# U.S. Environmental Protection Agency Board of Scientific Counselors

#### Safe and Sustainable Water Resources Subcommittee

#### **Virtual Meeting Minutes**

#### October 28-29, November 17, and December 2, 2020

**Dates and Times:** October 28, 2020, 11:45 a.m. to 5:15 p.m.; October 29, 2020, 11:50 a.m. to 5:30 p.m.; November 17, 2020, 11:00 a.m. to 2:00 p.m.; December 2, 2020, 2:00 to 5:00 p.m. Eastern Time

#### Location: Virtual

#### **Meeting Minutes**

Provided below is a list of the presentations and discussions that took place during the meeting with hyperlinked page numbers. The minutes follow. The agenda is provided in Appendix A, the participants are listed in Appendix B, and the charge questions are provided in Appendix C.

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# Wednesday, October 28, 2020

The meeting generally followed the issues and timing as presented in the agenda provided in Appendix A of this meeting summary.

## Welcome and Opening Remarks

## Tom Tracy, Designated Federal Officer, Office of Science Advisor, Policy, and Engagement

The meeting convened at approximately 12:00 p.m. Eastern Time. Mr. Tom Tracy, Designated Federal Officer (DFO) for the U.S. Environmental Protection Agency (EPA) Board of Scientific Counselors (BOSC) Safe and Sustainable Water Resources (SSWR) subcommittee, thanked the members for their attendance. He made brief announcements regarding virtual meeting capabilities and reminders. He shared the one submitted public comment, and he said BOSC SSWR subcommittee members had no conflicts of interest.

The BOSC SSWR subcommittee members, DFO, and EPA staff members introduced themselves.

## Office of Research and Development Welcome

# Jennifer Orme-Zavaleta, Principal Deputy Assistant Administrator for Science, Office of Research and Development

Dr. Jennifer Orme-Zavaleta welcomed BOSC SSWR subcommittee members and participants to the virtual meeting. She provided updates on several of EPA's Office of Research and Development (ORD) current activities, such as ORD's work to prepare for the approaching hurricane at the Gulf Ecosystem Measurement and Modeling Division (GEMMD) Laboratory in Florida. ORD is also doing what they can to assist California with the wildfires and related smoke challenges.

Dr. Orme-Zavaleta explained that EPA has operated under the teleworking framework since the second week of March 2020 and has been doing surprisingly well under those circumstances. EPA's laboratory facilities are open, but ORD encourages the workforce to work from home whenever possible.

Dr. Orme-Zavaleta discussed how EPA has supported Coronavirus Disease 2019 (COVID-19) research by partnering with the White House and the Centers for Disease Control and Prevention (CDC) to develop guidance for cleaning and disinfecting products. ORD partnered with airlines and hotels in several arenas focusing on disinfection. As research evolved, ORD is focusing also on aerosols, as inhalation was found to be a more predominant route of exposure and transmission. ORD has also conducted wastewater work and been able to detect RNA signals from the virus as an indicator of prevalence of the virus in communities. This work is performed in partnership with the states. ORD has worked with the state of Ohio, and it has had conversations with New Mexico and other states that have expressed interest. ORD works also with CDC on a national wastewater surveillance for detecting the virus. She believed this activity would have application for future viruses and pandemics. Dr. Orme-Zavaleta explained ORD is also helping to develop a a salivary assay mechanism that will provide another cost-effective way to determine COVID-19 exposure.

ORD values the interaction, information, and insights from the BOSC SSWR subcommittee members. She discussed how the role of the BOSC subcommittees has helped shape the SSWR research program to ensure ORD is doing the right science to address the problems, and how the purpose of the 2020 meeting will be to ask SSWR subcommittee members to evaluate and provide feedback on if ORD is doing that science correctly. Dr. Orme-Zavaleta expressed her appreciation to the subcommittee members for their time and energy spent to increase ORD's research impact in support of the Agency, states, and the larger science community.

#### Safe and Sustainable Water Resources Research Program Overview and Charge Questions

# Suzanne van Drunick, National Program Director, Safe and Sustainable Water Resources Research Program

Dr. Suzanne van Drunick, National Program Director, SSWR Research Program, thanked the SSWR subcommittee on behalf of the SSWR program team for their input on the Strategic Research Action Plan (StRAP) in 2019, which SSWR has considered in the transition from the research planning phase to the research implementation phase. Since completing the StRAP, the SSWR program has continued working closely with partners, EPA program and regional offices, as well as the states and tribal communities to identify the specific products needed to address priority research needs and optimize the use of those research problems to solve their pressing environmental challenges.

Dr. van Drunick discussed research areas structured under the SSWR program including watersheds, nutrients and harmful algal blooms, and water treatment and infrastructure. She explained that the virtual meeting would focus on watersheds and microplastics, and she provided an overview of the agenda and charge questions.

## **Office of Research and Development Overview – Centers**

#### Tim Watkins, Director, Center for Environmental Measurement and Modeling

Dr. Tim Watkins, Director, Center for Environmental Measurement and Modeling (CEMM), discussed EPA's CEMM, which has six divisions with 375 federal staff across five locations. He described how the Center's vision and mission was structured in efforts to provide fundamental methods and models to implement environmental statues and help inform both human and ecological health and risk assessments.

Dr. Watkins explained how CEMM works in all ORD's National Research Programs, with approximately 40 percent of the Center's Full-time Equivalents (FTE) are focused within the SSWR program. He described CEMM's capabilities, such as the experimental streams facility and aquatic research facility located in Cincinnati, Ohio, as well as the Gulf Ecosystem Measurement and Modeling Division (GEMMD) in Gulf Breeze, Florida, and laboratories in other regions. Dr. Watkins closed by providing examples of the Center's contributions in the SSWR program's Research Areas 1, 2 and 3.

#### Wayne Cascio, Director, Center for Public Health and Environmental Assessment

Dr. Wayne Cascio, Director, Center for Public Health and Environmental Assessment (CPHEA), welcomed SSWR subcommittee members and participants to the virtual meeting. He explained

how CPHEA formed in 2019 during the ORD reorganization, and its mission is to provide the science needed to understand the complex interrelationships between people and nature in support of assessments and policy to protect human health and ecological integrity.

Dr. Cascio explained how CPHEA comprises of five divisions located in six sites across the country. CPHEA functions to integrate work from other Centers applying systems approaches and integrating ecology and human health. He discussed CPHEA's role in overseeing the development of EnviroAtlas and how CPHEA contains the Health and Environmental Risk Assessment (HERA) Program. The HERA program is oriented under two topic areas, including science assessments and translation and advancing the science and practice of risk assessments.

Dr. Cascio discussed CHPEA's research on COVID-19, such as antibody assays, which is based on the salivary antibody technology that was developed as part of the SSWR program for recreational water quality assessments. CPHEA scientists have also developed the EPA COVID-19 Facilities Dashboard to characterize the 124 EPA facilities across the country, which will help advice the EPA Administrator on decisions about returning staff to the EPA workplace.

Dr. Cascio outlined CPHEA's work with Integrated Risk Information System (IRIS) assessments, Provisional Peer Review Toxicology Values (PPRTV), systemic review methods and evidence maps to improve assessments, and additional related research. He then provided an overview of CPHEA's divisions, including the following:

- Chemical and Pollutant Assessment Division (CPAD)
- Health and Environmental Effects Assessment Division (HEEAD)
- Pacific Ecological Systems Division (PESD)
- Public Health and Environmental Systems Division (PHESD)
- Public Health and Integrated Toxicology Division (PHITD)

Dr. Cascio discussed how CPHEA contributes significantly to the SSWR program, and how its capabilities are being applied in the program to address partner needs concerning watersheds, including the National Aquatic Research Survey (NARS), indicators, nano- and micro-plastics, aquatic mapping, and recreational water quality.

Dr. Cascio further discussed CPHEA's work with NARS, indicators, and microplastics. Within the aquatic mapping research area, he described how CPHEA works to advance geospatial methods and datasets to test watersheds, developing transferable methods that can support EPA's Office of Water (OW), the states, and tribal communities to implement the Clean Water Act.

Dr. Cascio shared CPHEA's research with recreational waters and health effects from waterborne contaminant exposure. He discussed how CPHEA developed novel approaches to study health effects from waterborne contamination, including a noninvasive salivary immunoassay, which is now being adapted to study COVID-19.

• **Fred Hitzhusen:** I worked with a multidisciplinary team to develop more appropriate financial and economic techniques for valuing human uses of water systems. We examined lakes, rivers, strip-mining, agriculture, and in-stream mining operations to

determine how to conduct cost-benefit analyses. These measures would help decide where the greatest willingness would be to allocate funds for environmental improvements given budget constraints and limited resources.

#### Watersheds Introduction

# Rick Greene, Supervisory Research Biologist, Safe and Sustainable Water Resources Research Program

Dr. Rick Greene, Supervisory Research Biologist, SSWR program, discussed how the watersheds topic research area aims to advance water quality and watershed management tools and protect and restore water resources. The watersheds topic is one of the three interrelated topics of the SSWR program, including Research Area 1, which addresses assessment monitoring and management of aquatic resources; Research Area 2, which addresses improved aquatic resource mapping; and Research Area 3, which addresses human health and aquatic criteria research.

Dr. Greene explained how this SSWR program overview is designed to provide subcommittee members an opportunity to learn about the SSWR program's research implementation, research products, and how this research is designed to address the environmental needs of the Agency and the general public.

# Research Area 1 Overview: Assessment, Monitoring, and Management of Aquatic Resources

# Brenda Rashleigh, Assistant Center Director, Center for Public Health and Environmental Assessment

Dr. Brenda Rashleigh, Assistant Center Director, CPHEA, provided a brief overview of Research Area 1 and the tools, indicators, methods, and models to proactively manage aquatic resources. Total maximum daily loads (TMDL) are a starting point or planning tool for restoring water quality. The SSWR program's research supports the national estuary program, a network that protects and restores nationally substantial estuaries.

## Research Area 1, Output 1: National Aquatic Resource Survey Support

## Steve Paulsen, Ecologist, Center for Public Health and Environmental Assessment

Dr. Steve Paulsen introduced the progress in Research Area 1, Output 1: Support and Research for NARS. NARS is a collaborative program that monitors and assesses the nation's water resources over long periods of times. There are three product areas of focus.

Product 1 focuses on technical support. ORD continues to provide technical support for current field surveys and assessments. All work under Product 1 includes working closely with a dedicated staff in OW, EPA regions, states, partners, and tribal communities.

Product 2 focuses on development of new or improved indicators. NARS requires indicators that can be collected, reported, and interpreted in a consistent way across the country and are scientifically defensible and can be adopted by states. One research focus is refining ORD's approach and contributing to the use of DNA technologies in NARS. We are examining

techniques for interpreting the role of critical gases in lakes using National Lakes Assessment 2017 pilot study data.

The current NARS assessments describe conditions of aquatic resources and provide a method to rank stressors in relation to their impact on the biological resources. Product 3 focuses on the expansion of the assessment capability and includes more interpretive and synthetic products using the field data and watershed variables collected by NARS. These NARS assessments will provide in-depth exploration of spatial and temporal patterns identified in statistical summaries from the original NARS assessment.

- Elizabeth Fassman-Beck: For Product 2, could you discuss the specifics of stressor indicators? Are you looking at individual chemicals? Combinations of contaminants? Contaminants and physical condition?
  - **Steve Paulsen:** We have measurements of individual contaminants, but one issue is combinations. Another challenge for the program is budget. As the chemicals of concern have grown, the budget does not grow for individual measurements. The first effort is to examine biological quality. I would say the coastal side has emphasized contaminants, both organic and inorganic, more than the freshwater side at this point.
  - Elizabeth Fassman-Beck: Is the SSWR program moving toward more "cocktail" assessment or toxicological assessment?
  - **Steve Paulsen:** We could consider "cocktail" assessments in the future. Budget issues are causing no growth, but I think they would be willing to consider.

## Research Area 1, Output 2: National Aquatic Resource Survey Extension

# Marguerite (Peg) Pelletier, Research Biologist, Center for Environmental Measurement and Modeling

Dr. Peg Pelletier introduced the work in Output 2, the NARS Extension. This output leverages and extends NARS data through integration with other data sources. This output involves developing new tools and models for condition assessment, extrapolating information from monitored to unmonitored sites and waters, and developing stressor-response linkages for key response variables. There are two product areas in the output. Product 1 focuses on geospatial application of NARS data and Product 2 focuses on interpolation and stressor-response analyses to extend the use of NARS data.

Product 1 applies NARS data and approaches to address state and regional needs and includes multiple research activities. Pilot projects have started to apply National Coastal Condition Assessment (NCCA) designs and indicators and deliver targeted assessments to build capacity for states and agencies to manage nearshore waters. The SSWR program couples these projects with the on-going Cooperative Science and Monitoring Initiative (CSMI), mandated by the binational Great Lakes Water Quality Agreement. These data are used to develop integrated Lake Condition Reports for the individual Great Lakes and to assess nutrient loading and

availability. EPA Region 8 works with Colorado and Wyoming to harmonize their data so they can conduct state bioassessment activities.

Product 2 focuses on interpolation and stressor-response relationships between NARS indicators and other ancillary data and includes multiple research activities. These interpolated data will then be used in economic models to assess the public's willingness to pay for incremental increases in biological condition. Using the same approach, Washington is piloting a separate effort by combining state and national EPA data.

Another effort is an estuarine study, using the Gulf of Mexico as a test site, combining EPA and other relevant data to extrapolate conditions for unmonitored areas. CEMM will use initially standard spatial statistics such as kriging, but they are also exploring modeling response variables based on in-estuary abiotic factors such as sea surface temperature and salinity. Finally, CEMM is developing estuarine stressor-response relationships using NCCA variables.

- John Lowenthal: Is there any motivation to link the national data, so you do not have to look for it regionally?
  - **Peg Pelletier:** Our data is not linked to the National Hydrography Dataset (NHD). For estuarian data, we are pulling in NHD data and enhancing it.
  - Steve Paulsen: Each location monitored in NARS uses NHD as the location because all sites are linked to NHD.
  - John Lowenthal: How we would know what information exists? Would you go through NARS?
  - **Steve Paulsen:** For NARS data, you would go to the NARS website. OW is in the process of making sure NARS data and state data are added to the National Water Quality Exchange.

# **Research Area 1, Output 3: Biological Indicators**

## Susan Yee, Ecologist, Center for Environmental Measurement and Modeling

Dr. Susan Yee introduced Output 3 and discussed the research goals of developing tools, indicators, and information to inform water quality goals, assess biological condition, and support effective management of diverse water bodies. This research will expand the tool kit of biological assessment approaches by developing innovative monitoring methods. The SSWR program is developing research under three products.

Dr. Yee explained that Product 1 has two major research areas. First, developing approaches for underrepresented and rarely monitored ecosystems. The SSWR program wants to focus on ecosystems specifically identified by partners for priority need. They want to develop classification schemes to help evaluate assessment indicators for low-gradient freshwater and tidal systems. The program is also developing innovative condition indicators to improve diatom-based metrics so they can be applied to assessments.

Dr. Yee described how Product 2 works to synthesize and expand biological condition gradient (BCG) approaches to include innovative measures, consider multiple scales, and transferability to new regions. This effort develops screening assessments that integrate stressor and resource data to identify priority stressors and areas for coral protection and restoration. The effort also includes integrating socio-economic data with coral reef and estuarine BCGs. This effort will help to identify priority waters, communicate with the public, evaluate recovery potential, and monitor progress toward goals.

Dr. Yee discussed how Product 3 facilitates the collection and evaluation of stressor-biological response evidence. This effort will compile and synthesize existing evidence to estimate the influence of different stressors. This effort will allow more efficient casual assessment to support stressor identification, water quality criteria development, and predictive assessment to link biological condition to stressor targets. These results will develop technological and functional improvements to related tools using test cases.

- **David Cole:** How did this originate?
  - Susan Yee: Black water ecosystems are a type of slow-moving streams that have high tannin levels and very brown and slow-moving waters. This topic arose from conversations with state and local communities that were implementing monitoring. These are systems that are never or rarely monitored by NARS. They wanted a better understanding of unique metrics for these systems. Diatom data was raised by state and local communities. They are not able to use it efficiently because of taxonomical data. Part of this effort is to provide an approach to utilize the diatom data.
- John Lowenthal: How will the diatom data relate back to recommendations for water quality improvements?
  - Susan Yee: The major focus is on taxonomic resolution. There is a component under Product 3 that will try to identify relationships between different stressors and diatom metrics.
- Joseph Rodricks: Could you say more about what other stressors you are hearing about from partners? How do you acquire that information from partners?
  - **Susan Yee:** We acquire this information primarily by working with OW, which has performed outreach activities and created prioritization lists that they would share with us and help us interpret them. Stressor response work does not focus on any one stressor; they look at several different factors such as temperature extremes, contaminants, and sediment. It is important to look at all things in this effort and be able to identify priority stressors.
- **Steve Weisberg:** When we met in 2019, we appreciated that the SSWR program worked with local entities. How are you working to ensure that those are real? Are you keeping track of projects that are jointly published with state and local entities?

- **Suzanne van Drunick:** There are formal mechanisms with which we engage with our stakeholders. In terms of tracking, we have a mechanism within ORD. We could pull that information together if needed. We are committed and genuine about working with external partners.
- **Joseph Rodricks:** I noticed this as well. How did you reach out and contact state and local officials? Has something changed about the process of reaching out?
- **Suzanne van Drunick:** Products were still under development during the last meeting in 2019. The engagements were already occurring, but the four-year StRAP did not afford us the opportunity to discuss these engagements. When developing and fleshing out the research area, there is a dedicated effort to work with stakeholders. Making and maintaining connections is important.
- Elizabeth Boyer: So much of what has been presented extended NARS data to new applications. Do you feel you have enough temporal coverage? Is the frequency of the data enough?
  - **Peg Pelletier:** In our output, we are combining our data with national coastal assessment data. We are trying to match the temporal land use with in-water collections to determining if it is efficient. We have the data, and we are doing analyses.
  - Elizabeth Boyer: Are you using national scales data?
  - **Peg Pelletier:** We am not, but I do not know if freshwater researchers are.
- Steve Paulsen: Regarding NARS, when we are developing thresholds NARS uses or observing watershed information to examine spatial patterns, we use all available data. NARS data is a series of status assessment. For the ecological community, we examine individual sites very intensively temporally. When reviewing population trends, it requires you wait longer to see shifts in spatial and temporal patterns. One issue we have discussed with states and OW is that the mashup of other data depends on when you are using it and the way in which you want to apply it.
  - **Elizabeth Boyer:** The presentation focuses heavily on NARS data. Are the indicators only using NARS data, or would you combine that with similar information?
  - **Steve Paulsen:** When developing indicators, they would combine. If looking at the NARS assessment, it limits the data collected in NARS.
- **Tim Davis:** How are you working to decrease the amount of time between collection and public availability of data? We work with 2012 data. If running these surveys every year and it takes several years to make data available, are you discussing ways to decrease this time?

- **Steve Paulsen:** ORD and OW focus on how to speed up the delivery of the data from laboratories, which has sped up substantially since the first survey. A large part of the delay in public availability is because the report had not been cleared. The extent of the approval process creates the delay. We hope to standardize the process so OW does not have to review it each time. Releasing them as web available information would substantially increase that as well.
- Lucinda Johnson: How are you benchmarking indicators? Are there specific metrics?
  - Steve Paulsen: When there is national or regional thresholds for a that have been consistently set, we use those. We are currently examining the least disturbed reference sites. Wetlands is using accommodation of regions and wetland pipes for their thresholds. We work with BCG studies and use biological responses to set a nutrient threshold. We are determining how effective that would be to try to implement for lakes initially.
  - Lucinda Johnson: I did not quite catch the content with respect to indicators.
  - Steve Paulsen: That was in context of looking at new indicators: indicators that might be useful to NARS in the future, or pilot work with indicators. It does not need to be added long-term. A study was done to see the magnitude of methane production in lakes and reservoirs. Can we effectively implement something in the survey mode that would capture useful information? This is from a climate change perspective.

## Research Area 1, Output 5: Water Quality Benefits

#### Matt Heberling, Research Economist, Center for Environmental Measurement and Modeling

Dr. Matt Heberling introduced Output 5: Water Quality Benefits. He noted that the SSWR program has had difficulty quantitatively representing the benefits. Quantifying the benefits helps people understand what they are getting from investments. Output 5 plans to improve the water and economic models to better support water quality decisions on local, regional, and national scales, and partners include OW, EPA's Office of Policy, regions, and states.

Dr. Heberling explained that the framework combining water quality modeling and economic benefits assessment will allow EPA and others to perform these integrated analyses. It is in a proof-of-concept stage. Output 5 will help contribute to further developments.

Product 1 in this research area focuses on improving water quality capabilities. The research was separated into watersheds and waterbodies. Research includes models for estuaries and coastal waters to support national policy decisions. This effort is important because the national watershed modeling capability can provide the sediment loadings, but it does not account for important functions. The SSWR program will deliver this product as a summary with software packages, manuscripts. and presentations.

Product 2 provides information about the benefits of water quality improvement such as public policy decisions, fixed budgets, and designing market-based approaches. Research under this output will help to better explain water quality benefits. The research also contributes directly to the Benefits Spatial Platform for Aggregating Socioeconomics and H<sub>2</sub>O Quality (BenSPLASH). The program will deliver this product as a summary report.

Product 3 will improve how water quality measures or models link to economic models. This product includes research that supports the translation of EPA's modeling and monitoring efforts. With a focus on water chemistry, it is not comprehensive. The SSWR program will deliver this product as a journal article and communicate research results through manuscripts, webinars, and presentations.

- **Fred Hitzhusen:** You cannot measure amenities of water and other environments. Have you had any push-back on these techniques? Which have you found to be most helpful in getting quantitative evidence?
  - Matt Heberling: We are exploring several approaches. Work in coastal recreation has interesting approaches with travel costs. They are running models now to see what kind of results they are getting and uncertainties that arise. Source water protection work examines land uses and impact of drinking water treatment costs. Depending on the model or data we have, there is some uncertainty there. Most drinking water plants that the SSWR program has surveyed have old data. There is a lot of uncertainty with costs.
  - **Fred Hitzhusen:** I think you have made progress, and I think it is inevitable that we must deal with these struggles.

## Research Area 1, Output 6: San Juan Watershed Support

# Kate Sullivan, Branch Chief Ecosystems Assessment, Center for Environmental Measurement and Modeling

Dr. Kate Sullivan, Branch Chief Ecosystems Assessment, CEMM, described how Research Area 1, Output 6, involves the work EPA, states, and tribal communities are doing to develop and implement the long-term San Juan Watershed water quality monitoring program. In 2015, a substantial mine spill sent highly colored water downstream polluted with metals. This spill brought attention to on-going contamination, but the visual elements of the spill brought national attention. Congress, after the spill, dedicated money to better understand the watershed under the Water Infrastructure Act. There are collaborative efforts between ORD, OW, and tribal communities to implement a monitoring program to better understand watershed restoration.

Product 1 works directly to implement and perform data analysis. The SSWR program compares results to state and tribal communities water quality standards to co-develops innovative tools for public communication. The program applies regression models to predict what will happen if these events happen in the future. The program will deliver this product as a data report and seminars to describe results to partners on an on-going basis.

Product 2 focuses on linking and tracking using innovative techniques and associating data. Outcomes are results that will help managers efficiently and cost-effectively direct restoration efforts. EPA Regions 6, 8, and 9 are involved as well as Colorado, New Mexico, Utah, and Arizona.

## BOSC Questions on Research Area 1, Outputs 1-3 and 5-6

Joseph Rodricks, Chair Robert Blanz, Vice Chair

- John Lowenthal: StreamCat and LakeCat are central places to house data. Are these data going to house NHD data?
  - **Marguerite Pelletier:** EPA takes data from NHD and other sources to link it to individual streams.
  - **Steve Paulsen:** We pull NHD data into StreamCat and LakeCat to create a fuller watershed picture.
- Elizabeth Fassman-Beck: Does EPA view indicators considering individual chemicals or cocktails of contaminants?
  - Steve Paulsen: Anion and cation scales reach several of the common and known contaminants on a routine basis. Looking at cocktails of chemicals is a challenge, though, and we must consider budget restrictions.
- Elizabeth Boyer: Does EPA feel they have enough coverage for extending NARS data from a modeling standpoint? In addition, what about NARS data with other data combinations? Are you using national scale U.S. Geological Survey (USGS) data?
  - **Marguerite Pelletier:** We collect data once every five years and match it with existing land use and land cover data. We combine state data with NARS data in some cases.

## Research Area 1, Output 4: Microplastics

# Kay Ho, Environmental Research Scientist, Center for Environmental Measurement and Modeling

Dr. van Drunick explained how the StRAP overview was high-level. EPA-heard from the subcommittee and program staff and, to obtain input from the BOSC, EPA needed to detail more at the product level. Dr. van Drunick noted that there are roughly 12 outputs within the watersheds topic. She stated that the SSWR program wanted input on some of their newer areas of research, including microplastics. Globally, there are many efforts in the microplastics realm and international consensus to standardize methods to characterize microplastics. The charge questions ask how the program is doing thus far with their current methods and if the subcommittee had advice regarding method development.

Dr. Kay Ho discussed Research Area 1, Output 4: Methods to Identify and Quantify Micro/Nanoplastics in Environmental Matrices. She defined microplastics as plastic particles ranging in size from 5 mm to 1 nm. Many microplastics are different from one another (e.g., properties, additives, sizes, and compositions), so not one method will be sufficient for all.

Dr. Ho outlined the SSWR program's research objective and research efforts to (1) standardize extraction, identification, and quantification methods for microplastics in sediment and surface waters, and (2) build capacity in EPA laboratories nationwide.

Dr. Ho focused on the first research effort, including sediment and water methods for microplastics, further standardizing sediment methods, using a hybrid method the SSWR program developed, and development of new methods focusing on smaller microplastics and nanoplastics.

Dr. Ho outlined the SSWR program's development of small microplastics/nanoplastics methods including flow cytometry, hyperspectral imaging, and microscopy. She highlighted the SSWR program's work to visualize and quantify fluorescent 140 nm microbeads in cells. She also emphasized their research to extract, concentrate, and characterize nanoplastics using magnetic separation. Dr. Ho described a research project to generate environmentally relevant nanoplastic particles generated from relevant stock materials using cryomilling. Lastly, she displayed a chart emphasizing the SSWR program's research to measure microplastic weathering with ultraviolet-visible spectroscopy.

Dr. Ho describe the Regional Applied Research Effort (RARE) in conjunction with the SSWR program. She outlined quantification and comparison of sediment extraction methods. She displayed the quantification and comparison results by percent recovery of microplastics. She noted that no existing method consistently extracted more than 70 percent of each microplastic and sediment, microplastics, and extraction methods all affected percent recovery. Dr. Ho noted that a hybrid method generally extracted more than 70 percent from both sediments and most microplastics.

Dr. Ho outlined the SSWR program's research to standardize water methods via the American Society for Testing and Materials (ASTM). She then described new RARE 2021 microplastics projects, using the Combustion Alternative Treatment for Microplastics in the Environment (CAT ME) method for rapid determination of total plastics in sediments and the hot needle method to determine if the particle is a plastic.

Lastly, Dr. Ho described future directions to continue method development and the standardization process, develop methods for smaller sized particles, quantify polymer concentration, and characterize particles.

- John White: Thinking about the Lawson ignition technique, is there a certain temperature you can volatilize it?
  - **Kay Ho:** First, we will do an extraction method. Then, on the high-density particles, we will do the Lawson ignition technique. We will need a good balance.

- John White: We looked at microplastics of the Mississippi River, and we
  determined nested Spark-Induced Breakdown Spectroscopy (SIBS) to standardize
  it for those working on the river, so I appreciate the work here. Most of the
  sediment is organic, so maybe the Lawson technique could work.
- Kay Ho: We will work in sediment, so we will also have that inorganic matter.
- John White: How large of a soil sample did you use for the pilot study?
- **Kay Ho**: The sample used was less than 5 grams and dried. I am hoping the density separation step will help us.
- Kate Lajtha: We do a lot of density fractionation and loss on ignition. It sounds like you are saying you will look for the microplastics in heavy fractionation, but I would expect them to be in high fractionation. I will also urge you to consider aggregate fractionates and sonification. You will have particles trapped in aggregates.
  - **Kay Ho**: We do plan to look at the light fraction. However, we have found that in our spiked microplastics samples, it gets our plastics up.
- David Cole: You showed the cell with 140 nm microbeads. What cell is that?
  - **Kay Ho:** That is a retinal cell.
  - Whitney Boyes: Retinal pigment epithelial cell.

# EPA's International Efforts on Plastics in Marine Litter

# Jane Nishida, Principal Deputy Assistant Administrator, Office of International and Tribal Affairs

Dr. Jane Nishida discussed the marine litter issue as an EPA priority. She described EPA's international efforts on plastics in marine litter and noted that 80 percent of the marine litter problem globally comes from land-based sources; therefore, the most effective way to address marine litter is to consider the land-based sources of waste. Dr. Nishida explained that 60 percent of the plastic waste comes from five major source countries in Asia.

Dr. Nishida shared how EPA does not examine just the context of plastics, but rather looks at it holistically. She indicated the need to address the entire waste stream, not just the plastics portion. Internationally, EPA works with internal partners on policy issues and to build capacity and include waste management systems.

Last week, Administrator Wheeler and senior officials from other agencies launched the U.S. federal strategy for addressing the global issue of marine litter. It is based on four pillars that define EPA's approach, which include (1) building capacity for better waste and litter management systems, (2) incentivizing the global recycling market, (3) promoting research and development, and (4) promoting marine litter removal, including litter capture systems. The United States is committed to implementing programs and initiatives to provide approaches and tools to countries struggling with this problem.

Initiatives:

- EPA's trash-free waters international program.
- EPA is working in an international fora or venue to advance the U.S. policy for marine litter. Saudi Arabia named marine litter as one of their top three priorities to address. As a result of the G20's focus on marine litter, there is a marine litter action plan.
- EPA has also advanced marine litter policies to the United Nations (UN) and specifically an ad hoc expert group on marine litter created at the UN general assembly.
- The U.S. Mexico Canada Agreement (USMCA) has included marine litter for the first time in any free trade agreement.
- The Commission for Environmental Cooperation is developing a toolkit and guide to train on the stakeholder engagement process. EPA works closely with partners to share their expertise, experience, and determine opportunities to collaborate internationally.
- EPA's Office of Land and Emergency Management (OLEM) released the solid waste management guide for developing countries to provide a comprehensive guide for decision makers.

# **BOSC** Questions on Research Area 1, Output 4, Charge Question 1

#### Joseph Rodricks, Chair Robert Blanz, Vice Chair

- John White: If you examine plastics entering the ocean, is it the large plastics degrading, or microplastics?
  - Jane Nishida: It is a combination.
  - John White: In Denmark, they had skimmers to remove the larger things before it degraded. Are others thinking about doing that as well?
  - Jane Nishida: In Denmark and other countries, there are those attempts. There is a device in the Baltimore Harbor to skim large plastics from bays when trying to address problems. We also see concerns regarding microplastics and human health effects and aquatic resources effects.
- **Fred Hitzhusen**: I read about promising activities on biodegradable plant material. Is that wishful thinking?
  - **Suzanne van Drunick:** This is a conversation I have had with the Sustainable and Healthy Communities (SHC) program and EPA OLEM, but I am not up to date on this topic.
  - **Fred Hitzhusen**: Maybe the compound is glycine. It was something I read, but it did not provide much detail.
  - Kay Ho: Is it PLA (polylactic acid) towards a biodegradable plastic?

- **Steve Weisberg:** I think you are correct. We are starting to interact with a company putting out a calcium carbonate system. There is a lot happening in that area.
- **Jane Nishida:** We look at it from a holistic lifecycle approach. If there is additional research in that area, it could land into this discussion.
- Janice Sims: It piques our interest, but they can also be contaminants and create many more problems than it would solve. We need to determine the risks and consequences as part of the whole lifecycle.
- Joseph Rodricks: What exactly is the objective of having analytical methods? What are we trying to understand about microplastics? How much of a risk they pose to the environment and human health?
  - **Kay Ho:** In general, we look at overall risk. If you cannot quantify it, you cannot determine that risk. We do not know what they are doing and where they are located. It is a critical part of risk assessment.
  - **Joseph Rodricks:** Do we think it is the chemistry or physical process that is important for risk?
  - **Kay Ho:** It is both. For the larger macroplastics, it is the physical process. There is some debate about the chemical concentration. There is a lot that is not known.
  - John White: If we do not have a reliable methodology, you cannot get society to make changes.
  - **Kay Ho:** It is new, and people are used to thinking of soluble compounds. We will get it, but it will take time.
- John White: Because plastics are hydrophobic, they could carry a greater concentration of something harmful into a cell because it attracts other hydrophobic particles.
  - **Kay Ho**: Organic food you eat is also hydrophobic.
- Lucinda Johnson: Can you speak to plans to move into the realm of examining ecosystem impacts, particularly impacts on the food web? The small particles are substituting for real food in the environment and could have substantial impacts.
  - **Kay Ho**: We want the SSWR subcommittee to help us with this. It is a logical next step.
  - Suzanne van Drunick: We must consider the available resources we have and consider the work done by other experts globally. Where can ORD make the greatest impact towards this microplastics challenge? We hope the subcommittee can identify ORD's niche area.

- Steve Weisberg: Dr. Ho, in your second discussion about building capacity for laboratories, what are you thinking about regarding accreditation? We hope to have methods selected by the state for routine monitoring and we need to develop a laboratory accreditation for that. How can you help with that process?
  - Kay Ho: This question has prompted several calls with National Institute of Standards and Technology (NIST) and NIST collaborators. We have laid out the needs for a suite of reference materials, and that is where it will have to go for accreditation and each time someone publishes. However, NIST, too, has been hit with COVID-19, so the movement has slowed down. We will continue to talk to NIST about this.
- **Fred Hitzhusen**: Plastics are cheap and convenient and have major downstream impacts. It raises the question on residual taxes on cheap products. If you have cleanup strategies and the taxes can cover those, it makes sense.
  - **Kay Ho:** There are many economic issues that need addressing, and I agree that it is unclear if this would be an ORD responsibility.
  - Jane Nishida: When you discuss policy approaches and tools, there are some countries and institutions looking at taxes and bans. Regarding circular economy, EPA uses sustainable materials management. We do not necessarily support other mechanisms across the world targeting bans on single use plastics. We want to approach the source of the projects to reduce and recycle materials. However, we are discussing this internationally.
  - Fred Hitzhusen: Someone must pay for the recycling.
  - Jane Nishida: The concern is that if we only focus on plastics bans and fees, you will inhibit more innovative approaches to address the problem more holistically. The more fundamental problem is that 80 percent is land-based, and it is not just plastics.
  - **Fred Hitzhusen**: A residuals tax is not necessarily a ban. It is consistent with a free market economy.
- Joseph Rodricks: Dr. Nishida, what do you think are the main gaps to moving ahead?
  - Jane Nishida: It is a combination of increasing awareness of individual and business contributions to the problem and the capacity. 60 percent of global marine problems come from countries in southeast Asia, and they do not have the capacity and finances to create improvements and innovate. The third area that should be addressed is the research and understanding innovation. The SSWR subcommittee can help in the third area to link how human behavior can affect this problem and determine innovative solutions to address the plastics and make them less toxic to our environment.

#### **Public Comments**

## Tom Tracy, Designated Federal Officer, Office of Science Advisor, Policy, and Engagement

Mr. Tracy shared that a student majoring in environmental sciences submitted a comment on the regulations.gov site. That student requested EPA put a restriction ban on those products, and her requesting document was posted on the SharePoint site. Mr. Tracy-encouraged members to review that document.

• <u>Document</u> (Docket ID No. EPA-HQ-ORD-2015-0467) found in public comments document submitted on Regulations.gov.

#### **BOSC Discussion**

Joseph Rodricks, Chair Robert Blanz, Vice Chair

- Scott Ahlstrom: Is plastic recycling a contributor to the microplastics problem?
  - **Kay Ho:** The issue is transport and fate.
  - **Fred Hitzhusen:** Given that Asian countries are the main contributors, is that where plastics originated?
  - **Kate Lajtha:** This issue involves waste management. Some companies have established systems to address this issue, but those efforts deal largely with macroplastics, which can ultimately help with the microplastic issues as well.
- Joseph Rodricks: The scope of the charge question is narrow in focus.
- Kate Lajtha: The issue deals with soil and sediment. The power of inorganic particles to absorb is incredibly high, and because clay is where the aggregates form, I would urge working with soil experts on this issue. I would also warn of the extraction issues with clay.
  - **Kay Ho:** All ORD efforts at Narragansett, Rhode Island, involve examining sediments. We looked at sandy sediment and silty sediment, which had a clay fraction.
  - John White: If you move from the freshwater realm to the marine realm, the amount of organic matter decreases.
  - **Kay Ho:** The sediment we used was from Long Island Sound, which had a 2 to 3 percent organic carbon content.
  - **Kate Lajtha**: In agriculture terms, it would be nice to quantify "mollisols with high clay content" is where there will be absorption issues. I could see microplastics becoming an issue, and the analytical piece is where we should be concerned with plastic mulches that are becoming options for farmers.
- Joseph Rodricks: Is this about extraction and collection?

- **Kay Ho**: This is about extraction and identification.
- Suzanne van Drunick: We are collaborating with the U.S. Department of Agriculture.
- Kate Lajtha: Runoff and leching from agriculture soils is a major area for consideration. Microbes would not have had time to bind.
  - **Kay Ho**: We are aware of the weathering concept and they also weather their samples. The biocell is something to account for.
- John White: Why would you have to dry off samples? Some methods use dry ground samples, but they were not getting the same numbers with wet samples (phosphorous availability).
  - **Kate Lajtha**: I agree drying phosphorous is important but will warn not to oven dry samples due to density fractionating.
  - Kay Ho: Looking at weight per unit mass could be important.
- **Steve Weisberg**: The RARE project work is a wonderful niche. I think getting down to the nano level is also a useful niche for the SSWR program. The third niche is as important for screening, and I believe SSWR developed the exact right direction for research. My only suggestion was to consider effects. If effects are at the nano level, then it would be critical to research further; however, if effects deal primary with the macro scale, there is likely less need to investigate that area. I suggest determining a strategy to transform the laboratory to a standardized method.
  - **Suzanne van Drunick:** There are two more years left on the current SSWR StRAP, and EPA felt it was important to complete the work and research outlined in the current StRAP. We plan to do a lot on one or two things, and do those well, and then consider effects in future research and planning.
  - Suzanne van Drunick: An earlier webinar discussed if it is the actual particle or rather the chemicals that leach.
- Steve Weisberg: When people consider the measurement, you have the extraction, and you have the measurement. California will develop a standard method for drinking water within the next six months.
  - John White: Also, consider the water in Los Angeles, California.
  - **Kay Ho:** The ecological matrix will need to be considered sooner than later. Microplastics are found at the bottom of the ocean. This can be depicted as materials sinking into the landscape.
- Joel Ducoste: Do you consider airborne contaminants?
  - **Kay Ho:** Laboratory precautions against contaminants include the use of fly hoods and wearing purple plastic gloves. Because airborne contaminants could be

an issue also, scientists wear tie-dye laboratory coats so that any fibers are more visible.

• Suzanne van Drunick: I can clarify it would not be a formal request from the Agency.

## Adjourn

The meeting adjourned at 4:52 p.m. Eastern Time.

#### Thursday, October 29, 2020

#### Welcome – Day 2

Tom Tracy, Designated Federal Officer, Office of Science Advisor, Policy, and Engagement Joseph Rodricks, Chair Robert Blanz, Vice Chair

The subcommittee reconvened at 11:45 a.m. Eastern Time. Mr. Tom Tracy welcomed the participants and provided reminders about virtual meeting participation.

• Fred Hitzhusen: There is some concern about environmental and economic metrics.

## **Office of Research and Development Overview – Centers**

*Rusty Thomas, Director, Center for Computational Toxicology and Exposure Greg Sayles, Director, Center for Environmental Solutions and Emergency Response* 

Dr. Rusty Thomas provided an overview of the new facility of the Center for Computational Toxicology and Exposure (CCTE). This facility integrates with the SSWR program and is where primary activities are located. There is a new organizational structure including four divisions. The primary focus of research activities related to the SSWR program is in Great Lakes. Dr. Thomas provided a brief overview of CCTE's mission, goals, and involvement in the SSWR program.

Research Area 1 focuses on developing novel genetic approaches for taxa-based assessments and characterizing nitrogen cycling in wetlands to provide natural resource managers new methods to assess ecological impacts of diverse environmental stressors. The research area responds to needs of federal, state, and Canadian lake managers.

Research Area 3 develops omics-based profiles of chemical classes for use in aquatic and human health criteria development, environment forensics, mixture toxicity, and cumulative exposures. This research area evaluates different performance parameters and advances methodology for deriving water quality to protect aquatic life from toxic chemicals.

- **Tim Verslycke:** The research areas describe different techniques. One relates to measures of success that you can identify. You track progress by measuring time required. Could you elaborate on the time required going from years to months?
  - **Rusty Thomas:** Forming these new centers and having new missions, each of us developed research focus areas and goals. The goals in our center are to have stretch goals to reduce the time required to test chemicals and other materials for human health and ecological toxicity. Our objective was to take the time required to fully evaluate these chemicals from years to months. We wanted to dramatically reduce the timeframe.
  - **Tim Verslycke:** Do you have thoughts on how you currently or might track a full endpoint characterization of a new chemical?

• **Rusty Thomas:** We know the amount of time required to run tests. There are metrics of throughput and the time required to create innovating approaches.

Dr. Greg Sayles provided an overview of EPA's Center for Environmental Solutions and Emergency Response (CESER) and its mission statement and values. He shared that the CESER theme emphasizes developing environmental solutions to challenges in the built environment. He provided an overview of the divisions within CESER, and he explained how CESER's involvement with the SSWR program is greatest in the areas of water treatment and infrastructure. CESER focuses on drinking water treatment, disinfection, corrosion control, water reuse, stormwater control, per- and polyfluoroalkyl substances (PFAS), and built environment water issues.

# Research Area 2 Overview: Improved Aquatic Resource Mapping

# Brenda Rashleigh, Assistant Center Director, Center for Public Health and Environmental Assessment

Dr. Rashleigh, Assistant Center Director, CPHEA, provided an overview of Research Area 2, which focuses on improved mapping of aquatic resources. She explained that Research Area 2 only has one output.

# Research Area 2, Output 1: Improved Accuracy and Application of Geospatially Explicit Aquatic Resource Data

## Jay Christensen, Research Ecologist, Center for Environmental Measurement and Modeling

Dr. Jay Christensen, Research Ecologist, CEMM, introduced Research Area 2, Output 1: Improved Accuracy and Application of Geospatially Explicit Aquatic Resource Data. Existing geospatial datasets are exemplary national datasets, but with these resources, the SSWR program's existing knowledge of the spatial extent of headwater areas and their characteristics are limited.

Dr. Christensen explained how headwater systems benefit the management policies in the underlying hydrologic structure, regardless of the policy. An ORD charge is to explore enhance methods for wetlands mapping and gain a complete picture of these hydrologic systems alongside federal and state partners. Improving mapping is a collaborative effort as there are numerous challenges. OW created an interagency workgroup that began in February 2020. The initial task is to determine technical requirements needed to produce this underlying hydrologic structure. The workgroup is currently examining existing datasets and models to understand known and unknown information on the structure of hydrology. The output includes three products that will largely be a synthesis of analyses.

Product 1 is a review of current mapping approaches and geodatabases. This relates to the charge questions about different methods and approaches to improve and enhance the current mapping. The SSWR program gathered geospatial information from federal, state, and tribal community

sources and solicited feedback from USGS and the Fish and Wildlife Service to help with creating the manuscript.

Product 2 focuses on testing and analyzing models and methods. Varied geology and different mapping approaches might work better or worse in different settings. The SSWR program uses an ensemble approach where they consider multiple mapping and modeling approaches.

Product 3 focuses on field-based tools and methods to help with validating and improving field assessments. This is a large logistical effort supported by the SSWR program's external partners. They deploy these activity loggers in non-perineal spaces to determine and validate predicted classifications of models. There is a massive effort with ORD to support Stream Flow Duration Assessment Methods (SDAMs).

- Joseph Rodricks: Is this relatively new effort?
  - **Suzanne van Drunick:** The new administration introduced the interagency work and how to help stakeholders implement the new rule.
- John Lowenthal: Part of regulatory changes involve isolated wetlands and non-adjacent wetlands. Is the SSWR program implementing new activities to improve mapping to identify those features as well?
  - Jay Christensen: Regulatory construct focuses on streams to review classification of permanence. Our approach to implement and map wetlands has been that these methodologies are trying to examine the structure of the streams and wetlands. When we use remote sensing approaches, we are trying to capture as much of the landscape as we can.
  - John Lowenthal: It is unfortunate the National Wetlands Inventory (NWI) does not have any attributes. It is difficult to use their dataset without tweaking it to make those determinations. I think it would be good to consider this.
- Lucinda Johnson: I got the sense that you were alluding to a goal of having a hierarchical strategy for developing a set of protocols that has a rapid assessment component followed by more detailed mapping, then detailed modeling. Is that a correct assumption?
  - **Jay Christensen:** Yes, but not necessarily hierarchical. ORD helps with that effort, but it is led by OW. We can potentially use some of that information.
  - **Lucinda Johnson:** If you are going to deploy protocols across the United States or large regions, the constraints on availability of data would drive you to a system that would allow you to infer spatial relationships of large areas, to drive down more data-intense efforts. Are any of those approaches something the SSWR program uses to infer the possible existence of these isolated wetlands?

- **Jay Christensen:** We have the case study areas, and we consider how much we can infer beyond locations. We are still in the earlier stages of modeling. I am not sure there is a clear answer for how we expand these modeling efforts or make predictions for ungauged watersheds, but it is a question we have.
- Elizabeth Fassman-Beck: The presentation seemed to focus on field assessments and instream or near-stream measurements. Could you talk more about efforts that are going into assessing watersheds?
  - Jay Christensen: We are reviewing semi-distributed watershed models that incorporate the topography across the entire watershed. We are interested in what is happening with the flow.
- **Tim Verslycke:** On the application side, to what extent are on-going hydrological modeling efforts conversations happening that would turn this into a model that could be challenged with chemical loads?
  - Jay Christensen: Within our research area, we are not looking at constituents. We are specifically looking at hydrology. Within the nutrient and watershed component of the SSWR program, many models examined in the past are now in a nutrient component.
  - **Tim Verslycke:** I looked first at the question of identifying clean waters of the United States. Can we disregard that topic? I know groundwater has been an issue.
  - Jay Christensen: I have tried to emphasize hydrology, but definitions and policies change. Our view and the interagency group that has worked on this are trying to understand the underlying science to provide the information needed for the specific policy. OW policy can be overlaid on that underlying structure.

## • Timothy Davis: What other emerging technologies have you or your collaborators used?

- Jay Christensen: Imagery, worldview imagery, Landsat, and the Sentinel 1 and 2 are now available. CubeSat has good frequency, though it is not as high resolution as worldview imagery, and there are more returns and coverage. Another would be various machine learning technologies. We use some machine learning, but we have not explored other approaches.
- **Timothy Davis:** Are you not able to use Sentinel 3?
- Jay Christensen: We have not thus far, but this could be an area of improvement. Part of what we look at is temporal dynamics and having a time frame over multiple years to get surface water extent. In the newer platforms, we get a shorter temporal time frame.

- **Timothy Davis:** I was wondering why you did not use Sentinel 3. There is nothing precluding you from doing it; you just have not done it *yet*, correct?
- **Jay Christensen:** Correct. There is no federal agreement as far as being able to use something like CubeSat. Access would be expensive.
- Elizabeth Boyer: Considering charge questions about geospatial datasets, it seems that the focus on the case studies is slightly off on what is needed to inform national scaling. You mentioned NWI, which is widely used today. I think people are working on it, so why is it not mentioned here? On the stream side, many studies raise needs and where advances could assist. These are not things I hear you talking about. Are there problems with coastal reach? How useful it is to have attributes? How is your Agency and groups thinking of national scale datasets?
  - Jay Christensen: Work within ORD does not touch on a national aspect yet. It is part of the interagency workgroup to tackle the issues of NWI. The interagency group focuses on the modernization. EPA, NWI, and NHD are trying to identify these issues. Our small part with ORD in this effort helps to educate people that this amount of work will go into creating a dataset that meets the needs of water management individuals (i.e., the long-term steps we must take to get there).
  - Elizabeth Boyer: There are needs for geospatial data and this research is extremely relevant. The data are available, and you could take this to the next step. I recognize the importance of streams as well. There are other agencies and academia doing a lot, and I realize it is expensive and can be challenging. Transferability over time is important.

## Gulf Ecosystem Measurement and Modeling Division Virtual Lab Tour

Ms. Hannah Boone, Oak Ridge Associated Universities Contractor at EPA, presented a virtual laboratory tour video.

## Research Area 3 Overview: Human Health and Aquatic Life Criteria

## Ann Grimm, Assistant Center Director, Center for Environmental Measurement and Modeling

Dr. Ann Grimm reviewed Research Area 3 goals and how they provide OW with essential information and tools needed for establishing and updating Agency criteria. She also outlined how the goals support regions and states to implementation those criteria. She then reviewed Research Area 3's three outputs including Output 1: Human Health and Recreational Water Quality; Output 2: Human Health and Chemical Contaminants; and Output 3: Aquatic Life Criteria.

## Research Area 3, Output 2: Human Health and Chemical Contaminants

Adam Biales, Supervisory Biologist, Center for Computational Toxicology and Exposure

Dr. Adam Biales presented Research Area 3, Output 2, that focuses on human health and chemical contaminants and includes two products. He outlined both products, the SSWR program's action, and the expected outcome.

Dr. Biales explained that Product 1 involves occurrence and toxicity data needed for environmental chemical prioritization in surface water for human health and aquatic life criteria development. He outlined the two research efforts under Product 1 including the in vivo transcriptomic signature and in vitro bioassays.

Dr. Biales discussed Product 2, which focuses on the development, application, and evaluation of effects-based measures for the detection and characterization of similarly acting groups of chemicals in aquatic systems.

# Research Area 3, Output 3: Aquatic Life Criteria

# Russ Erickson, Chemist, Center for Computational Toxicology and Exposure

Dr. Russ Erickson presented Research Area 3, Output 3, and provided research product overviews. He described Product 1 and the research across different levels of biological organization.

Dr. Erickson described Product 1 and the research across different levels of biological organization including (1) Toxicity of major ion mixtures in single-species toxicity tests; (2) Response of experimental ecosystems to major ion elevations; and (3) Assessing effects of major ions based on field observations.

Dr. Erickson also explained Product 2, which has three research efforts including (1) wholeorganism evaluations of chronic PFAS toxicity to freshwater aquatic organisms, (2) grouped chemical approaches to toxicity extrapolation, and (3) occurrence and bioaccumulation of PFAS in marine systems.

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# BOSC Questions on Research Area 3, Outputs 2 and 3

Joseph Rodricks, Chair Robert Blanz, Vice Chair

- Joseph Rodricks: How is the toxicity-normalized hazard quotient derived and applied?
  - **Russ Erickson:** You define a group of chemicals you think have a related mode of action. For each individual chemical, we would need data to give benchmarks just to that chemical. For this one, we normalize each individual chemical to the toxicity to a single species tested for each chemical. If another species has twice that, we would assign that reference species a value of one. The other species for that chemical would have different quotients and ratios. You would normalize all

the data for that chemical to that reference species. If the normalized benchmark is one half, and the chemical of interest or reference species has a toxicity value of 10, the benchmark would be five.

- **Steve Weisberg:** We focused yesterday on how well you were doing reaching out to partners that would use this information. Regarding emerging contaminants, that will become state-specific. Can you elaborate on how you are interacting with the states?
  - Adam Biales: The in vitro systems have been a close interaction with local communities, and they have deployed these in Chicago, Illinois, Cape Cod, Massachusetts, and other areas.
  - Elizabeth Kakaley: We used the bioassays in case studies in collaboration with the USGS. They are sampling water at certain locations for specific contaminants Locations. We are also starting a workgroup with people from the water boards and someone from the Statewide Comprehensive Outdoor Recreation Plan. We are considering ways to leverage research opportunities, so all groups are eliminating redundancies.
  - Steve Weisberg: It would be nice to have those interactions summarized for us.

## Research Area 3, Output 1: Human Health and Recreational Water Quality

#### Orin Shanks, Senior Research Geneticist, Center for Environmental Measurement and Modeling

Dr. Orin Shanks presented Output 3.1: Data and Innovative Tools to Advance Public Health Protection from Microbial Contaminants in Surface Water, highlighting the 2017 Five-Year Review of the Recreational Water Quality Criteria (RWQC) and the four research products, including each product's problem, action, expected outcome, and external collaborators.

Dr. Shanks outlined Product 1: Development and characterization of analytical methods to support RWQC recommendations in fresh and marine waters. Product 1 involves occurrence and toxicity data needed for the prioritization of environmental chemicals in surface water for human health and aquatic life criteria development, and he discussed the problem, action, expected outcome, and external collaborators. The four Product 1 research objectives include (1) coliphage surface water method development; (2) national occurrence of alternative microbial targets in untreated sewage; (3) development of certified reference DNA material; and (4) molecular method performance in recreational waters.

Dr. Shanks described Product 2: Development and implementation of human health risk and water quality predictive modeling tools to support new or revised RWQC. Product 2 focuses on the development, application, and evaluation of effects-based measures for the detection and characterization of similarly acting groups of chemicals in aquatic systems. He discussed the four Product 2 research objectives, which include (1) human health risk assessment method development; (2) characterization and modeling of antibiotic resistance bacteria and their genes;

(3) fate and transport of key microbial targets in recreational water settings; and (4) water quality forecasting with Virtual Beach advancements.

Dr. Shanks outlined Product 3: Implementation of new tools in support of RWQC on the Great Lakes, including the problem, action, expected outcome, and external collaborators. Product 3 is an organized large-scale field study to leverage resources to do a more in-depth analysis of different systems. In support of recreational water quality criteria on three Great Lakes recreational areas, the SSWR program implemented new tools and measured several microbial targets to determine microbial target data patterns and populate models. The three Product 3 research activities include (1) large-scale implementation of rapid *E. Coli*, (2) evaluate coliphage and other fecal indicator predictive models for water quality forecasting, and (3) microbial source tracking applications.

Dr. Shanks outlined Product 4: Implementation of new tools in support of RWQC on Gulf Coast marine waters. He noted the project scheduled for May 2020 was postponed to 2021, due to COVID-19. The study focused on four beach sites, sampling over a 20-week period (3 days per week). Like Product 3, they measured several microbial targets and other analytes to determine patterns in the microbial target data and populate models. Unlike Product 3, the SSWR program added "nutrients" to the analyte list. The five Product 4 research objectives include (1) large-scale implementation of rapid enterococci qPCR, (2) predictive models for water quality forecasting, (3) co-occurrence of coliphage, fecal indicator bacteria, and pathogens, (4) microbial source tracking applications, and (5) incidence of antibiotic resistance targets.

Lastly, Dr. Shanks summarized technical support and communication with stakeholders and ways they conduct outreach for these research products. He outlined the regional support network, cooperative partnerships, EPA method technical support, training opportunities, and other communications (e.g., publications, models, and software; publicly available datasets; and webinars, workshops, and meetings).

# BOSC Questions on Research Area 3, Charge Question 3

Joseph Rodricks, Chair Robert Blanz, Vice Chair

- Joseph Rodricks: What is the magnitude of the problem? Is the problem getting better or worse?
  - **Orin Shanks:** There are several things that OW carries out to estimate the extent of pollution in recreational waters. I cannot speak to if it is getting worse, but it is a large issue that has repercussions for public health, ecological health of waters, and the economy.
- **Timothy Davis:** In the study about antibiotic resistant genes and recreational water, how do you separate that from everything else they are doing? How do you make that link?

- **Orin Shanks:** The health response to exposure to antibiotic resistant bacteria in a recreational setting is complex. We decided to move forward with this project as a first step. The background confounding variables could be too vast to move forward.
- **Timothy Davis:** As you look for antibiotic resistant genes, have you thought about looking for novel antibiotics in those regions?
- Orin Shanks: Much of our output is on the molecular side, but in some experiments, we do have a chemistry test component where we are measuring antibiotics. I anticipate much discussion about the antibiotic resistance piece. What is the occurrence in recreational settings and pollutant sources? EPA scientists also consider application since methods developed in clinical settings do not always translate well into environmental applications. Antibiotic resistance research occurs in other research areas in the StRAP as well.
- Fred Hitzhusen: How big is the beach closure issue?
  - **Orin Shanks:** I am not aware of anything that has been done on a national level. There are some models I am aware of for economic impact. Molecular methods cost more and require higher trained staff to implement.
- Steve Weisberg: You have all been involved in microbial work. This transformed how we manage beaches in California. We have run into several roadblocks, and I would like to know what EPA is doing to address those roadblocks. The first roadblock is human markers, and the ability to discriminate recent deposits versus things from recycled water. The second roadblock is how well we understand relative degradation. The third roadblock is not all humans are created equal. California has a large homeless population that lives near river systems. We should examine if the issues are related to leaking systems or human deposits. How do we get past these three problems?
  - Orin Shanks: To answer the first question, molecular methods are limited so we cannot tell the difference between treated or untreated. A viability component might help us to have more information about treated or untreated. Relative to degradation, I spoke to fate and transport types of studies done. We complete theoretical exercises with different components to see what could happen. There is a plateau in these exercises. In the last funding cycle, we did a study on the problem of "not all humans are created equal." This clearly has an impact, and there are probably forensic technologies available to help us go further, but sensitivity is an issue.
- Lucinda Johnson: I am curious about the exclusive focus on recreational waters in this discussion. What is the scope of the attention to these kinds of fecal contamination and detection issues in non-recreational waters?

- Orin Shanks: I believe this work and microbial source tracking has broad applications past recreational waters. We are working and using these technologies elsewhere. I am not sure if this subcommittee will evaluate storm water or not, but much of this will be prevalent there as well. Some of these tests show up in wastewater testing. Sewage surveillance, important during the COVID-19 pandemic, some technologies EPA developed are being used by several researchers across the world to fight against COVID-19 measurements. There is fecal pollution everywhere. There are different arenas for these technologies.
- **Suzanne van Drunick**: In addition to the broad applications, communities downstream of concentrated dog parks are a source of pollution.
- **Orin Shanks:** Yes, I thought you all would ask about domestic animals or wildlife. Dogs and birds shed *E. coli* as well, and our part of the solution is managing those sources for recreational areas.
- **Fred Hitzhusen:** How broad is the term recreational water use? For example, how would recreational waters classify sitting in a boat fishing versus swimming?
- **Orin Shanks:** I believe OW has specific definitions. It is interesting, and I think people are working on that.
- Lucinda Johnson: Regarding mitigation and treatment, what you described is related to detection and indicators. Is there any effort to develop protocols and technologies for managing and mitigating the microbial pollution?
  - **Orin Shanks**: There are several reasons microbial source tracking could occur. One challenge is EPA's ability to identify the problem trying to be solved and designing an appropriate experiment to get there. OW conducts a series of their own research activities, and policy decisions will occur there. We work closely with them to provide the science they need.

#### **BOSC Discussion and Next Steps**

Joseph Rodricks, Chair Robert Blanz, Vice Chair Suzanne van Drunick, National Program Director, Safe and Sustainable Water Resources Research Program Tom Tracy, DFO, Office of Science Advisor, Policy, and Engagement

Mr. Tracy explained that workgroups were free to collaborate as they desired, whether individually or formally as a team, and he provided directions for working in the draft subcommittee report. He announced that EPA staff would be available for questions during the next meeting, which would include longer breakout sessions. Each workgroup would then present their document.

# Adjourn

The meeting adjourned at 5:00 p.m. Eastern Time.

#### Tuesday, November 17, 2020:

## Welcome – Day 3

Tom Tracy, Designated Federal Officer, Office of Science Advisor, Policy, and Engagement Joseph Rodricks, Chair Robert Blanz, Vice Chair

The subcommittee convened at approximately 11:03 a.m. Eastern Time. Mr. Tracy, DFO for the SSWR subcommittee, welcomed and thanked the participants for their attendance. The subcommittee discussed who would lead each workgroup and reorganized BOSC members amongst groups as needed. The subcommittee then divided into the three workgroups to discuss and draft responses to the charge questions. Following deliberations, subcommittee members reported on the workgroup's responses. EPA staff were available to answer questions.

- Lucinda Johnson: Does the narrowly defined charge questions preclude the opportunity to comment on the SSWR program overall? Are there are other high-level aspects of the SSWR program outside of the charge questions that the subcommittee should consider?
  - **Suzanne van Drunick:** Recommendations should tie directly to specific charge questions, and the commentary section sets the stage for the suggestions and recommendations. The narrative section would be an appropriate place to include broader comments.

# **Charge Question 1**

Dr. Steve Weisburg reviewed the Charge Question 1 draft strengths, suggestions, and recommendations. He shared strengths within the SSWR program including that EPA has identified understudied measurement method niches that have competencies that make them the right group to pursue that research. He suggested that the SSWR program continue investing the three measurement niches, including (1) measurement methods for microplastics in sediments, (2) nanoplastics measurement methods, and (3) the CAT ME method for rapid determination of total plastics in sediments. He also noted that the subcommittee was impressed with EPA's capacity-building investments, quality assurance, and laboratory accreditation protocols.

Dr. Weisberg said measurement methods to characterize microplastics is an appropriate starting point for the SSWR program, and he described the subcommittee's recommendation for the SSWR program to work towards developing a strategy for incorporating both environmental and human health effects into the next StRAP.

- Lucinda Johnson: Will the group discuss next stages of this work, focused on the potential toxicity whether through the particulars themselves or compounds?
  - **Steve Weisberg:** If absorption and desorption of chemicals are the greatest mode of effect, then it would be useful to focus on larger particles, whereas if the translocation across membranes into tissue is the greatest effect then it would be best to focus measurements on the smaller particles. Therefore, the subcommittee

did not specify what effects the SSWR program should focus on but suggested they consider a strategy for incorporating effects research into their efforts and methods.

- **Steve Carr**: Do different types of plastic compositions impact toxicity, specifically range materials including silicone, polypropylene, and polyethylene? Will there be differences in the way those interact with cellular structures?
  - **Steve Weisberg:** Our group did not work to that level of detail. Our group's microplastics health effects webinar series included a talk from Matt Cole that was relevant to this topic.

# **Charge Question 2**

Dr. Johnson discussed the Charge Question 2 draft strengths, suggestions, and recommendations. Dr. Johnson shared strengths within the SSWR program, including its participation in interagency efforts to identify strategies and tools for mapping jurisdictional waters, especially with their focus on filling gaps and addressing known deficiencies in regional data sources such as NWI and NHD. She discussed how existing regional data sets are useful but do not classify jurisdictional waters, and she explained how the SSWR program is well oriented to address the high-resolution data and modeling. She also shared the suggestions for the SSWR program to (1) engage the U.S. Army Corps of Engineers (USACE) partners to define specific gaps in tools and knowledge, identify existing USACE guidance, and target case studies and methods development to urgent environmental problems, and (2) fund the interagency group's proposal to enhance the existing NWI and NHD to improve the decision-making capabilities for mediumresolution datasets.

Dr. Johnson described the recommendations for Charge Question 2 including to (1) focus on continuum and probability approaches rather than classification, and (2) focus on developing high-resolution data and models that reduce uncertainty in estimates of channel origins and extent of frequency for adject wetlands connectivity.

## **Charge Question 3**

Dr. Elizabeth Boyer reviewed the Charge Question 3 draft strengths, suggestions, and recommendations. She shared that ORD generated a robust portfolio pertaining to public health research, and it has strong interdisciplinary expertise to conduct their research. Dr. Boyer described recommendations for the SSWR program to prioritize two research foci including (1) the development of NIST-certified reference DNA material, and (2) coliphage surface water method development.

Dr. Weisberg described key recommendations for the SSWR program including (1) developing laboratory accreditation standards in collaboration with NIST, and (2) developing methods for the detection and quantification of coliphages as indicators of fecal contamination in surface waters. Dr. Boyer expressed how this work seemed to focus on coastal waters and beaches, and it

could be beneficial to focus also on inland recreational waters and particularly slow moving warm waters.

• Steve Carr: The SSWR program might also want to consider microbial source tracking since there are several *E. coli* crossovers from wild animals and humans.

Dr. van Drunick discussed how the subcommittee's report will help enable EPA staff to consider next steps for the SSWR program's microplastics research. She further explained how the report will provide specific direction based on the subcommittee's expertise and how their recommendations will help shape the next four-year StRAP. She thanked the subcommittee on behalf of ORD staff for their efforts.

- Elizabeth Boyer: Will there will be future opportunities to consider research related to the broader areas presented in the overview? The focus areas within Research Area 3 overview highlighted ORD's capabilities that could be used to develop nutrient criteria standards. There is a need for states to have nutrient criteria standards to protect human health and ORD could help develop standards and meet those needs.
  - **Suzanne van Drunick:** The charge questions are narrowly focused to create achievable targets for ORD to address the SSWR subcommittee members' suggestions and recommendations. For example, we kept the microplastics charge question narrow because of the on-going international research efforts, and the SSWR program must determine the appropriate next steps. ORD discusses charge questions with the NPDs, and I encourage SSWR subcommittee members to include useful input or guidance in the narrative section.

#### Wednesday, December 2, 2020:

#### Welcome – Day 4

Tom Tracy, Designated Federal Officer, Office of Science Advisor, Policy, and Engagement Joseph Rodricks, Chair Robert Blanz, Vice Chair

The subcommittee convened at approximately 2:00 p.m. Eastern Time. Mr. Tracy, DFO for the SSWR subcommittee, welcomed and thanked the participants for their attendance. Mr. Tracy provided an overview of the timeline for the BOSC workgroups and reminded the group that his team would send this report several weeks prior to the Executive Committee meeting on January 27, 2021.

## **Charge Question 1**

Dr. Weisberg discussed the Charge Question 1 messages that portray three identified niches. The BOSC workgroup proposed a recommendation to develop the strategy of collecting measurements to then relate it back to human health. Dr. Weisberg stated that the subcommittee should add a paragraph to justify the recommendations.

- **Kate Lajtha:** Should we justify why we think there needs to be a link between measurement methods and human health? Should we bring that to the group as a whole? Do we need more information on why we think the next step is health effects?
  - **Steve Weisberg:** There is no clear strategy for how these methods will be employed. You cannot have that until the health effects interpretation framework is developed.
  - **Kate Lajtha:** I thought those were two separate things. Step one is understanding biodegradability, and step two is understanding the toxicology of it. Are there health effects based on particles? Is direct physical toxicity versus chemical toxicity tightly correlated? Maybe we should discuss this.
  - **Steve Weisberg:** They are exploring methods that go to nano-size, which are difficult and expensive. Screening methods are being examined without identifying specific polymers, rather just the amount. From a cost and rigor perspective, those are extreme ends of the spectrum. If the nano method is causing health effects because it can cross membrane boundaries, pre-screening efforts will be most important.
  - John White: To me, it was self-evident. Maybe focus on the framework.
  - **Steve Weisberg:** I think we talked about it from developer framework. In the next EPA Strategic Plan, EPA should define this. The workgroup agreed on the paragraph in the recommendations.

- Joseph Rodricks: If at some point there is a need to consider health effects of microplastics, will there be physical and chemical standards so that you can make sure you are examining it consistently? Is one of the goals to ensure physical and chemical consistency?
  - **Steve Weisberg:** The workgroup felt comfortable with this. You must first know how to measure the nanoparticles and how to evaluate the health effects. We recommend this if there is no framework.
- **Kay Ho**: I think it is important for us to have this feedback from this workgroup so that we can move forward iteratively. To develop these methods, there are laboratory studies I think we can do. The issue is environmental exposures. We are progressing significantly with methods for dosing studies. EPA is working with other groups to create larger capacities for standard nanoplastic particles.
  - Joseph Rodricks: Is that well underway?
  - **Kay Ho:** There are other international groups working on it to create a standard spike.

# **Charge Question 2**

Dr. Johnson discussed the progress on Charge Question 2. The charge question revolves around mapping waters in the United States which is primarily driven by the recent change in rule making. The effort is centered on approaching the 80 percent mark regarding the fine-scale mapping exercise. It is important to know what tools and datasets are available for this effort. The workgroup was impressed with the Agency's participation in an interagency group discussion to identify strategies for mapping these jurisdictional waters. There is a proposal the interagency group is developing that would enhance national datasets to improve mapping using current technology. Dr. Johnson emphasized that the Agency has undergone a comprehensive exercise to help with the problem, particularly for identifying where the streams begin.

The workgroup proposed suggestions that a few datasets and approaches, if not already considered, should be examined and that the SSWR program should identify academic partnerships that can help develop and refine those models. The workgroup also suggested that the SSWR program begin to explore relationships with individuals that are completing regulatory actions to help identify challenges. The last suggestions from the workgroup were to prioritize the ORD efforts and explore a probability approach.

- Joseph Rodricks: I do not understand suggestion number five. Is this clear to everyone?
  - **Lucinda Johnson:** The approach is to concentrate the primary work in three case study areas that represent challenging geographic landforms. The suggestion is to ensure that the upscaling and transfer of knowledge gained from those case studies is applicable to broader areas than just those specific watersheds. If the geography is so specific that is cannot be transferable, it is not a useful study

design. If the SSWR program can apply it widely, we should make sure that is possible and efficiently executed.

Dr. Johnson discussed the proposed workgroup recommendations, including prioritization and addressing uncertainty. With the current information available at a national scale, there is possibility of identifying jurisdictional waters for wetlands and headwater streams for a large part of the geography. The limitations of current national datasets are such that getting to 100 percent classification of jurisdictional versus not is difficult and expensive. The focus now is on the gap between what can be mapped with the national datasets versus the models that could approach 80 or 90 percent. The recommendation focuses on prioritizing and working on the data and tools that are going to get to the correct classification most efficiently.

- **Rick Greene**: The statement about wetlands is not entirely clear to me. The question of wetlands is whether they are adjacent to navigable waters or streams, or jurisdictional waters. Is that captured?
  - John Lowenthal: I think it is by intent, but maybe we can change the wording to make it clearer.
- Lucinda Johnson: Is the issue hydrologic connectivity or adjacency?
  - John Lowenthal: Understanding the hydrologic connectivity is important. The coverage of wetlands wording might be confusing to me.
  - **Lucinda Johnson:** I think it is confusing, too. Maybe recommend the probability approach instead of the classification approach?
- Elizabeth Boyer: A recommendation here could be to focus less on case studies and more on high resolution data at a national level.
  - **Lucinda Johnson:** As I understand, there is an interagency effort with using these national datasets and mapping. One of the issues they are tackling is what updates and refinements they would need to make to make them more useful. The discussion about national scale mapping is happening in a separate environment, and ORD efforts focus on the gap between what you can achieve with national data versus the difficult areas that you cannot map. I agree that there should be a high priority for fixing the national data. We were not sure if we could recommend this national effort that is separate from what ORD is doing.
  - Elizabeth Boyer: There are several research needs in mapping efforts. I would like to see room here for the Agency to move in the direction of reducing uncertainty.
  - **Lucinda Johnson:** The intent of the ORD effort is to down scale their mapping capabilities by using LiDAR, fine-scale resolution satellite imagery, and other tools which would not be efficiently done at a national scale.

## **Charge Question 3**

Dr. Boyer discussed Charge Question 3. The research programs priorities include health studies. EPA developed external partnerships to advance these goals. The workgroup had a variety of comments included as strengths and suggestions. Proposed suggestions included (1) considering potential coordination with other agencies doing similar work, (2) considering more focused research on antimicrobial resistance, and (3) considering disinfection techniques at local scales to mitigate infectious rates. The workgroup recommendation was to prioritize the research objectives.

- Steve Weisberg: Some suggestions are technically incorrect. More importantly, the charge question to this group was to prioritize the research. Some of the suggestions are not applicable to the charge question. I think we need to replace it with things that are ways that they could do these things better.
  - Steve Carr: Is prevention beyond the scope entirely?
  - **Steve Weisberg**: I did see it as a little bit outside of the charge question because it had no mention of activities to induce or reduce health effects.

#### Appendix A: Agenda

#### **United States Environmental Protection Agency**

#### **Board of Scientific Counselors (BOSC)**

#### Safe and Sustainable Water Resources (SSWR) Subcommittee

#### Meeting Agenda – October 28–29, November 17, and December 2, 2020

Virtual

#### Day 1: Wednesday, October 28, 2020, Eastern Daylight Time

Time (EDT)	Торіс	Presenter
11:45-12:00	Sign on & Technology Check	
12:00-12:15	Welcome and Opening Remarks	Tom Tracy (DFO)
		Joseph Rodricks (BOSC SSWR Chair)
		<b>Robert Blanz</b> (BOSC SSWR Vice Chair)
12:15-12:30	ORD Welcome	Jennifer Orme-Zavaleta
		(ORD Principal DAA for Science)
12:30-12:40	SSWR Overview and Charge Questions	Suzanne van Drunick (SSWR NPD)
12:40-1:00	ORD Overview – Centers	Tim Watkins (Director, CEMM)
		Wayne Cascio (Director, CPHEA)
1:00-1:10	Watersheds Introduction	Rick Greene (Watersheds Topic Lead)
1:10-2:10	Overview of Research Area 1:	Brenda Rashleigh (ACD, CPHEA)
	Assessment, Monitoring and	
	Management of Aquatic	
	Resources	
	• Output 1: National Aquatic	Steve Paulsen (CPHEA)
	Resource Survey (NARS) Support	Peg Pelletier (CEMM)
	• Output 2: NARS Extension	Susan Yee (CEMM) Matt Habarling (CEMM)
	• Output 3: Biological Indicators	Wate Fullivan (CEMM)
	• Output 5: Water Quality Benefits	
2.10.2.20	• Output 6: San Juan Watershed Support	Levent Dedricher Deberg Diere
2:10-2:30	BOSC questions on Research Area 1, Outputs 1.3 and 5.6	(POSC Chairs)
2.20.2.45	Outputs 1-5 and 5-0	
2:30-2:45	Break	
2:45-3:15	Research Area 1, continued	Кау Но (СЕММ)
	Output 4: Microplastics	
3:15-3:30	EPA's international efforts on plastics in	Jane Nishida (Principal Deputy AA,
	marine litter	OIIA)
3:30-4:15	BOSC questions on Research Area 1,	Joseph Rodricks, Robert Blanz
	Output 4, Charge Question 1	(BOSC Chairs)
4:15-4:30	Public Comments	Tom Tracy (DFO)
4:30-5:00	BOSC Discussion	Joseph Rodricks, Robert Blanz
		(BOSC Chairs)

5:00-5:15	Wrap up	<b>Joseph Rodricks, Robert</b> <b>Blanz</b> (BOSC Chairs)
5:15	Adjourn	

#### Day 2: Thursday, October 29, 2020, Eastern Daylight Time

Time (EDT)	Торіс	Presenter
11:50-12:00	Sign on & Technology Check	
12:00-12:10	Welcome – Day 2	Tom Tracy (DFO)
		Joseph Rodricks (BOSC SSWR Chair)
		Robert Blanz (BOSC SSWR Vice Chair)
12:10-12:30	ORD Overview – Centers	Rusty Thomas (Director, CCTE)
		Greg Sayles (Director, CESER)
12:30-1:00	Overview of Research Area 2:	Brenda Rashleigh (ACD, CPHEA)
	Improved Aquatic Resource Mapping	
	• Output 1: Improved Accuracy	Jay Christensen (CEMM)
	and Application of Geospatially	
	Explicit Aquatic Resource Data	
1:00-1:45	BOSC questions on Research Area 2,	Joseph Rodricks, Robert Blanz
	Charge Question 2	(BOSC Chairs)
1:45-2:00	GEMMD Virtual Lab Tour	
2:00-2:15	Break	
2:15-2:35	Overview of Research Area 3:	Ann Grimm (ACD, CEMM)
	Human Health and Aquatic Life Criteria	
	• Output 2: Human Health and	Adam Biales (CCTE)
	Chemical Contaminants	
	• Output 3: Aquatic Life Criteria	Russ Erickson (CCTE)
2:35-2:50	BOSC questions on Research Area 3,	Joseph Rodricks, Robert Blanz
	Outputs 2 and 3	(BOSC Chairs)
2:50-3:20	Research Area 3, continued	Orin Shanks (CEMM)
	Output 1: Human Health	
	and Recreational Water	
	Quality	
3:20-4:15	BOSC questions on Research Area 3,	Joseph Rodricks, Robert Blanz
	Charge Question 3	(BOSC Chairs)
4:15-4:30	Public Comments	Tom Tracy (DFO)
4:30-5:15	Charge Question Break-out Groups	Joseph Rodricks, Robert
	(committee members will be	Blanz (BOSC Chairs)
	preassigned to specific charge	
	questions)	

5:15-5:30	BOSC Discussion / Next Steps	Joseph Rodricks, Robert Blanz (BOSC Chairs) Suzanne van Drunick (NPD) Tom Tracy (DFO)
5:30	Adjourn	

## Day 3: Tuesday, November 17, 2020, Eastern Daylight Time

Time	Торіс	Speaker
11:00–2:00 pm	Subcommittee Worktime	

#### Day 4: Wednesday, December 2, 2020, Eastern Daylight Time

Time	Торіс	Speaker
2:00–5:00 pm	Subcommittee Worktime	

#### **Appendix B: Participants**

#### **BOSC Safe and Sustainable Water Resources Subcommittee Members:**

Joseph Rodricks, Chair Robert Blanz, Vice Chair Scott Ahlstrom\* Elizabeth Boyer Shahid Chaudhry Timothy Davis\*\*\* Elizabeth Fassman-Beck Lucinda Johnson, BOSC Executive Committee Vice Chair Michelle Lorah\*\*\* Tim Verslycke Stephen Weisberg Jerad Bales, attended October 28 only Steve Carr David Cole Joel Ducoste\*\*\* Fred Hitzhusen\*\* Kate Lajtha John Lowenthal John White

\*did not attend October 29 \*\*did not attend November 17 \*\*\* did not attend December 2

# **EPA Designated Federal Officer (DFO):** Tom Tracy, Office of Science Advisor, Policy, and Engagement

#### **Presenters:**

Adam Biales, Supervisory Biologist, Center for Computational Toxicology and Exposure Wayne Cascio, Director, Center for Public Health and Environmental Assessment Jay Christensen, Research Ecologist, Center for Environmental Measurement and Modeling Russ Erickson, Chemist, Center for Computational Toxicology and Exposure Ann Grimm, Assistant Center Director, Center for Environmental Measurement and Modeling Rick Greene, Supervisory Research Biologist, Watersheds Topic Lead Matt Heberling, Research Economist, Center for Environmental Measurement and Modeling Kay Ho, Environmental Research Scientist, Center for Environmental Measurement and Modeling Jane Nishida, Principal Deputy Assistant Administrator, Office of International and Tribal Affairs

Jennifer Orme-Zavaleta, Principal Deputy Assistant Administrator for Science, Office of Research and Development

Steve Paulsen, Ecologist, Center for Public Health and Environmental Assessment Peg Pelletier, Research Biologist, Center for Environmental Measurement and Modeling Brenda Rashleigh, Assistant Center Director, Center for Public Health and Environmental Assessment

Greg Sayles, Director, Center for Environmental Solutions and Emergency Response Orin Shanks, Senior Research Geneticist, Center for Environmental Measurement and Modeling

Kate Sullivan, Branch Chief Ecosystems Assessment, Center for Environmental Measurement and Modeling

Rusty Thomas, Director, Center for Computational Toxicology and Exposure Suzanne van Drunick, National Program Director, Safe and Sustainable Water Resources Research Program

Tim Watkins, Director, Center for Environmental Measurement and Modeling Susan Yee, Ecologist, Center for Environmental Measurement and Modeling

#### **Other EPA Attendees:**

Souhail Al-Abed Swinburne Augustine Vince Bacalan Nizanna Bathersfield Lara Beaven Barbara Bergen Savannah Bertrand Heidi Bethel Karen Blocksom Tracy Bone Hannah Boone Justin Bousquin William Boyes Angela Brown Cheryl Brown Tim Buckley Robert Burgess Bekah Burket Miranda Chien-Hale Bryan Clark Phil Colarusso Jana Compton Joel Corona A Cruz Lesley Danglada Alfred Dufour

**Bill Fisher** Ken Fritz Heather Golden Linda Harwell Annelise Hill Susan Holdsworth Michael Hughes Elizabeth Kakaley Whitney King Stephen Kraemer Rose Kwok Michelle Latham Sarah Lehman Todd Lutte Gouri Mahadwar Marissa Mazzotta Richard Mitchell Michael Morton Cristina Mullin Diane Nacci Amy Newbold Thomas O'Farrell Kevin Oshima Benjamin Packard Amina Pollard Anne Rea

Jay Reichman **Cindy Roberts** Sandra Robinson Bruce Rodan Mary Ross Marc Russell Deborah Santavy Marika Schulhof Gregg Serenbetz Jane Ellen Simmons Janice Sims Bernice Smith James Smith Lisa Smith Heather Strathearn Avery Tatters Michelle Thawley Tom Tracy **Emily Trentacoste** Scarlett VanDyke Katrina Varner Chau Vu Marc Weber Joe Williams Robert Zucker

Other Attendees:

Ben Kallen David LaRoss Jeremy Lerner Alvina Mehinto Paul Ringold

Contractor Support:

Canden Byrd Amy Scheuer Leah West

# Appendix C: Charge Questions

**Q.1:** Progress towards characterizing microplastics in the environment and uncertainties about their potential environmental health effects requires reliable and consistent methods. SSWR is conducting research to develop and standardize collection, extraction, identification, and quantification methods for microplastics. Based on the progress and results to date, what suggestion(s) or recommendation(s) does the Subcommittee offer on research into addressing the uncertainties and challenges associated with the Agency's efforts to develop reliable and consistent microplastics analytical methods? [Research Area 1, Output 4]

**Q.2:** Existing geospatial datasets are often limited with respect to mapping rivers, streams, and wetlands with the degree of accuracy and at the resolution needed to support federal, state, tribal, and local water management decisions, including identifying "waters of the United States" subject to Clean Water Act jurisdiction. SSWR is leveraging existing interagency partnerships to improve the accuracy and application of geospatial data for mapping aquatic resources nationally. What suggestion(s) or recommendation(s) does the Subcommittee offer on further identifying emerging technologies, methodologies, and datasets to improve aquatic resource mapping tools and their application for federal, state, and local water management decisions? [Research Area 2, Output 1]

**Q.3:** To help reduce health risks associated with exposure to fecal contaminants in recreational waters, SSWR is conducting research to strengthen the scientific basis of existing, and to advance new, fecal contaminant detection methods, source tracking, predictive tools, and health effects assessments that contribute to human health recreational water quality criteria programs. As the research progresses, what suggestion(s) or recommendation(s) does the Subcommittee offer on continuing to identify and conduct research of greatest importance to advancing human health protection from fecal contaminants in recreational waters? [Research Area 3, Output 1]