoring and assessment. He noted that this is particularly important in addressing persistent nutrient pollution challenges, since there are fewer documented successes compared to pollutants like bacteria and sediment.

Mr. Scozzafava praised the agenda's mix of technical data tool sessions (like TADA and Expert Query), nutrient and harmful algal bloom (HAB) strategies, and foundational trainings for new CWA 303(d) practitioners. He then elaborated on upcoming cross-program events, describing in more detail ACWA's nutrient pollution-focused Clean Water Cross-Program Workshop and the Protection Learning Exchange, previewed by Mr. Havard, planned to be convened by ELI. Mr. Scozzafava also emphasized the value of open-source innovation and credited EPA's Water Data Integration Branch for their progress. He highlighted ATTAINS' success in handling the 2024 submissions and noted that the team has reindexed GIS data for the new Vision 2.0 cycle. He explained that ATTAINS is undergoing a vital software refresh. He also highlighted functionality improvements to How's My Waterway and Tools for Automated Data Analysis (TADA). Mr. Scozzafava also noted the finalization of two key spatial data layers—the U.S. Geological Survey (USGS) Watershed Boundary Dataset and NHDPlus High Resolution hydrography—which will allow the EPA to better integrate water data from multiple sources and allow for more visualization capacity. In conclusion, he encouraged participants to join the Water Data Integration Branch's breakouts across the week and reaffirmed that the EPA remains committed to supporting state, Tribal, and territorial programs.

Barbara Bennett, TMDL Coordinator for the State of Colorado, began by sharing a story of Fountain Creek in Pueblo, Colorado, where their team is beginning to work on an *E. coli* TMDL. She explained that the river is prone to both flash flooding and water quality challenges, but despite this, the creek remains a vital recreational resource for the community. She noted that this story highlights the importance of communication and telling the story behind the data, a focus of this year's workshop.

Ms. Bennett then acknowledged the growing national conversation around science and environmental outcomes. She emphasized that communication is a critical part of the work and encouraged attendees, especially those who are more introverted or data-driven, to actively share ideas and build relationships throughout the week. She framed the workshop as a venue to

strengthen a community of practice and noted that the value of the workshop extends far beyond the week itself, urging participants to follow up with presenters, exchange contact information, and share helpful resources.

Ms. Bennett concluded her remarks by expressing deep gratitude to EPA staff for their support and collaboration and reminded participants that leadership comes from action, not titles. She encouraged participants to bring back ideas to their teams and to contribute to shaping the future of their respective programs.

Mr. Schempp then provided a brief orientation to the week ahead. He also reminded participants to engage actively in plenary sessions, breakouts, and roundtables. On a lighter note, he asked anyone interested to submit a photo of a waterbody that is meaningful to them for a slideshow that would be shared during the closing session. Mr. Schempp wrapped up the Welcome by encouraging participants to take full advantage of the opportunity to spark connections and build community.

Session 1: Tools and Other Resources

This session, facilitated by Adam Schempp of ELI, featured five presentations on new and updated tools and resources from the EPA and across the country that improve efficiency and empower staff in the implementation of various Clean Water Act program responsibilities as well as improve communication with partners and the public.

(1) Jesse Boorman-Padgett, Biologist in the Water Data Integration Branch at EPA Headquarters

Jesse Boorman-Padgett opened the session with a presentation entitled *Towards an EPA Reference Hydrography to Support Water Quality Data Integration.* He began by framing hydrography as a foundational element of the water quality data lifecycle, connecting the lifecycle stages of monitoring, assessment, reporting, and communicating with the public. He then elaborated on the tools used at each stage—Water Quality eXchange (WQX) and the Water Quality Portal (WQP) for monitoring data, TADA to help with assessment, ATTAINS for reporting, and How's My Waterway for communicating with the public. Mr. Boorman-Padgett then introduced the suite of hydrography products that support this integration: the National Hydrography Dataset (NHD), the Watershed Boundary Dataset (WBD), and NHDPlus. He explained the transition from the older NHDPlus V2 (medium resolution) to the newer NHDPlus High Resolution, which provides more detailed spatial data to support state, Tribal, and regional needs.

Mr. Boorman-Padgett noted that, to support interoperability and simplify national-scale use, the EPA developed the GeoFabric, based on NHDPlus High Resolution, which includes ocean and Great Lakes catchments and full Alaska coverage using H3 hexagonal grids. He also described NHDPlus VF-Gen, a generalized version of the high-resolution network that retains essential modeling attributes while enabling better integration across scales.

Mr. Boorman-Padgett explained how these hydrography products integrate with ATTAINS and How's My Waterway, adding that the EPA recently shifted from medium- to high-resolution indexing for assessment data to support public transparency tools and performance metrics. Looking ahead, Mr. Boorman-Padgett said that the USGS is developing a new LiDAR-derived dataset, the 3D Hydrography Program (3DHP), though the current hydrography products will remain the EPA's national reference in the meantime. He concluded by reaffirming EPA's commitment to data integration and support for diverse partner needs.

(2) Casey Scott, Data Analyst in the Wastewater Permitting Group at the Minnesota Pollution Control Agency (MPCA)

Casey Scott grounded Mr. Boorman-Padgett's presentation on NHD and NHDPlus with examples of how these hydrography datasets are used in Minnesota to support Clean Water Act permitting and assessment workflows. Focusing on both geospatial and tabular approaches, he explained how the MPCA integrates these datasets with internal permitting and monitoring systems to trace upstream and downstream impacts of wastewater discharges. He noted that these tools help answer critical legislative and management questions like "how far upstream is a source from a drinking water intake or metropolitan area" and "what impairments and TMDLs are in the path?"

Mr. Scott explained that, because discharge points do not always align perfectly with mapped streams, MPCA uses a densified network derived from flow accumulation grids in NHDPlus to improve snapping accuracy. He added that this enhanced network supports origin-destination and service-area analyses in ArcGIS, allowing staff to trace facilities to downstream waterbodies like Lake Pepin and quantify distances in river miles.

Mr. Scott also highlighted how MPCA uses an internally built "next downstream" attribute to sequence assessment units in tabular formats. He said that this approach enables powerful SQL-based tools to join permitting data, impairments, TMDLs, stressor IDs, and more, creating comprehensive tables that tell the full downstream story. To support broader use and performance, he continued, MPCA moved many of these functions to a server-based GIS environment, where geoprocessing tools now allow staff to run upstream catchment delineations or measure downstream distances more efficiently. Mr. Scott concluded his presentation with a reflection on the investment required to maintain these tools and the value of having centralized, accessible datasets that allow for consistent, informed decisions across programs.

(3) Angie Reed, Water Resources Planner at the Penobscot Indian Nation

Ms. Reed began her presentation by sharing how the Penobscot Indian Nation uses environmental data to protect traditional Tribal lifeways while also working to make tools, resources, and training accessible to other Tribes through the Tribal Exchange Network Group (TXG). Ms. Reed detailed their adoption of QR-coded sample bottle labels and digital data entry tools, their transition from custom software to ArcGIS Survey123, and their growing reliance on R for statistical analysis and generating reports. She described how coding capacity supported the pre- and post-dam removal monitoring at the Great Works Dam site, which

revealed a change in the variability of water temperature reflecting more natural conditions. She also highlighted the value of using R Markdown to produce a Tribal Assessment Report (TAR) about water quality data.

Ms. Reed then provided an overview of TXG's free services for Tribes, including the Tribal Data Academy, one-on-one technical assistance, monthly "data drop-in" sessions, and regional coding groups. She shared a current Pacific Northwest Tribal coding project, where the Jamestown S'Klallam Tribe is partnering with volunteers from the University of Washington to streamline data entry using Survey123, apply R-based quality control workflows, and adapt tools like TADA and the ContDataQC Shiny app. Ms. Reed concluded with an illustration by artist and data scientist Allison Horst depicting the entire journey from water sample collection to final reporting.

(4) Cristina Mullin, Biologist in the Water Data Integration Branch at EPA Headquarters

Cristina Mullin introduced TADA, an open-source, R-based toolkit designed to help water quality professionals clean, organize, and analyze large datasets from the Water Quality Portal. She explained that TADA has been in development since 2020, with extensive community input. She added that TADA aims to reduce the time spent on repetitive, error-prone steps like harmonizing units, flagging suspect records, removing duplicates, and generating statistics and visualizations.

Ms. Mullin emphasized that TADA is not a "magic fix," but rather a flexible, evolving toolset that can be used through either a user-friendly web-based application built with R Shiny, or as a standalone R package for advanced users. She said that tasks like preparing datasets that once took weeks can now be completed in days. Ms. Mullin explained that TADA is rooted in open-source code publicly available on GitHub, where the EPA works alongside state, Tribal, academic, and nonprofit partners to share knowledge. She added that a recent partnership between Colorado State University's ROSS Lab and the Internet of Water Coalition have created geospatial capabilities that link Water Quality Portal sites to assessment units, NHDPlus networks, and Tribal boundaries. She also described ongoing efforts in EPA Region 8 to integrate user-supplied water quality criteria into TADA workflows.

In conclusion, Ms. Mullin underscored the value of open, transparent data tool development, and she encouraged participants to explore the tool as well as to join the R-focused breakouts later in the week.

(5) Jason Jones, Matt Robinson, Mackenzie Moore, and Zac White of the Arizona Department of Environmental Quality (ADEQ)

Several staff from ADEQ presented a rapid-fire look at how the agency uses R for many aspects of its work, from training and data analysis to automation in Clean Water Act assessments and TMDL development. Jason Jones opened with an overview of ADEQ's in-house R training program, which he developed to teach staff the fundamentals of the language. He explained that the three-course sequence covers R basics, data manipulation and joining data with dplyr, and data visualization with ggplot. Mr. Jones noted that they have used R for

modeling the effects of changing *E. coli* standards, point and nonpoint source contributions to impaired waters, and calculating average air quality data.

Matt Robinson followed with a case study on automating ADEQ's Index of Biological Integrity (IBI) calculations. He said that ADEQ has collected over 2,000 macroinvertebrate samples from 557 sites in the past 30 years, including 896 unique taxa. He explained that the team uses Tidyverse functions to filter data, apply separate metrics for cold- and warm-water streams, combine results into overall IBI scores, and use ggplot2 visualizations to see where sites meet or fail to meet biological criteria. He added that these results and all of the biological assessment data soon will be publicly accessible on ADEQ's new Shiny app.

Next, Mackenzie Moore described the Assessment Calculator, an end-to-end solution for ADEQ's assessment workflow, which has been automated by R. She noted that the calculator has turned a nine-month manual process into a 15-minute automated run. She explained that, using the USGS dataRetrieval package, the system pulls data from the Water Quality Portal, standardizes and aggregates by time and location, and compares results against ADEQ's numeric criteria to flag provisional impairment or delisting decisions. Ms. Moore said that the team then verifies that the automated decisions are accurate, with the results being automatically updated in the public-facing Shiny dashboard, uploaded into ATTAINS, and go into the Integrated Report. She added that the source code links to GitHub, making the data very accessible and allowing users to deploy any individual portion of the code.

Finally, Zac White described ADEQ's use of R to streamline TMDL development processes. He noted that the team uses R for data management and analysis (whether pulled internally or from the Water Quality Portal), modeling (including a load duration curve template), and to make applications specific for different projects. He said that the team uses the USGS's dataRetrieval tool for pulling data from the Water Quality Portal into their R package. Mr. White then explained how they have been using R rather than Excel for developing load duration curves, particularly for *E. coli* impairments. He highlighted two additional Shiny applications: the Surface Water Quality Explorer and the TMDL Prioritization App. He said that the former allows users to visualize monitoring data and the latter ranks impaired waters based on weighted statutory metrics. Mr. White added that the TMDL Prioritization App, which is updated quarterly, has allowed the team to begin understanding which waters need to be worked on first and to justify which waters are being prioritized.

(6) Jesse Boorman-Padgett, Biologist in the Water Data Integration Branch at EPA Headquarters

To conclude the session, Mr. Boorman-Padgett introduced Expert Query, EPA's newly developed tool for querying national ATTAINS data. He noted that the original Expert Query existed in an earlier version of ATTAINS, but the updated tool has been expanded with a more modern, user-friendly interface and a full-text search function that extends beyond the TMDL reports to documents for other types of actions such as ARPs and protection approaches. He said that the interface guides users through three steps: selecting a data profile (i.e., TMDL sources, assessment units, etc.); applying filters; and downloading results. He

added that Expert Query is refreshed weekly to ensure that it is using the most up to date ATTAINS data.

Mr. Boorman-Padgett then demonstrated the tool's flexible filtering options, showing how users can refine queries by geography, reporting cycle, use category, parameter, and pollutant group. He highlighted that each query generates a shareable URL, allowing users to easily replicate results. Mr. Boorman-Padgett then showcased some of the advanced features, such as a national download option for large datasets and the new actions document text search, which allows users to download documents containing key terms. He emphasized that Expert Query is designed to be accessible for everyone and encouraged participants to explore the tool and take part in additional training opportunities later in the week.

Session 2: Breakouts I

This session consisted of six breakouts, each focusing on a different topic. ELI staff selected the topics based on responses in the registration materials and then, with the help of the WPG, developed the respective agendas, including speakers and facilitators. Most of the presentation slides and materials from breakouts that had them can be found here.

- Introduction to Assessment

  This breakout provided an introduction to CWA 303(d) assessment. Participants learned about related CWA 303(d) requirements, the basic steps for assessing waters, and what information to include in an Integrated Report. Presentations were delivered by Jill Fullagar of EPA Region 10, Selena Medrano of EPA Region 6, and Emily Cira of EPA Headquarters.

- Modeling 101 for TMDLs

  This breakout covered the role of water quality models in TMDLs and the basics of model development and application. Ben Cope of EPA Region 10 and Amy King of EPA Region 8 delivered the presentations.

- Examples of Engaging Partners and the Public in TMDL Development and Implementation

  This breakout provided examples from four states of approaches, processes, and products that engage various partners and the general public in the development and implementation of TMDLs. Adam Griggs of EPA Headquarters moderated the breakout, and presentations were delivered by Emily Ayers and Clay Mansfield of Arizona, Thea Wickersham of Idaho, Christina Staten of Montana, and Kevin Kirsch of Wisconsin.

- Advance Restoration Plans

  This breakout began with an overview of key considerations and elements of advance restoration plans (ARPs), leading into examples that demonstrated how ARPs are being developed and implemented. Chris Hunter of EPA Headquarters moderated the breakout and provided the overview, and Michele Golden of New

York and Mike Morris of Pennsylvania presented examples from their respective states.

- Protection 101: CWA 319 Guidelines, the Vision, and Incorporating Protection Plans into Watershed-Wide Planning

  This breakout explored how water quality protection is and can be incorporated into planning across CWA 303(d) and 319/NPS Programs, from overviews of the CWA 319 guidelines and the CWA 303(d) Vision to examples of innovative water quality protection efforts in two states. Miranda Chien-Hale and Steve Epting of EPA Headquarters moderated the breakout and provided the overviews, and Ali Dunn of California, Lauren Haydon and Pamela Toshner of Wisconsin, and Justin Wiese of EPA Region 8 presented examples from their respective jurisdictions.

- How to Access ATTAINS Information in R Using Expert Query Web Services (for beginner and more advanced R users)

  This breakout demonstrated the use of rExpertQuery, a new R package which allows users to query and download ATTAINS data via Expert Query web services, to query and import common data profiles as well as how to summarize or create visualizations of these data using other R packages. Jesse Boorman-Padgett, Hillary Marler, and Wendy Reid of EPA Headquarters delivered the presentations and facilitated the discussion.

Session 3: Communicating Science to Non-Scientists

Chelsea Boozer, Executive Director of Rogue Water Lab, opened the session by emphasizing that communication is a vital skill for ensuring public understanding and trust in scientific work. She described the session as a practical workshop built on storytelling, behavioral science, and language strategies. Ms. Boozer noted that professionals across many disciplines often struggle with this aspect of their work. She explained that the difficulty is not due to a lack of knowledge or intent, but because traditional scientific and regulatory training rarely prioritizes communication as a core skill. She clarified that the goal of the session was to provide attendees with tangible frameworks and examples, not to offer theoretical advice. She stressed that facts alone do not change minds, stories do, and that being an effective communicator is just as important as being an effective scientist.

To begin the session, Ms. Boozer invited participants to reflect on the communication challenges they encounter in their professional roles. She asked everyone to write in the chat box an answer to the question: "What makes communicating your work hard?". The answers varied, including the complexity of the terminology, the size of the datasets, and the technical nature of the material. Ms. Boozer reassured the participants that these challenges are common to many professions. She then transitioned into outlining the structure of the session. She explained that the training would be broken into four major parts: how to simplify scientific messages; how to understand and communicate with specific audience types using personas; how to counter incorrect information; and how to manage social media communications. She explained that most of the session would be dedicated to the first two segments, as they are the foundation of clear public engagement.

To reinforce the importance of communication beyond general statements, Ms. Boozer presented a research finding from a study conducted by the American Water Works Association. The study examined how communication from drinking water utilities affected customer trust. Ms. Boozer acknowledged that few of the workshop participants worked in drinking water, but she emphasized that the insights were broadly applicable. According to the study, customers who had heard from their utility in the prior twelve months were three times more likely to say that their water safety had improved, regardless of whether the communication had been about a positive or negative topic; even communications about service disruptions or boil water notices resulted in improved trust, simply because the utility had been in touch. Ms. Boozer said that this finding illustrates how vital communication is: any communication at all can increase public confidence, even when the message is not necessarily favorable. She continued: when customers were aware of the frequency with which their water was tested, 67 percent said they trusted their utility, compared to just 34 percent among those who were unaware of testing frequency. Ms. Boozer explained that these figures were not due to customers understanding technical details; it was about trust increasing simply because people felt informed. She added that when scientists and agencies communicate regularly and transparently, even at a basic level, trust grows and gives potential for more effective engagement.

Ms. Boozer transitioned into the first of the four content pillars: simplifying scientific messages. She began by clarifying what "simplify" actually means in this context: it does not mean dumbing down or oversimplifying to the point of inaccuracy; instead, it means clarifying. She said this involves focusing the message, removing unnecessary jargon, and meeting people where they are. She added, it means identifying and preserving the core of the message while eliminating barriers to understanding. Ms. Boozer introduced the psychological concept known as the "curse of knowledge." She described it as a cognitive bias that affects experts in every field. The curse of knowledge, she explained, occurs when someone forgets what it is like not to know something; the bias causes experts to overestimate the background knowledge of their audience and to unconsciously skip foundational explanations. Ms. Boozer noted that this phenomenon is not limited to scientists; it applies to everyone, including communications professionals. She said that people spend years in school and on the job gaining expertise, but that experience makes it harder to remember what it was like at the beginning; as a result, experts often use terminology and concepts that feel obvious to them but are completely foreign to a layperson. She put forward the example of a scientist talking about nutrient load reduction in impaired water bodies under a TMDL framework, suggesting that the concept would most likely be understood by all of the workshop participants, but no random person on the street would understand it. In contrast, she continued, all that the public would want to know is whether the water is safe for kids to swim. Ms. Boozer gave three tips: start at a fifth-grade level, start with why it matters to them, and start with plain language and fewer details, only layering on details if the audience asks for it. She proposed thinking of this concept as switching the mindset from technical to conversational.

Ms. Boozer then provided a series of examples that demonstrated this approach in technical communication. She began with a water utility sending a message to the public about lead in drinking water, explaining that what the customer hears is "there is lead in the drinking water." Her next example was an announcement issued by a utility that they "will commence a $5 million project to install a 20-inch pipe on your street" – while accurate and specific, she said the sentence

fails to address what matters to the public. Ms. Boozer said that most residents do not think in terms of pipe diameter or capital projects; they want to know whether they will still be able to get their kids to school or if their shower will work that day, being more concerned with how the project will affect their daily life. She added that the communicator must align the message with what the audience values and experiences.

To begin offering solutions to the communication barriers named in the chat, Ms. Boozer introduced the first of three major tools: the "One Thing Rule." She explained that this technique asks communicators to identify and commit to a single takeaway that they want their audience to retain. While scientists may feel compelled to present all the facts, charts, disclaimers, and nuances, she continued, the average audience member will only remember one thing; therefore, it is the communicator's job to decide what that one thing should be. Ms. Boozer emphasized that this is not about "dumbing it down," but about structuring the message so that the main point is not lost in the noise. To demonstrate the One Thing Rule, she offered an example: "Due to increased nutrient loading from non-point sources, we anticipate an exceedance of algal biomass thresholds in Lake X this summer." She noted that, while this is technically accurate, it is filled with terminology most people will not understand. Ms. Boozer then translated it into a message that follows the One Thing Rule: "If nothing changes, the lake will likely experience a harmful algae bloom this summer, threatening fish and swimmers." She said that this sentence is not only clearer, but it also appeals to the audience's emotions; it connects the issue to the audience's lived experience and gives them a reason to care.

Ms. Boozer then detailed the second framework: the CAP Method, which stands for "Care, Action, Perspective." She explained that this method is designed for situations that are emotionally charged, adding that, when people are frightened, angry, or anxious, their amygdala takes over. She said that this part of the brain governs emotion and instinct; it shuts down the prefrontal cortex, which is responsible for logic and reasoning. Ms. Boozer noted that, when people are scared and you lead with a chart or a regulation, they are not listening; the brain simply is not processing information logically in that moment. Often in technical fields, she continued, professionals are taught that emotions do not matter, facts do, but science shows that they do matter, especially when communicating technical information in high-stakes situations. Ms. Boozer explained that the CAP Method offers a structure to re-engage people who are in an emotional state. First, she said, the communicator must express care: a statement that acknowledges the audience's feelings and concerns, which might be as simple as saying, "We know this is alarming" or "We understand why people are upset." She added that this is not about agreeing with everything the public says, it is about validating their emotional reality. Once care has been established, she continued, the communicator then can move to action, explaining what is being done; once trust has been partially rebuilt, the communicator can move to perspective, which is when scientific or regulatory context can be given.

Ms. Boozer proceeded to introduce the third communication tool: the 27-9-3 Rule. She noted that this framework was developed by Dr. Vincent Covello at the Center for Risk Communication and is widely used in risk communication. She explained that it is based on the cognitive limits most humans have: people can only process 27 words spoken over 9 seconds and retain only 3 messages. She added that this is especially true when under stress during events like press interviews or social media messaging in the aftermath of a crisis. Ms. Boozer reemphasized the importance of

identifying the "one thing" others should take away from the communication, which can be used in a blurb on a website or social media post. She added that this "one thing" will be the basis of the three key points used in this message. She gave three examples of effective 27-9-3 messages: (1) "We test rivers to see if they're clean, safe, and healthy, and we restore the ones that aren't"; (2) "We collect data to understand where pollution comes from and how to reduce it"; and (3) "We protect our water by tracking runoff, testing streams, and fixing problems early." She said that all of them limit filler and provide three clear points.

Ms. Boozer then invited participants to try writing their own 27-9-3 messages in the chat. Dozens of participants submitted messages, and Ms. Boozer reviewed as many as she could in the limited time. For example, one participant wrote: "Report water pollution or spills to prevent illness, protect human health, keep water clean." Ms. Boozer said that this example tells people what is needed from them as well as how it affects them and why it matters. Another participant wrote: "We recommend that you don't eat any fish from the lake, a pollution spill has occurred and we're not sure how it might impact your health." Ms. Boozer praised the message as showcasing the importance of overcoming fear of communication when an answer is not known. She added that communicating to the public that not everything has been investigated is important because when there is no communication at all, people tend to automatically fill in that information with something negative. She explained that communicating what is not known is just as important as communicating what is, and supplemental information can be provided later.

Ms. Boozer transitioned to the second of the session's four pillars: audience understanding and message targeting. She introduced the concept of audience personas as a way to understand how to craft an effective message. She said that using this tool helps communicators tailor their words to specific informational needs of different audience segments, including values, fears, and cultural attitudes, helping to inform how an audience receives messaging. Ms. Boozer emphasized that water professionals cannot assume they are speaking to "the public" as a monolith; instead, audiences should be understood as diverse, with differing values, media preferences, and social realities. She described personas as semi-fictional characters that represent real audience segments. She noted that they are constructed from actual data gathered through community engagement, surveys, partner feedback, and social listening and that companies use this tool as a way to sell products. Ms. Boozer added that governments and public entities can use this tool as a way to earn public trust by making people feel seen and understood, noting that the CDC health communication playbook incorporates this tactic by segmenting their audience and adapting messages specifically to segments of the population they are trying to reach.

Ms. Boozer detailed how to create user personas through three steps: research, segmentation, and persona development. She explained that the research step involves gathering data on the demographics with which there are interactions and the belief systems on which they operate. She said that the second step is to segment that information into distinct groups according to their specific needs, e.g., communication to volunteers, community activists, and students will all look different from each other. She described the persona development as creating characters based on this real data by attributing back stories to each persona that corresponds to the segments previously created. Ms. Boozer suggested many data sources for persona creation: community listening sessions/public forums, analysis of public comments on regulations and notices, interviewing frontline staff, partnerships with local NGOs, demographic and behavioral data,

social media and website analytics, local news and media monitoring, and community-based participatory research. She added that community listening sessions/public forums and analysis of public comments give insight on underlying values directly from residents; interviewing frontline staff that have lived experience through their interaction with people on the ground gives a unique perspective on public sentiment; local organizations and NGOs tend to have the trust of the communities they work in giving access to networks and new data points; demographic and behavioral data from the census, Pew Research, and CDC give actual demographic data of the area being served; social media and website analytics can describe demographic data and online behavior exhibited by the people accessing one's online profile and website; local news and media monitoring is important to know how issues are being framed to the general public; and community-based participatory research can be done by partnering with a college or community group that can do direct research that can be used in crafting an effective message.

To illustrate the approach, Ms. Boozer walked participants through three fully developed personas, each based on real-world insights from her work in the field. She stressed that the three characters were not meant to represent all audience types; they illustrate how varied communication strategies must be. Her main takeaway was that communicators must tailor not only their message but also the messenger and medium. Ms. Boozer emphasized that even though these personas are fictionalized, they are built on actual behavior patterns, and communicators who tailor messages to such archetypes are more likely to reach their audiences effectively.

Moving on to the third pillar of the session, combatting incorrect information, Ms. Boozer acknowledged that public mistrust in science and institutions is growing and that incorrect information spreads quickly. She noted that this is especially true in the absence of clear, early communication. Ms. Boozer described common pitfalls such as safety fears, oversimplified information, and the notion that something is being hidden from the public. She added that, even though fears felt by the public may be unfounded, they need to be met with empathy.

Ms. Boozer shared a real-world case study: the East Palestine train derailment and the incorrect information that followed. After the train derailment and chemical spill, she explained, a map began circulating online showing the entire Ohio River Basin as contaminated; the map was misleading, but because no official narrative had yet been widely shared, it went viral. She noted that the public interpreted silence from agencies as either incompetence or cover-up. Ms. Boozer said that once the incorrect information had gained traction, official efforts to correct the narrative became far more difficult. In response, she continued, the Ohio EPA prioritized rapid release of accurate information through digital platforms to contain the spread of the incorrect information. She added that the Ohio EPA collaborated with agency partners in an effort to engage with the community to quell fears borne out of the incorrect information, and that was then followed by monitoring and addressing any further incorrect narratives.

Ms. Boozer then identified ways to counter incorrect information. She raised the concept of "pre-bunking," which involves proactively addressing potential misconceptions before they arise. Applying it to the East Palestine example, she suggested that early messaging that warns of inaccurate maps online could have prevented the traction that was gained. Ms. Boozer then explained that refuting incorrect information with facts alone is usually ineffective because the incorrect information tends to elicit an emotional response. She added that, if communicators

respond solely with charts or regulations, they may appear cold or bureaucratic, which can undermine trust. Instead, she continued, responses should begin by pairing facts with feelings as a way to help people trust a message. She also highly recommended working with trusted community messengers, explaining that studies show that the messenger often is just as or even more important than the content of the message. Ms. Boozer emphasized that visuals also can play a critical role in countering misleading content. She referred back to the East Palestine case, where agencies responded by producing accurate maps, centralized web updates, and coordinated messages that provided clear corrections. Ms. Boozer also highlighted messaging hubs such as landing pages and QR codes, adding that centralized messaging through one hub can be used to reduce confusion when people are having trouble keeping track of all the data. Her final suggestion for preventing the spread of incorrect information was real-time myth busting, including monitoring social media and directly addressing false claims within a couple of hours. She added that a quick response sheet can be created and distributed to non-public-facing colleagues, because even if they are not officially responsible for communications, they may be receiving questions from neighbors or community members.

The session concluded with the fourth pillar, social media engagement. Ms. Boozer noted that many participants may not directly manage their agency's social media accounts, but that most participants are still public facing in community settings or online forums. She offered a series of best practices for online communication. She said that responses should be human, not robotic; people respond to tone and authenticity. Ms. Boozer added that, where possible, answers should be public and not hidden in DMs or private emails since public answers demonstrate transparency and build trust with the broader audience. She also emphasized that communicators must be prepared to pause scheduled posts during a crisis, as automated content can appear tone-deaf when circumstances change. Finally, she noted that communication roles and responsibilities must be clearly assigned ahead of time, including who drafts the post, who approves it, and who send it.

Ms. Boozer stressed that people connect with people. She provided a quick overview of the session takeaways, including the CAP method, the "one thing rule," the 27-9-3 rule, audience personas, addressing incorrect information, and social media tips. She closed the session with the statement, "Science doesn't speak for itself, we have to speak for it," adding, "When messaging is done with compassion and confidence, community trust can be built, resulting in a larger impact in one's work."

Session 4: Breakouts II

This session consisted of five breakouts, each focusing on a different topic. ELI staff selected the topics based on responses in the registration materials and then, with the help of the WPG, developed the respective agendas, including speakers and facilitators. Most of the presentation slides and materials from breakouts that had them can be found here.

- Assembling and Evaluating "All Existing and Readily Available Water Quality-Related Data and Information"

  This breakout provided an overview of the requirements for assembling and evaluating "all existing and readily available water quality-related data and

information," followed by examples of state approaches to and experiences with assembling and evaluating the quality of the data and information. Emily Cira of EPA Headquarters moderated the breakout and delivered the overview, and the panel consisted of Skip Feeney of Colorado, Becky Monahan of Maryland, Frank Klapinski of New Jersey, and Meredith Zeigler of New Mexico.

- TMDL 101 (Foundations Excerpt): A Load Duration Curve Analysis Explanation and Exercise

  This breakout offered a sneak peek at some of the material covered in TMDL Foundations (an introductory course on TMDL development for entry-level staff), covering water quality modeling basics and walking participants through the development of a load duration curve, an analysis tool for TMDL development. Presentations were delivered by Selena Medrano of EPA Region 6, Rosaura Conde of EPA Headquarters, and Andy Somor of Cadmus.

- How-To: StoryMaps

  This breakout explored how to build an Integrated Report StoryMap using assessment data processed in R as well as tools and functionalities to really make StoryMaps pop. Dustin Shull of Pennsylvania led the breakout and delivered the presentation.

- Obstacles to and Opportunities for Merging and Coordinating Watershed-Based Plans and TMDLs

  This breakout began with a quick overview of coordination between CWA 319/NPS Watershed Based Plans and TMDLs and then led into examples (with challenges) from three states, one that has combined the documents, one that has developed them simultaneously, and one that has developed Watershed Based Plans after TMDLs. Cyd Curtis and Justin Drew of EPA Headquarters facilitated the breakout and delivered the overview, and Kathy Stecker of Maryland, Nicole Hall of Texas, and Ben Rau of Washington delivered the other presentations.

- How to Use the Tools for Automated Data Analysis (TADA) R Shiny App to Retrieve, Clean, and Visualize Water Quality Portal (WQP) Data (no R experience required)

  This hands-on breakout introduced participants to TADAShiny, a user-friendly, web-accessible interface built on top of the TADA R package. Participants learned how to leverage the app to flag potentially invalid (suspect) results; filter results; integrate censored data (nondetects); harmonize synonyms and units; calculate Total Nitrogen and Total Phosphorus; visualize results in maps and figures; and download, interpret, and use the data files generated by the tool in subsequent analyses. Jesse Boorman-Padgett and Cristina Mullin of EPA Headquarters delivered the presentation and facilitated the demonstration.

Session 5: Breakouts III

This session consisted of six breakouts, each focusing on a different topic. ELI staff selected the topics based on responses in the registration materials and then, with the help of the WPG, developed the respective agendas, including speakers and facilitators. Most of the presentation slides and materials from breakouts that had them can be found here.

- When Streams Go Dry: Approaches to Monitoring and Assessment Challenges

  This breakout highlighted examples of how trail cameras and other remote environmental monitors inform state staff when sufficient water is and is not flowing for water quality monitoring as well as approaches to monitoring when there are little or no flows, approaches to assessment when there are gaps in the data record, and considering IBI comparability following a severe drought. Kristy Fortman of EPA Region 8 moderated the breakout, and presentations were delivered by Jason Elliott of Arizona, Mary Becker of Connecticut, Molly Rippke of Michigan, and Mindy Neil of West Virginia.

- Algal Blooms/HABs: Linking Nitrogen, Phosphorus, and Other Drivers

  This breakout explored the relationship between algal blooms/HABs and levels of nitrogen, phosphorus, and other drivers, with an example of how those relationships factor into water quality assessment and TMDLs. Kevin Kirsch of Wisconsin moderated the breakout, and presentations were delivered by Sebastien Clos-Versailles and Robert Voss of Missouri and Shawn Giblin of Wisconsin.

- TMDL 101 (Foundations Excerpt): EPA Collaboration and Public Participation in Preparing a TMDL

  This breakout provided a sneak peek at some of the material covered in TMDL Foundations, specifically the content concerning public participation and coordination between the EPA and states, territories, and Tribes in TMDL development. Rebecca Veiga Nascimento of EPA Region 10, Rosaura Conde of EPA Headquarters, and Andy Somor of Cadmus delivered the presentations.

- Continuous Monitoring: Approaches to Data Management and Quality Control

  This breakout provided an overview of managing and conducting QA/QC on continuous monitoring data and then brief presentations on a wide variety of tools and approaches used by states and even an early look at a continuous data analysis app being produced by EPA's Office of Research and Development (ORD). Dustin Shull of Pennsylvania moderated the breakout, and presentations were delivered by Brittany Faust of Minnesota, Meredith Zeigler of New Mexico, Travis Pritchard of Oregon, Matt Shank of Pennsylvania, Cathy Anderson of Texas, Paul Burnett and Alan Ochoa of Utah, and Laura Naslund and Michael Pennino of EPA ORD.

- How to Answer Common Questions with Available Data Tools

  This breakout demonstrated how to use ATTAINS reports, ATTAINS web services, the ATTAINS Expert Query search tool, and the ATTAINS geospatial service to answer common questions about the data. Jesse Boorman-Padgett,

Hillary Marler, and Wendy Reid of EPA Headquarters conducted the demonstration.

- Beginner R User: Introduction to Using the EPA TADA R Package to Retrieve, Clean, Analyze, and Visualize WQP Data

  This breakout provided an overview of EPATADA, an open-source tool set (R package) built in the R programming language, and led users through a RMarkdown document. Participants learned how to download the TADA R package from GitHub, access and parameterize several important functions, and create basic visualizations with a sample dataset. Cristina Mullin, Shelly Thawley, and Kenny Wong of EPA Headquarters conducted the demonstration.

Session 6: Topic-Driven Conversational Roundtables

This session consisted of one-hour, small-group facilitated discussions that provided participants an opportunity to meet counterparts from around the country while learning from one another about obstacles, opportunities, and approaches regarding an issue of personal interest. Participants were assigned to specific tables (virtual rooms) based on their topic preferences expressed prior to the training workshop. The following topics were addressed:

- Improving TMDL and NPDES coordination
- Merging and coordinating Watershed Based Plans and TMDLs
- Advance restoration plan (ARP) development
- Tracking plan implementation and effectiveness
- Challenges to implementing water quality standards in listing and TMDLs
- EPA additions of water impairments to a state/territory's list
- Artificial intelligence in assessment, listing, and planning
- Answering the questions people really have
- Career development

Session 7: Breakouts IV

This session consisted of six breakouts, each focusing on a different topic. ELI staff selected the topics based on responses in the registration materials and then, with the help of the WPG, developed the respective agendas, including speakers and facilitators. Most of the presentation slides and materials from breakouts that had them can be found here.

- Litigation on Assessment/Listing and TMDLs

  This breakout provided a summary of recent and pending federal TMDL and listing litigation and the potential impacts of recent decisions. Jim Havard of EPA Headquarters moderated the breakout, and the presentation was delivered by Elise M. O'Dea and Andrea Priest of EPA Headquarters.

- How to Incorporate Greater Hydrologic Uncertainty and Extremes in TMDLs

  This breakout focused on how modeling, the critical flow conditions used, and narrative content can better account for hydrologic uncertainty and extremes in TMDLs and water quality standards, concluding with a presentation on post-fire water quality effects and how that information can be incorporated into TMDLs. Kristy Fortman of EPA Region 8 moderated the breakout, and presentations were delivered by Rebecca Jascot and Kate Knight of Connecticut, Heidi Henderson of New Mexico, Troy Clift and Michael Suplee of Montana, and Greg Clark of USGS.

- Algal Blooms/HABs: Innovative Approaches to Criteria Development, Assessment, and TMDLs

  This breakout explored recent research into algal blooms as well as examples from two states of how they are addressing algal blooms in their criteria, water quality assessments, and TMDLs. Kevin Kirsch of Wisconsin moderated the breakout, and presentations were delivered by Zane Poulson of California, Lesley Merrick and Dan Sobota of Oregon, and Dale Robertson of USGS.

- Examples of Tracking TMDL Implementation and Effectiveness

  This breakout showcased the approaches and processes of four states for tracking TMDL implementation and its effects on water quality. Rebecca Christopher of EPA Headquarters moderated the breakout, and presentations were delivered by Kyle Milke of Montana, Nicole Hall of Texas, Ashley Wendt of Virginia, and Pat Oldenburg of Wisconsin.

- TMDL Revisions: Process and Examples

  This breakout provided an overview of requirements and expectations regarding TMDL revisions, details of an EPA Region's interactions with states on revisions, and examples of revisions from a state. Chris Hunter of EPA Headquarters moderated the breakout and delivered the overview, and Selena Medrano of EPA Region 6 and Andrea Plevan of Minnesota delivered the other presentations.

- How to Build Automated Data Dashboards, Maps, and Apps Using WQP Data and Other Data Sources

  This breakout demonstrated how to use the WQP webservices in data applications and how to build different types of dashboards and StoryMaps using the various WQP data profiles and services. It covered effective queries; 'caching' larger queries for efficient updates; and the types of maps, charts, and comparisons that can be made from the WQP formats. Adam Griggs of EPA Headquarters led the breakout and conducted the demonstration.

Session 8: Topic-Driven Conversational Roundtables II

This session consisted of one-hour, small-group facilitated discussions that provided participants an opportunity to meet counterparts from around the country while learning from one another about obstacles, opportunities, and approaches regarding an issue of personal interest. Participants

were assigned to specific tables (virtual rooms) based on their topic preferences expressed prior to the training workshop. The following topics were addressed:

- Data management practices
- Developing data analysis skills using R and other software language
- Assigning, managing, and splitting assessment units
- PFAS in assessment, listing, and planning
- HAB assessment methods and TMDLs
- Modeling
- Merging and coordinating Watershed Based Plans and TMDLs
- Coordinating water quality programs with water supply, instream flows, stormwater, and floodplain/wetland management
- Empowering program staff
- Managing a team

Wrap-Up and Send-Off

Adam Schempp of ELI began the session by setting the stage for forward-looking announcements and by introducing Jasper Hobbs of ACWA.

Jasper Hobbs, Environmental Program Manager at ACWA, began by explaining that ACWA hosts numerous work groups and committees supporting state staff across a variety of topics. He identified the Watersheds Committee as the most directly relevant to this audience, adding that the committee meets on the fourth Thursday of every month and is designed around a presentation, a case study, or a structured discussion to bring states together on watershed issues. Mr. Hobbs invited non-members to join these meetings, noting that his contact information appears in the meeting materials. He then previewed two upcoming events: (1) the annual Clean Water Cross-Program Workshop, with a nutrients focus and (2) the annual Water Quality Modeling Workshop, including a specialized focused in part on Loading Simulation Program in C++ (LSPC) and the Environmental Fluid Dynamics Code model (EFDC), hands-on exercises, case studies, and trainings. Mr. Hobbs concluded his remarks by reiterating appreciation for the conversations of the week.

Beth Malcolm, Environmental Analyst at NEIWPCC, started by thanking everyone who contributed to the training workshop. She clarified NEIWPCC's mission as advancing clean water in the Northeast through collaboration with and service to member states. She described how NEIWPCC engages and convenes water quality professionals and other interested parties to collaborate across water, wastewater, and environmental science issues. Ms. Malcolm added that the commission administers work groups as recurring forums where state, Tribal, and EPA staff discuss topics relevant to their clean water work. She identified place-based initiatives and partnerships, including the Hudson River Estuary Program, the Lake Champlain Basin Program, and the Long Island Sound Study. She noted that NEIWPCC provides staff who work directly within state agencies on water-related priorities.

Ms. Malcolm emphasized that, while NEIWPCC's core focus is the Northeast, the organization proudly works with partners across the country to address water quality, water pollution control,

and watershed management. She highlighted the National CWA 303(d)/TMDL Webinar Series that NEIWPCC runs, producing webinars for practitioners and archiving them on YouTube for future reference. Ms. Malcolm said that some topics that have been covered include phosphorus, nitrogen, temperature impairments, stressors, stormwater implementation, community engagement, and restoration. She explained that the series is supported by EPA funding and that a team of advisers coordinate closely with CWA 303(d) programs nationwide.

Ms. Malcolm then talked about the Clean Water Pod, a podcast focused on clean water efforts featuring the voices of environmental professionals nationwide and intended to improve understanding about how to meet the goals of the Clean Water Act, including orienting new professionals as they join the field. She noted that the podcast presently is showcasing innovative approaches through CWA 303(d)/TMDL success stories to inspire other programs, inform stakeholders and the public, and generate support for future work, adding that last year focused on nutrients and the first year of this EPA-funded effort provided an overview of programs and functions of the Clean Water Act at 50 years. Ms. Malcolm encouraged the participants to tune in wherever they get their podcasts and to help spread the word.

Jim Havard, Chief of the Watershed Branch at EPA Headquarters, began by highlighting the integrity and talent of the participants, emphasizing how much he appreciates working with them. He then thanked the Workshop Planning Group for their efforts. He observed that the sessions he attended could have continued beyond their allotted time given the breadth of information offered.

Mr. Havard proceeded to highlight specific programmatic offerings from the week. He referenced strong presentations on data systems including WQX, TADA, ATTAINS, and How's My Waterway, which all are focused on the lifecycle of data that supports the program and improves efficiencies. He credited Arizona for multiple presentations exploring the use of data tools to improve efficiency. He also recommended the Modeling 101 for TMDLs breakout to anyone who missed it and passed along an important takeaway that models should be only as complex as necessary to address the problem or objective. Mr. Havard recounted discussions in sessions devoted to collaboration in developing and implementing TMDLs, emphasizing engagement early and often, using communication tools effectively, and recognizing that addressing public comments can strengthen a TMDL. From the plenary session on Communicating Science to Non-Scientists, he noted messages such as "facts alone don't change minds, stories do" and that "the role of communicator is as important as the role of scientist." He also reiterated approaches to communications like the 9 seconds, 27 words, 3 messages framework. Mr. Havard then said that he appreciated hearing directly from participants during one of the roundtables regarding EPA additions of water impairments to a state/territory's list, including that the EPA should relay comments early, that opportunities to review early drafts of lists are valuable, and that availability to be contacted on specific issues in advance helps resolve matters early.

Mr. Havard then turned to next steps. He referenced the Clean Water Pod as a valuable resource for lay persons, adding that it provides a good level of detail. He emphasized the national program's focus on eliminating backlogs and staying on time, describing a positive culture shift that he intended to maintain in coordination with regions and the rest of the office. He announced that the TMDL Foundations course would be offered again in July in a virtual format, identifying Rosaura Conde as the contact. Mr. Havard emphasized his excitement for ACWA's Clean Water

Cross-Program Workshop and the Water Quality Modeling Workshop. He announced plans for the Protection Learning Exchange that ELI would be hosting. He also highlighted that the Restoration and Protection Screening (RPS) Tool had been updated with a new web interface and new indicators and directed participants to Emily Cira of the Watershed Branch as the contact. Mr. Havard concluded his remarks by thanking everyone for a great week and expressing hope that the training workshop will be in person next year.

Adam Schempp of ELI reiterated his appreciation to the EPA for making the event possible and to the Workshop Planning Group for guiding the development of the agenda. He thanked all presenters and moderators for making the plenary sessions, breakouts, and roundtables engaging and productive, and he thanked participants for their time, attention, and input. He emphasized that participants rose to the occasion in the virtual setting.

Jesse Ferraioli of ELI thanked the more than forty participants who submitted photos throughout the week and summarized what had been shared: generational histories with rivers, traditional practices, years-long water sampling efforts, and the joy of watching improvement in an impaired waterbody over time. She explained that a guessing game initially had been planned, but the depth and meaning of the stories led the team to simply share the photos and narratives as submitted, using the participants' own words. She announced that the slideshow would be played after the send-off remarks.

Traci Iott, Supervising Environmental Analyst at the Connecticut Department of Energy and Environmental Protection, began by expressing her appreciation for the opportunity to hear all the discussion over the week, whether focused on policy, new approaches, or new tools, and then she introduced the theme of her remarks: change and transition. She added that the program is in a significant transitional period. She displayed pictures of the National Conservation Training Center (NCTC) for those familiar with the venue and for those who had not yet attended, expressing hope that the next year's event will be at NCTC in person. Ms. Iott framed change as a shared professional reality: in a very small office, losing one staff member can mean losing half the program; a new governor or legislature can make programmatic changes in which some programs stay and others leave; and large staff departures are difficult to manage. She connected these transitions to practical challenges: relationships shift, it becomes harder to get work done, workloads remain while resources drop, and the "rules of the game" may change. Ms. Iott emphasized supporting colleagues as changes occur. She praised the resilience of this group, reminding everyone of the ability to adapt and move forward by bringing people together across a broad community, including those gathered virtually over the week.

Ms. Iott then referenced an exhibit at the NCTC museum, noting that Rachel Carson's desk and a representation of her office serves as a touchpoint for thinking about change and response. Ms. Iott summarized Carson's role as a writer and scientist concerned about the effects of pesticides and chemicals on birds, wildlife, and eventually people. She described Carson's example as one of stepping up, communicating, creating awareness, and finding solutions to move forward in the face of environmental change. Ms. Iott noted that Carson's work had a ripple effect, contributing to the environmental laws and programs under which many participants now work. She then contrasted program changes with underlying continuity: while programs face pushback and implementation partners may change, the fundamentals (including why people take on this work)

remain. She urged maintaining focus on the big picture and reaching out to colleagues inside and outside the current forum. Ms. Iott closed with a passage from The Lord of the Rings: "All we have to decide is what to do with the time that is given us."

Kevin Kirsch, TMDL Development Coordinator at the Wisconsin Department of Natural Resources, started by reflecting on the 17-year continuity of the training workshop, remarking that each workshop has been excellent regardless of being virtual or in-person. He described the 2024 training workshop closing remarks provided by Steve Winnett as words that touched and rejuvenated the soul, and those by Tom Stiles provided concrete actions that the group could take. He said that one could not improve on that year's closing remarks; one could only pay homage.

Mr. Kirsch acknowledged that the year had been challenging. He said that the Wisconsin Department of Natural Resources family experienced two sudden and unexpected deaths in the spring, Brian Hartsook and Gordon Stevenson. He described both men as husbands, fathers, friends, and dedicated public servants. Mr. Kirsch described Mr. Hartsook's relational strengths and shared a specific experience from a Milwaukee River Basin TMDL meeting: Mr. Hartsook and Mr. Kirsch presented allocations to municipalities and afterwards a public works director stressed the difficulty of meeting the required reductions but committed to them to avoid disappointing Mr. Hartsook. Mr. Kirsch then reflected on Mr. Stevenson, his mentor who hired him into the agency. He described Mr. Stevenson's engineering background, sharp intelligence, mischievous wit, and distinctive storytelling style that supported and nurtured colleagues. Mr. Kirsch drew from these memories Aldo Leopold's three "pillars," which he associated with both colleagues: interconnectedness, responsible stewardship, and safeguarding the natural community. He recalled Mr. Stevenson's guidance that necessary steps are rarely rushed, that progress happens through relationships and collaboration, and that "on a good day, we save a stream."

At that point, Mr. Kirsch paused and said he felt stuck. He chose to "use a lifeline" and "phone a friend," demonstrating how easy it is to reach out to colleagues. He first brought on Tom Stiles of Kansas. Mr. Stiles described the previous twenty minutes as the epitome of what makes these training workshops effective: they humanize the work, and participants leave hopeful. Mr. Stiles stated a preference for live, in-person meetings at NCTC, asserting that certain relationships are only formed in that setting and community. He made a historical note that the following day would be D-Day. He offered encouragement to continue the important work as a "band of brothers and sisters," and advised that, in an age of metrics, a practical test of success is whether tomorrow can be made a little better than yesterday. Mr. Stiles then referenced The Lord of the Rings again: "shortcuts lead to long delays." He paired it with John Wooden's "be quick, but don't hurry," encouraging a balance between momentum and care to avoid unintended consequences from rushed decisions. Mr. Kirsch thanked Mr. Stiles and then transitioned to the next "call," one to Emma Lorenzen of Wisconsin. Ms. Lorenzen relayed two themes that they had discussed over the years: (1) TMDLs are better and implementation smoother when staff reach out across sections and programs, ask for help, and accept help in return and (2) the act of giving and receiving help builds a sense of belonging within the workplace as the work proceeds. Mr. Kirsch thanked Ms. Lorenzen and then "called" Chuck Berger of Louisiana. Mr. Berger encouraged participants to treat the workshop community as a "second work family." He recalled reaching out to the group with questions such as "how do you deal with this type of situation in a TMDL" and described receiving practical guidance. Mr. Kirsch thanked Mr. Berger and "called" Dave Werbach of EPA

Region 5. Mr. Werbach summarized what he sees as a core strength of the program: the ability to work closely together and to craft creative solutions. Mr. Werbach added that innovation also serves as a powerful incentive to collaborate to find lasting solutions, since the program does not impose a one-size-fits-all approach. He framed problem discovery as easy and solution development as hard. He identified collaboration as the mechanism by which ideas become resolutions that can be implemented. Mr. Werbach said this is the work he particularly enjoys and thanked Mr. Kirsch for the "call."

Mr. Kirsch summarized the demonstration: he contacted four people, received four contributions that improved the overall presentation by adding viewpoints and simultaneously strengthened community. "It really is just that easy," he added. Mr. Kirsch then offered an analogy, that NCTC is "Hogwarts for conservation and water quality;" it represents grounds that foster friendship, mutual support, and a safe space for sharing experiences and learning together, enabling the navigation of challenges that might otherwise feel daunting. He observed that "help is always given at ~~Hogwarts~~ NCTC to those who ask," and he repeated Mr. Stiles' closing message from 2024: "These are your friends. They get you. This community can help, build, and support each other's programs." He thanked everyone and turned to the slideshow that showcased more than 40 slides of participants' favorite waterbodies, accompanied by short descriptions of what those waters mean to them.

APPENDIX 1: TRAINING WORKSHOP AGENDA

2025 NATIONAL TRAINING WORKSHOP ON WATER QUALITY DATA, ASSESSMENT, AND PLANS

BUILDING CAPACITY AND EFFICIENCY THROUGH SHARED EXPERIENCE

June 2-5, 2025

VIRTUAL TRAINING WORKSHOP AGENDA

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

PURPOSE OF THE TRAINING WORKSHOP

To empower state, territorial, and Tribal water quality and data program staff to succeed through building core skills and capacity and communicating effectively

WORKSHOP OBJECTIVES

- Share and learn about approaches to various aspects of water quality assessment and TMDL development and implementation
- Learn about and contribute to approaches to protection planning
- Improve familiarity with data tools, develop other technical skills, and advance programmatic acumen
- Learn how innovations in technology and process can achieve programmatic outcomes more efficiently
- Learn about and contribute to approaches to communicating with and collaborating with a wide range of partners and audiences
- Receive updates on research, materials, tools, and legal developments relevant to the CWA 303(d) Program
- Improve the coordination between water quality data management efforts and CWA 303(d) Program activities
- Expand and improve connections among state, territorial, and Tribal staff and with EPA Regional and Headquarters staff, enhancing the network of data, assessment, listing, TMDL, and other water quality professionals

OUTPUTS

- A final report summarizing the proceedings of the training workshop, to serve as a reference and assist program personnel in achieving programmatic requirements
- A companion website for this training workshop that contains the materials, presentation slides, and participant list for use during the event and as a reference afterwards

AGENDA

(All Times Eastern Daylight)

Monday, June 2

1:00 pm – 1:30 pm **Welcome**

1:30 pm – 3:00 pm **Session #1: Tools and Other Resources**

A collection of brief presentations on new and updated tools and resources from the EPA and across the country that improve efficiency and empower staff in the implementation of various CWA program responsibilities as well as communication with partners and the public.

Towards an EPA Reference Hydrography to Support Water Quality Data Integration
Jesse Boorman-Padgett, EPA HQ

An Integrated View of NPDES Permits, Impaired Waters, and Other Water Assessment Data with GIS Routing Tools
Casey Scott, MN

Services that the Tribal Exchange Network Group (TXG) Offers Tribes
Angie Reed, Penobscot Indian Nation

Tools for Automated Data Analysis (TADA)
Cristina Mullin, EPA HQ

How Arizona Uses R to Automate Assessments and TMDLs
Jason Jones, Mackenzie Moore, Matt Robinson & Zac White, AZ

Expert Query
Jesse Boorman-Padgett, EPA HQ

3:00 pm – 3:30 pm Break

3:30 pm – 5:00 pm **Session #2**: **Breakouts I**

Training workshop participants will attend one of the following webinars.

- Introduction to Assessment
- Modeling 101 for TMDLs
- Examples of Engaging Partners and the Public in TMDL Development and Implementation
- Advance Restoration Plans
- Protection 101: CWA 319 Guidelines, the Vision, and Incorporating Protection Plans into Watershed-Wide Planning
- How to Access ATTAINS Information in R Using Expert Query Web Services (for beginner and more advanced R users)

Tuesday, June 3

11:00 am – 12:00 pm Data Tools Office Hours (for those who signed up)

1:00 pm – 2:30 pm **Session #3: Communicating Science to Non-Scientists**
Approaches and tips for effectively sharing technical information and concepts with various audiences

Chelsea Boozer, Rogue Water Lab

2:30 pm – 3:00 pm Break

3:00 pm – 4:30 pm **Session #4: Breakouts II**
Training workshop participants will attend one of the following webinars.

- Assembling and Evaluating "All Existing and Readily Available Water Quality-Related Data and Information"
- TMDL 101 (Foundations Excerpt): A Load Duration Curve Analysis Explanation and Exercise
- How-To: StoryMaps
- Obstacles to and Opportunities for Merging and Coordinating Watershed Based Plans and TMDLs
- How to Use the Tools for Automated Data Analysis (TADA) R Shiny App to Retrieve, Clean, and Visualize Water Quality Portal (WQP) Data (no R experience required)

4:30 pm – 5:30 pm Data Tools Office Hours (for those who signed up)

Wednesday, June 4

11:00 am – 12:00 pm Data Tools Office Hours (for those who signed up)

1:00 pm – 2:30 pm **Session #5**: **Breakouts III**
Training workshop participants will attend one of the following webinars.

- When Streams Go Dry: Approaches to Monitoring and Assessment Challenges
- Algal Blooms/HABs: Linking Nitrogen, Phosphorus, and Other Drivers
- TMDL 101 (Foundations Excerpt): EPA Collaboration and Public Participation in Preparing a TMDL
- Continuous Monitoring: Approaches to Data Management and Quality Control
- How to Answer Common Questions with Available Data Tools
- Beginner R User: Introduction to Using the EPA TADA R Package to Retrieve, Clean, Analyze, and Visualize WQP Data

2:30 pm – 3:00 pm Break

3:00 pm – 3:50 pm	**Session #6**: **Topic-Driven Conversational Roundtables I** This session will consist of facilitated discussions in small groups on a wide range of topics. Participants who signed up are assigned to specific tables (virtual rooms) based on their topic preferences expressed prior to the training workshop.
3:50 pm – 4:00 pm	Break
4:00 pm – 5:00 pm	Data Tools Office Hours (for those who signed up)

Thursday, June 5

1:00 pm – 2:30 pm	**Session #7**: **Breakouts IV** Training workshop participants will attend one of the following webinars. • Litigation on Assessment/Listing and TMDLs • How to Incorporate Greater Hydrologic Uncertainty and Extremes in TMDLs • Algal Blooms/HABs: Innovative Approaches to Criteria Development, Assessment, and TMDLs • Examples of Tracking TMDL Implementation and Effectiveness • TMDL Revisions: Process and Examples • How to Build Automated Data Dashboards, Maps, and Apps Using WQP Data and Other Data Sources
2:30 pm – 3:00 pm	Break
3:00 pm – 3:50 pm	**Session #8**: **Topic-Driven Conversational Roundtables II** This session will consist of facilitated discussions in small groups on a wide range of topics. Participants who signed up are assigned to specific tables (virtual rooms) based on their topic preferences expressed prior to the training workshop.
3:50 pm – 4:00 pm	Break
4:00 pm – 4:30 pm	**Wrap-Up and Send-Off**

APPENDIX 2:
COMPILATION OF TRAINING WORKSHOP PARTICIPANT EVALUATIONS

A total of 87 workshop participants completed an anonymous Participant Evaluation Form following the 2025 National Training Workshop. The combined numerical results from the evaluations indicate an overall event rating of "Very Good-to-Excellent." In addition to the numerical responses, we received many written comments, which also are reproduced here.

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

A. The Workshop—Overall

Information Presented
5 (66) 4 (18) 3 (2) 2 (1) 1 (0) AVG: 4.71
Workshop Materials
5 (58) 4 (18) 3 (8) 2 (2) 1 (0) AVG: 4.53
Workshop Organization
5 (72) 4 (12) 3 (1) 2 (2) 1 (0) AVG: 4.77
Group Interaction
5 (39) 4 (34) 3 (12) 2 (1) 1 (0) AVG: 4.29
Session Facilitation
5 (67) 4 (12) 3 (7) 2 (0) 1 (1) AVG: 4.66
Conference Platform (Zoom)
5 (55) 4 (18) 3 (9) 2 (2) 1 (1) AVG: 4.46

Comments:

- Too bad there was no virtual campfire.
- I thought the Workshop went extremely well this year over Zoom, despite all the last-minute changes. As I have every year since I started work here, these sessions taught me something new and gave me lots of new faces to meet, so I look forward to more!
- Great job facilitating, super interesting topics. I wasn't able to make all the sessions in person, so I really appreciate having the YouTube link available for the workshops. The YouTube has also given me more time to work through some of the trainings at a slower pace and has been very helpful. Thanks so much!
- I think the entire workshop went well for being a virtual one, but I feel like I get more out of an in-person workshop.
- Great conference and workshop! Hopefully we can go back to in-person workshops next year!
- The range of topics and the depth of information far exceeded my expectations. I was very impressed and learned so much.

- No Breakouts should have only 1 person presenting and facilitating. That should be a Data Tool Office Hour. We did not have a Regional States only meeting. We need this time. I missed NCTC and all the amazing food :(
- Despite the limitations for this year's conference, this was still a very informative and fun experience to have for the first time!
- Despite being a virtual-only conference y'all did a great job! The content was interesting, relevant, and educational. The interaction and engagement was better than I could ever hope to have in a virtual setting. Well done!
- I appreciate the presentations posted on YouTube. I have watched several already and intend to watch several more next week. The asynchronous availability of talks made attendance much easier.
- Everything was great. I loved being a presenter and the send-off made me tear up.
- Great workshop! Thank you!
- I think there could have been more materials given to attendees of the conference in order to increase engagement. I am not a fan of zoom as the meeting place, but I understand there's no alternative in the current situation. I think the organization of conversation roundtables and breakout rooms could have been split up better. For instance, rather than having all the TMDL topics one day, mixing them into different days is better, in my opinion, so there are chances to go to multiple of them. I also think finding a way to have more conversations, rather than lectures, would be better. The conversational roundtables were nice but quite quick in comparison to the lengthy presentations that would go one after another.
- Would have loved some tribal-state partnership case studies.
- Group interaction and conference platform only 3/5 because online platform will always be inferior to in person for group interaction. Y'all did great with what we had though! Thank you
- I thought the virtual aspects were managed well, but you cannot recreate the experience of being fully PRESENT in person. Doing this virtually means that it is harder to tune out distractions from other duties in front of you in your office.
- Overall the conference was very smooth and very engaging to be a part of!
- Great workshop!!
- The content for entry level professionals (i.e. new grads) was pretty lacking. Most of the presentations (with the exception of Chelsea Boozer's presentation on communicating science to non-scientists) went right over my head. There was so much technical jargon involved that it was hard for me to understand how the content presented could apply to the work I'm doing at my agency. Even the R demonstrations left no room for addressing issues in workflows. Oh well, I'm glad the presentations were recorded, and PowerPoint slides were made available, that way I can learn at my own pace. Thanks.
- Very well executed online training. Thank you for getting this together for all of the attendees.
- It is no one’s fault that group interaction is not great. It is hard to interact at an online meeting. The chat function at least gave some ability to do so.
- Well done in the virtual format.
- This workshop was organized incredibly well, as always, even with the challenge of it being entirely virtual. The sessions had great information and the roundtable discussions

provided a nice opportunity to discuss specific topics in small groups, which helped me stay engaged this week. I appreciated that there were a few sessions that were specific to assessments and listing, but would always welcome more focus on things like interpreting IR Guidance memos and challenges faced with assessing.

- For a virtual platform, Zoom was great (of course we would prefer in-person at NCTC)
- Always outstanding and worth every minute, virtual or in-person. Thank you!
- Sessions were very well chosen with good speakers. Organization was very clear on where to be and when. Really well done.
- Success as usual. I do like to have the state breakout sessions, even if a separate zoom. For region 4 states, we have started holding EPA/state calls so it is happening externally.
- Some presenters were better presenters than others, but that's to be expected. Chelsea Boozer's presentation on communication was phenomenal! Thanks for putting on this entire workshop
- Zoom was as good as it could be, but I hope to attend in person one day and have the chance to talk more in depth with my fellow practitioners! The way that the workshop was opened with a presentation on R, it felt a little inaccessible as someone new to R (but with 25 years in the water resources field). It also didn't match with the plenary session on communication. It's true to the diversity of the demands of the job but starting with R was not a good way to start in my opinion - too technical, and not motivational. I think there also needs to be more careful vetting of speakers. Some people's accents and speaking styles are distracting. Maybe there just always needs to be a closed caption option.
- Interaction and facilitation hard with virtual.
- Chelsea Boozer's presentation was fantastic!
- Another amazing conference, I'm hopeful to attend in person one day and establish some more personal connections with assessment coordinators in other states.
- Great workshop. One complaint (if it really is a complaint...): there is too much material - I can't get to it all :)
- This was great! Thank you for organizing!
- Will be better in person, but it was still great.

B. Goals and Expectations

How effective was the workshop in satisfying the stated goals?

5 (59) 4 (21) 3 (5) 2 (0) 1 (0) AVG: 4.64

How successfully did the workshop meet your own expectations?

5 (58) 4 (22) 3 (6) 2 (0) 1 (1) AVG: 4.56

Comments:

- As a first-time participant, I knew I would learn something, and I did. The format of the workshop allows both beginners and experts to learn something. The presenters were knowledgeable and effective.
- For being virtual, I anticipated there being more technical issues than there actually were.
- Great conference and workshop! Hopefully we can go back to in-person workshops next year!

- The workshop exceeded my expectations.
- The workshop exceeded my expectations. As usual my only regret is not being able to attend EVERY session, but you did make that possible! I appreciate the recordings.
- Great presentations. Learned a lot and will use it in my work!
- I think the workshop went how I expected it to, over zoom, for the most part. I expected a little more creativity with engaging attendees, but again, this conference has set such a high bar in the past from the in-person conference it usually is.
- My expectations were scaled back, because this was virtual. I marked a 4 rank because of the lost time that we normally have with the all-day/evening days long conference in person.
- Very well planned out and organized workshop
- Great workshop! I just one suggestion: some of my staff overlooked the email invitation to sign up for the roundtable discussions. It would be nice if that information had also been included in the email with the original registration link, reducing the likelihood it would be overlooked.
- Great virtual meeting. Not the same as in person but did allow more staff to watch and learn.
- There were fantastic sessions on tools for data analysis and communication in TMDL and Listing programs that I think satisfied the objectives for the workshop. I knew the virtual format would impact my engagement and ability to make connections with other participants, but I am pleasantly surprised to still have a lot of takeaways from the presentations alone and to feel like I virtually engaged with folks enough to be able to follow-up with them to continue conversations we had over Zoom.
- For the platform, I thought the Workshop did a really great job. Definitely the best zoom workshop I have attended. Everything went smoothly, there was connection between participants, really good content. I only gave 4s instead of 5s because it's not as good as in person ;).
- Enjoyed hearing the presentations and always find this as a learning opportunity.
- The speaks provide many informative topics and materials. Thank you for EPA and organizers.
- Lots of technical stuff. Good for those interested, but that's not me.

C. Specific Sessions

Welcome

5 (38) **4** (16) **3** (4) **2** (0) **1** (0) **AVG: 4.59**

Comments:

- Brief and well-orchestrated remarks that kept us on time.
- Virtual is difficult; and hard to set the mood and focus of the in-person atmosphere. But, best option in such circumstances.
- Loved the waterbody submission part of the welcome to add to our engagement throughout the conference. Hope it comes back for next year!

- I always look forward to hear Jim Havard's stats on how many states have submitted or have yet to submit their 303(d) lists. Makes me know I'm not alone in this field. Adam never ages, wish he'd share that secret with us all. I've lost all my hair since I started attending these workshops 9 or 10 years ago.
- I couldn't attend.
- The opening was not as inspirational as it could have been. I felt more could have been said to help us understand the purpose of the workshop and truly kick off a week of learning/sharing.
- The wrap up remarks have been very emotional and motivating this year and last. Consider adding something like that to the welcome session or day 1 wrap up to help pump everyone up to collaborate.
- Great introduction and kickoff to the workshop.
- Instructions on how to participate on the virtual platform was clear. The encouragement to participate seemed to be well received through the week.

Session #1: Tools and Other Resources

5 (37) **4** (13) **3** (5) **2** (0) **1** (0) **AVG: 4.58**

Comments:

- For a person who rarely uses or has low familiarity - it was hard to follow or see the impact of the tools being demonstrated.
- It was just ok. I would rather hear from states/tribes and less from EPA HQ.
- I am still going back to the previous recordings for this day to get more insight on the new ATTAINS and associated data tools to this database to improve my application in it for our region.
- I intend to explore TADA.
- I couldn't attend.
- I missed most of this but heard positive things from colleagues
- Lots of great stuff shared!
- Good overview at a high level. Enough to get staff interested in some of the tools and can do more research afterwards.
- More quick demos! easier to do in a webinar setting
- It was a lot of high level and details. I think it made sense to try to make the whole group aware of tools and data, so I understand why this was a whole group session. But, at the same time, it was a bit hard to take in from short presentations.
- Excellent overview of available tools, resources, and initiatives.

Session #2: Breakouts I

Overall Rating: **5** (32) **4** (17) **3** (3) **2** (0) **1** (0) **AVG: 4.56**

Introduction to Assessment

5 (3) **4** (2) **3** (2) **2** (0) **1** (0) **AVG: 4.14**

Comments:

- Extremely valuable info.
- I appreciated this session because I think it provided a good foundation for any participants that are new assessment coordinators. I'd love to see a more advanced version of this session in the future that digs deeper into assessment topics such as how to wrangle data or interpretations of what "readily available data" looks like.

Modeling 101 for TMDLs

5 (5) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

- Was great.

Examples of Engaging Partners and the Public in TMDL Development and Implementation

5 (1) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

Advance Restoration Plans

5 (3) **4** (6) **3** (0) **2** (0) **1** (0) **AVG: 4.33**

Comments:

- It is great to see this discussion as we learn more about the actual restoration process, not just the technical model or assessment
- Gave perspective for me in this specific kind of CWA approach for 303d listings, and I am going back to listen to the Assessments recording to broaden my understanding of how our stakeholders collect this information.
- This was super informative and interesting. I really enjoyed it and learned from it. Great presentations all around and good comments and discussion.
- Still early in the process for most states to report on actions. Session was a good intro and learning for staff still new to the concepts.
- Good presentations and facilitation.

Protection 101: CWA 319 Guidelines, the Vision, and Incorporating Protection Plans into Watershed-Wide Planning

5 (5) **4** (3) **3** (0) **2** (0) **1** (0) **AVG: 4.63**

Comments:

- Content as expected.

How to Access ATTAINS Information in R Using Expert Query Web Services (for beginner and more advanced R users)

5 (2) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

Session #3: Communicating Science to Non-Scientists

5 (47) **4** (19) **3** (2) **2** (0) **1** (1) **AVG: 4.61**

Comments:

- Great presentation! and the presenter was wonderful also!
- I liked the 27/9/3 rule; I'd never heard of it before and will definitely try to incorporate it in the future.
- She was excellent, we've recommended her as a possible keynote speaker at a conference we are planning
- Very good. Could have done less into the virtual "character" development; but good ideas regarding 27/9/3 and using less technical language.
- I worked in customer-facing utilities for a decade and felt I learned new ways to approach tough topics.
- Very valuable and had a great selection/diversity of approaches to help communicate with specific individuals one can face when addressing environmental issues.
- I wish I could rank this a 10. We've had similar presentations/breakouts like this in Shepherdstown in the past, but this one was the best. Real good and actionable advice was given. I did break the rules and shared the link to this session with some of my team members who were not participating in the workshop.
- Very useful presentation and much needed! Thank you!
- Best part of the week in my opinion. Great approaches presented that I can't wait to try out.
- This was an excellent presentation/training. I have already shared information with others and I am rethinking some information going to the public soon.
- Very helpful information in this workshop!
- It is challenging to talk to different audiences. Some helpful tips were provided. I found the CAP method particularly useful.
- Very good overview. Great for new staff and good reminders for senior staff. Definitely a skill set that we all need to continue to grow and refine. Wished for a bit more on how to combat misinformation on social media but maybe no silver bullet.
- This plenary session was interesting and provided good tools for communication that I think us technical practitioners can always use reminders on.
- Thank you for choosing this topic. This is something we really need training on, and specifically targeted to our type of subject matter.
- Learned a lot in this one for communicating.
- This was an excellent presentation. Chelsea did a great job with the materials, delivery, and message. Such an important topic. Chelsea is an amazing presenter.
- Especially good for early-career people. This sort of session should be repeated each year, maybe not plenary every time.
- Chelsea Boozer is great. I like the One Thing Rule and CAP method.
- Excellent information! I found this session to be extremely helpful and feel like everyone in the science field should attend a training like this.
- Awesome. I really appreciated this topic and how the presenter reinforced communication as a science.

- I found this session to be particularly helpful with our line of work considering how hard it can be to convey what we do to folks that do not work in the water quality field.
- Fantastic!

Session #4: Breakouts II

Overall Rating: **5** (30) **4** (20) **3** (3) **2** (0) **1** (0) **AVG: 4.51**

Assembling and Evaluating "All Existing and Readily Available Water Quality-Related Data and Information"

5 (6) **4** (5) **3** (3) **2** (0) **1** (0) **AVG: 4.21**

Comments:

- This breakout was phenomenal. My colleagues and I in Idaho were furiously chatting amongst ourselves about strategies used in other states and opportunities open to us. This is currently a large hurdle for us, and it was great to hear how others have dealt with the overwhelming task of determining quality thresholds for external data.
- I expected this to be more about what "readily available" actually meant. For example, just because you can get the data doesn't mean you can readily assess it. Sometimes the provided location is incorrect. What lengths are we expected to go to in order to get the data to a reasonable level of assurance to base listing decisions on it.
- Great presentation. Loaded with information, chat was very active and had tons of useful information as well. Thank you!

TMDL 101 (Foundations Excerpt): A Load Duration Curve Analysis Explanation and Exercise

5 (2) **4** (2) **3** (0) **2** (0) **1** (0) **AVG: 4.5**

Comments:

- I learned how to develop a load duration curve for TMDL development.

How-To: StoryMaps

5 (1) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

- Using what I learned in this breakout to aid in the GIS mapping webpages I've been developing lately

Obstacles to and Opportunities for Merging and Coordinating Watershed Based Plans and TMDLs

5 (6) **4** (8) **3** (0) **2** (0) **1** (0) **AVG: 4.43**

Comments:

- Always interesting to hear how other state programs are built and can interact.
- Timely and relevant to my state's work as we've just begun similar efforts. Great to hear how other states tackle this and learn from them. Only complaint was that we could have gone longer. :-)
- Very good comments and discussion here, along with the presentations. I got a lot out of it.
- Liked seeing the connection between these processes.

- Nice to see some states have lots of resources and stakeholders to help merge/implement.
- Texas did great.

How to Use the Tools for Automated Data Analysis (TADA) R Shiny App to Retrieve, Clean, and Visualize Water Quality Portal (WQP) Data (no R experience required)

5 (4) **4** (1) **3** (0) **2** (0) **1** (0) **AVG: 4.8**

Comments:

- This session and the demo that Cristina led on the TADA Shiny apps was one of my favorites of the workshop. I liked that it was encouraged that participants follow along, as that was engaging, and it was nice getting to familiarize myself more with the Shiny app, which I think has great utility for those without much experience in R.
- I did not have the necessary software installed on my computer, but the course was still extremely useful to me. We are making use of the TADA program in Georgia. I am just not the one pulling the data. It was helpful to get an overview of how it works. I think it was more useful for me not to try to pull data at the same time the presentation was happening as I would have been less able to focus on the demonstrations.
- The presentation and information were great. The one suggestion I have is that it would have been helpful to know what software/packages needed to be installed prior to the session to make it easier to participate in the presentation. I tried installing the required packages as instructed at the beginning of the presentation, but it took too long to install to be able to follow along with the presentation.

Session #5: Breakouts III

Overall Rating: **5** (30) **4** (12) **3** (5) **2** (0) **1** (0) **AVG: 4.53**

When Streams Go Dry: Approaches to Monitoring and Assessment Challenges

5 (6) **4** (4) **3** (1) **2** (0) **1** (0) **AVG: 4.45**

Comments:

- Extremely useful coming from the arid Southwest. Only a small section of the river runs perennially.
- Great presentations (Mindy Neil rocks), good combination of different states' views and issues, good questions
- Nice mix of tools and guidelines to share.
- Watched the recorded version when I was able. Another monumental challenge facing Idaho and many other regions. Timely, important, and informative.
- Joined out of interest for the different approaches in water monitoring while considering weather constraints. The connection for me that day was bad, so I had trouble getting the full session.
- It was interesting to see how different parts of the country deal with this issue (out west where it is very dry to places in the east where withdrawals can cause a stream to go dry). I never thought of using trail cams to visualize a stream. Very interesting idea.
- This was less relevant to me and also ended up being about some different topics than I was expecting.

- The presentations about placing sensors and cameras in remote areas were very interesting and helpful.

Algal Blooms/HABs: Linking Nitrogen, Phosphorus, and Other Drivers

5 (6) **4** (1) **3** (0) **2** (0) **1** (0) **AVG: 4.86**

Comments:

- Great talks. Really enjoyed the Missouri example discussing their criteria, assessment, and TMDL.
- More in-depth than expected, good content though.
- These presentations were amazing!
- Good discussion. The audience seemed very interested and wanting to learn more.

TMDL 101 (Foundations Excerpt): EPA Collaboration and Public Participation in Preparing a TMDL

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

Comments:

Continuous Monitoring: Approaches to Data Management and Quality Control

5 (3) **4** (0) **3** (1) **2** (0) **1** (0) **AVG: 4.33**

Comments:

- I thought this breakout covered a good array of data management approaches.
- Great information and a lot of innovative approaches being discussed/presented.

How to Answer Common Questions with Available Data Tools

5 (1) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

- Good information. Liked how it was organized: what questions can be answered with what tool.

Beginner R User: Introduction to Using the EPA TADA R Package to Retrieve, Clean, Analyze, and Visualize WQP Data

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

Comments:

- I enjoyed this session on TADA since it was also a demo and following along in the code was encouraged. Since this session relied on use of RStudio, it was not as simple to follow along as with the Shiny app session, but it was great seeing how to utilize the TADA packages in R.

Session #6: Topic-Driven Conversational Roundtables I

Overall Rating: **5** (16) **4** (13) **3** (1) **2** (0) **1** (0) **AVG: 4.5**

Comments:

- Addition of waters to list. Good discussion between EPA and states.

- Advance Restoration Plan (ARP) Development. Great discussion. This was nice to have. Like a real National Training Workshop conversation.
- EPA additions of Water Impairments to a State/Territory's List - I thought this was a positive conversation. I know more states have experiences than were present.
- ARPs - while there was a good conversation, with only 7-8 people and half the group "here to listen", it was a very limited interaction with 1 or 2 people dominating the discussion
- Challenges to Implementing Water Quality Standards in Listing and TMDLs - The discussion our group had was a bit slow to start (likely in part because of the virtual setting), but once we got into it, I felt like I gained a lot of insights from others regarding challenges with implementing narrative standards. Hearing other perspectives from around the nation is such an important part of workshops like these, and I'm glad we were able to have a breakout session like this, even in a virtual format.
- Tracking Plan Implementation - Good ideas and sparked some directions that we could take or at least set as broad goals.

Session #7: Breakouts IV

Overall Rating: **5** (35) **4** (10) **3** (4) **2** (0) **1** (1) **AVG: 4.56**

Litigation on Assessment/Listing and TMDLs

5 (13) **4** (1) **3** (2) **2** (0) **1** (0) **AVG: 4.69**

Comments:

- I think this session offered some good insights on the trends in litigation and advice on how to avoid being subject to lawsuits for listing and TMDLs. The Q&A session at the end of the presentations was the most helpful part of the session for me, so I'd love to have had more time for folks to ask questions if a session like this happened again.
- Information about lawsuits related to listing was helpful for me to hear. The fact that "readily available" has not been defined by the courts was an interesting fact as was the emphasis on the Administrative Record.
- This had very similar information from the year before. I probably should skip this every other year -- or maybe there could be a "hook" at the beginning to say what new decisions were made. I think that info was buried.
- A lot of useful information. Thank you for providing such a session!
- Good topic. Not much new info, but good reminders and always information that we need to stay aware of.
- Good conversation!
- New to this sort of stuff so this synopsis on how to understand and handle these was very helpful for me!
- First time to hear about the Constructive Submission Theory.

How to Incorporate Greater Hydrologic Uncertainty and Extremes in TMDLs

5 (4) **4** (1) **3** (1) **2** (0) **1** (0) **AVG: 4.5**

Comments:

- Great information, we will be reaching out to NM DEQ to discuss some of their work.

- This was also very useful in how to assess before & after droughts or fire and how it affects data comparability.

Algal Blooms/HABs: Innovative Approaches to Criteria Development, Assessment, and TMDLs

5 (2) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

- Very good discussions. Great to see states like Oregon that are multiple years into their program and work especially in a state that is just getting started.

Examples of Tracking TMDL Implementation and Effectiveness

5 (1) **4** (1) **3** (1) **2** (0) **1** (1) **AVG: 3.25**

Comments:

- Overall good. Maybe a bit more backstory of some examples that could show the "starting origin" would be helpful.

TMDL Revisions: Process and Examples

5 (2) **4** (1) **3** (0) **2** (0) **1** (0) **AVG: 4.67**

Comments:

- Was great to see this discussion gaining more traction as TMDLs have been around for a long time and the revisitation of existing TMDLs is needing.
- This was a helpful topic with good conversation from states and EPA.

How to Build Automated Data Dashboards, Maps, and Apps Using WQP Data and Other Data Sources

5 (3) **4** (0) **3** (0) **2** (0) **1** (0) **AVG: 5.0**

Comments:

- I thought this presentation was excellent and provided great examples of the possibilities for creating custom data dashboards. I love these kinds of presentations that show the possibilities with existing resources/data systems.

Session #8: Topic-Driven Conversational Roundtables II

Overall Rating: **5** (16) **4** (13) **3** (1) **2** (0) **1** (0) **AVG: 4.5**

Comments:

- Merging and Coordinating Watershed Based Plans and TMDLs. It was great to learn from some States on how the coordination is working between these two programs.
- Assigning, Managing, and Splitting Assessment Units - Pretty good discussion, but not well facilitated. Not everyone was encouraged to speak, or even introduce themselves.
- AUID approaches - facilitators needed a bit more guidance or defined questions to work through, conversation wandered and didn't even get through the introductions with all attendees (got sidetracked by asking follow-up to introductions rather than putting those Q's in a parking lot for circling back to after intros)
- Coordinating water quality programs with water supply, instream flows, stormwater, and floodplain/wetland management -- free ranging conversation.

- Coordinating Water Quality Programs with Water Supply, Instream Flows, Stormwater, and Floodplain/Wetland Management - This was pretty broad, so we would have benefited from having more structure or specific questions. Oddly, few people could remember signing up for this topic specifically.
- Developing Data Analysis Skills Using R and Other Software Language - This was another great roundtable discussion that I'm grateful to have been able to participate in at this workshop. The conversation provided a good opportunity to engage with folks more deeply on topics that I'd been interested in throughout the week, so it was nice to be able to have a space to ask questions since we didn't have the in-person components of the workshop for that.
- Empowering Program Staff - More time and more participants would have been nice in this group. However, strong discussion and sharing of ideas and perspectives occurred. Make my score a 4.5!!
- HAB Assessments - while there was a good conversation, with only 7-8 people and half the group "here to listen", it was a very limited interaction with 1 or 2 people dominating the discussion
- Merging and Coordinating Watershed Based Plans and TMDLs. Interesting discussion, though a lot of overlap of people and topics from the ARP discussion. Facilitator talked too much and hindered the organic discussion.
- Merging WBPs and TMDLs. Rosaura facilitated well. Good discussion. I was pleasantly surprised that it was good. Wish there were no EPA people so I could complain about our Region, but will not let that decrease my score.

Wrap-Up and Send-Off

Overall Rating: **5** (49) **4** (5) **3** (3) **2** (0) **1** (0) **AVG: 4.81**

Comments:

- Always great to hear the inspiration of the speakers.
- Again, virtual format makes this difficult and speakers worked with what they had. Content of the sendoff was good, and I appreciated the message from Kevin and Traci. My only advice to all speakers would be to have less "scripted" content. It easier to keep listener focus if you can speak "to the audience." Scripted comes across as reading "at the audience," especially in the virtual format.
- Another session that I would rate a 10 if possible. Traci and Kevin did great. Tom Stiles is always an inspiration. I've learned so much from all three of them over the years, and their words are meaningful. Despite being a virtual meeting, you all pulled it off and made us feel like the same collaborative community we see in person every year.
- Excellent send-off!!
- Excellent talks! Felt energized and with some hope to keep fighting the fights.
- Fantastic wrap-up to a wonderful workshop week!
- Great format and very engaging. This meeting clearly is an important place to both share information and recharge our enthusiasm for our task...
- I loved the slideshow presentation that was put together this year. Seeing all of the waters that we all connect to and love was a wonderful send-off and an empowering way to have

us think about why we do the work we do. Kevin's address was also a strong reminder of the powerful community we have because of workshops like this one where we're all able to come together and engage with other people doing the same work.
- Inspirational
- Kevin did a good job bringing some emotion, fun and inspiration into the closing. I am glad he spoke last.
- Really enjoyed the creativity and dedication to the mission shown by the wrap up speakers. The slide show of the submitted photos was great!
- The personal stories at the end made it feel closer to what in person meetings are like.
- The slide show is great.
- Very good remarks from all speakers and presenters.
- Very inspiring send-off! Felt like it was in person and not on-line.
- Very lovely and a great way to close the conference
- Very well done.
- Way to take to heart the message from the communication presentation that emotion should be part of the science story. Didn't expect to leave a zoom conference teary. Thank you so much for doing this.

Office Hours

Overall Rating: **5** (8) **4** (3) **3** (1) **2** (0) **1** (0) **AVG: 4.58**

Comments:
- Had a great interaction with the ATTAINS/How's my waterway teams. Helped address our questions and was able to bring up a few other minor issues.

Other Comments or Suggestions

Comments:
- All the speakers for the breakouts I attended were great. They gave me a lot of good ideas for ways our program could improve.
- Amazing job planning an in-person meeting and then transitioning to virtual. All ELI communications, calendar invites, links, etc. work without error so impressive job to ELI for managing all those details behind the scenes.
- As always, I thought this workshop was wonderful. I did have a few suggestions for consideration that I think could slightly enhance the experience: 1.) It might be helpful to name presentation files that are hosted on the ELI workshop webpage so that they are more inline with the actual presentation name. I think this will help participants to more easily manage/organize the files after downloading them. 2.) For these virtual workshops, it might be helpful to request participants use a standardized naming convention when logging into the Zoom meetings. For example, something along the lines of "[First Name] [Last Name] ([Affiliation])" 3.) For the interactive breakout sessions that use software, it might be helpful to send out pre-session to-do guides with instructions on what software to install/have ready prior to the session.

- Fingers crossed that this is in person again next year! A huge thank you to ELI, especially Adam, for how well organized this event is. I know this year there were added challenges with uncertainty with budgets/EPA attendance and support. Thank you for rolling with the punches and pulling off a wonderful virtual conference.
- Great conference and workshop! Hopefully we can go back to in-person workshops next year!
- Hopefully it goes back to in-person but virtual was okay.
- I am very impressed with how seamless the virtual facilitator/presenter transitions went - excellent work! I can tell that this workshop was well planned and coordinated.
- I liked the half day format. I wish there was some more instruction on getting the TADA extension in R for non-users. I wanted to follow along, but did not get it uploaded to R in time for the presentation. I am going to go back and watch the recording.
- I love that I can go back and review the presentations as well. Thank you!!
- I plan to sign up for this again next year. The degree of expertise in all the presenters was so welcomed and opened my mind to how different approaches to collecting / presenting data; it was hard to pick just one to listen to. The YouTube links are great so I can catch up with all the ones I missed!
- I'm so glad I attended! I will watch more of the recordings next week. Thank you for putting together a useful program in a flexible format.
- Let's do it all in person next year!!
- Looking forward to next year already :) In person I hope as well.
- Maybe keeping the breakout sessions and conversation roundtables or office hours links in the same email next conference?
- Recorded talks are nice to go back and view.
- Super well done overall. Nothing beats an in-person conference, but you all did an amazing job of making a Zoom conference easy and effective.
- Thank you to ELI and EPA for hosting this workshop year after year. This was my third year attending, and I look forward to it every year now because I gain so much knowledge and sense of community from the sessions and other participants. Looking forward to the next one!
- Thank you very much!!!
- Thank you!
- Thanks to ELI staff for another excellent workshop!
- The slide show was super special, thank you for organizing that!
- Were funding cuts responsible for the virtual meeting? Or was it just uncertainty?
- Wishing you luck with all the wrap up that goes with 2025 meeting, and hope 2026 development goes smoothly with an in-person format.

APPENDIX 3:
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 2025 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.