

2023
POTOMAC RIVER CONFERENCE:
ONE RIVER'S PERSPECTIVE ON A
CHANGING CLIMATE

Conference Booklet

September 21, 2023
Fairfax Water Griffith Treatment Center
Lorton, Virginia



In memory of Curtis Dalpra

The 2023 Potomac River Conference is dedicated to Curtis Dalpra, who passed away in March of this year. During his long tenure in the Communications Department at ICPRB, Curtis was always willing to share his knowledge of the basin and its storied past. During his 41 years at ICPRB, he championed good stewardship of the Potomac River. Let us all continue that legacy.



Interstate Commission on the Potomac River Basin Conference Planning Committee



Cherie Schultz, Ph.D.
Director, CO-OP Operations



Heidi Moltz, Ph.D.
Director, Program Operations



Renee Bourassa
Director, Communications



2023 POTOMAC RIVER CONFERENCE: ONE RIVER'S PERSPECTIVE ON A CHANGING CLIMATE

Date: Thursday, September 21, 2023, 8:30 am - 3:30 pm

Location: Fairfax Water, 9600 Ox Road, Lorton, Va.

Agenda

Coffee and Registration (8:30 am)

Session 1: Opening (9:00 am)

Moderator - Michael Nardolilli, ICPRB

- In Memoriam Curtis Dalpra - Michael Nardolilli, ICPRB
- Welcome to Fairfax Water - Jamie Hedges, Fairfax Water
- Welcome to the 2023 Potomac River Conference - Robert Sussman, ICPRB Chair
- Keynote Speaker: The Climate Crisis and Potomac River Communities - Katie Blackman, Potomac Conservancy

Session 2: Trends in the Potomac Basin (9:45 am)

Moderator - Chris Jones, GMU

- Climate Change: Trends & Projections for the Potomac River Basin - Cherie Schultz, ICPRB
- Temporal trends in Potomac River fish abundance indicate a changing flow regime - Nathaniel Hitt, USGS
- Using Cluster Analysis to Detect Changes in Seasonality of Estuarine Water Quality Over Time - Elgin Perry, Consultant to EPA CBP
- Oligotrophication of the Tidal Freshwater Potomac River in a Changing Climate - Dann Sklarew and Chris Jones, GMU
- CBP Tributary Summaries: Communication tool on water quality changes to inform management decisions - Alex Gunnerson, CRC CBP

Break (11:05 am)

Session 3: Regional Resilience (11:15 am)

Moderator - Pam Kenel, Loudoun Water

- Climate Change Considerations for MS4 utilities: a District of Columbia case study - Anouk Savineau, LimnoTech and Matt Gallagher, DOEE
- MD's Forests and New Forest Conservation Legislation - Susan Minnemeyer, Nature Plus



Agenda (Cont.)

Lunch, Posters, and Networking (12:00 pm)

- Reflections on Curtis Dalpra will occur during the lunch hour. We invite you to share your thoughts.

Session 4: Government Innovation (1:00 pm)

Moderator - Jeffery Seltzer, DOEE

Christopher Beck (MDE); Erin Garnaas-Holmes (DOEE);

Katherine Rainone (MWCOG); Megan Porta (PA DEP)

Session 5: Implementation (2:00 pm)

Moderator - Steve DeRidder, Berkeley County PSWD

- Watershed Forest Management Challenges for Water Supply - Jenny Willoughby, Frederick, MD
- Water Quality Modeling and Monitoring in Vulnerable Communities within the Chesapeake Bay Watershed - Leah Staub, Andrew Sekellick, and Tristan Mohs, USGS

Session 6: Closing (2:35 pm)

Michael Nardolilli, ICPRB Executive Director

Poster Session (2:45-3:45 pm)

- A New Primary Producer Enters the Tidal Freshwater Potomac: Seasonal Dynamics of the Benthic Cyanobacterium *Microseira (Lyngbya) wollei* - Chris Jones, GMU, and Sam Mohney, GMU
- Assessing the sources of pesticides in the Potomac River Watershed through wastewater reuse modeling - Samuel Miller, Daniel Burns, and Kaycee Faunce, USGS
- A Tale of Two Embayments: Interaction of Nutrients, Water Clarity, Phytoplankton, and Submersed Aquatic Vegetation Drives Ecosystem Structure - Chris Jones, GMU
- Chemical prioritization of contaminants in the Potomac River - Scott Glaberman, GMU
- Field surveys and comparative parasitology of freshwater native and invasive snails in the Potomac River and its watershed - Amy Fowler, GMU
- Phenology of Two-horned Water Chestnut (*Trapa bispinosa Roxb. var. iinumai Nakano*) in Northern Va. Ponds - Sujata Poudel, GMU, Chris Jones, GMU, and Nancy Rybicki, USGS/GMU
- Potomac Riverkeeper Network's Community Science Water Quality Monitoring Program and Public Health - Morgan Bench and Lisa Wu, Potomac Riverkeeper Network
- Shifts in the community structure of tidal freshwater fishes associated with alternate stable states - T. Reid Nelson, GMU
- Short-term risk assessment for a newly introduced water chestnut, *Trapa bispinosa Roxb.*, entering the Potomac River, U.S. - Nancy Rybicki, USGS/GMU
- Why Viewsheds matter to planning for land use change - Lynn Crump and Jennifer Wampler, Scenic Virginia



Speaker Biographies

Session I: Opening

Michael Nardolilli, ICPRB



Michael Nardolilli joined the Interstate Commission on the Potomac River Basin as its Executive Director on April 1, 2019. Previously, Mr. Nardolilli served as the Chairman of the Board of Directors of the Northern Virginia Regional Park Authority (operators of 33 parks in Northern Virginia), President of the Arlington Outdoor Lab (a 225-acre nature educational facility in Virginia), Executive Director of the Montgomery Parks Foundation (the fundraising arm of Montgomery Parks), President of the C&O Canal Trust (the official non-profit partner of the C&O Canal National Historical Park), and President of the Northern Virginia Conservation Trust (a regional land trust). Prior to his work in the non-profit field, Mr. Nardolilli had a successful 18-year legal career representing Fortune 500 companies suing their insurance carriers for delayed manifestation claims. In 2011, Mr. Nardolilli was selected as a “Green City Leader” by Washington Life Magazine and was named a WETA-TV “Hometown Hero” in 2007. Mr. Nardolilli received a Certificate of Executive Non-Profit Management from Georgetown University, a JD from the College of William & Mary and a BSFS from Georgetown University.

Jamie Hedges, Fairfax Water



Jamie Hedges is the General Manager of Fairfax Water, Virginia’s largest water utility producing water of exceptional quality for over two million residents of Northern Virginia. Ms. Hedges leads a workforce of 475 to directly serve over one million residents of Fairfax County and the Cities of Falls Church and Fairfax, and indirectly serve one million residents in neighboring jurisdictions through seven wholesale utility partners. She is responsible for the efficient operation and stewardship of Fairfax Water’s \$2 billion in infrastructure that includes two treatment plants with a combined capacity of 345 million gallons per day and a distribution system comprised of over 4,000 miles of water main. Fairfax Water’s rates are among the lowest in the region and it maintains a triple-A rating from all three major bond rating agencies. Ms. Hedges has over 30 years of experience in the drinking water industry. Prior to becoming the General Manager, she served as Fairfax Water’s Deputy General Manager, and as the Director of Planning and Engineering. Ms. Hedges had key roles in strategic initiatives at Fairfax Water including the acquisition and integration of the former City of Falls Church and City of Fairfax water systems, the development of future water supply storage by re-purposing a rock quarry, water treatment plant expansions, and the development of asset management programs. Ms. Hedges received a BS in Civil Engineering and a Master of Business Administration, both from Virginia Tech and is a licensed professional engineer in Virginia. She is a member of the Association of Metropolitan Water Agencies, the American Water Works Association, and the American Society of Civil Engineers. She is the Vice President of the Virginia Municipal Drinking Water Association and has served on several regulatory advisory panels for the Virginia Department of Health. Ms. Hedges has been on the Board of Directors for George Mason University’s (GMU) Civil Engineers Institute for over a decade and was previously an adjunct professor at GMU in professional practice and management. She has been the recipient of the George Mason University Civil Engineering Institute’s Engineering Excellence and Leadership Award and the Meritorious Public Service Award from the American Council of Engineering Companies (Metropolitan Washington).



Robert Sussman, ICPRB Chair

Bob Sussman is the principal in Sussman and Associates, a consulting firm that offers advice on energy and environmental policy issues to clients in the non-profit and private sectors. Bob served in the Obama Administration as Co-Chair of the Transition Team for EPA and then as Senior Policy Counsel to the EPA Administrator from 2009-2013. He served in the Clinton Administration as the EPA Deputy Administrator during 1993-94. At the end of 2007, Bob retired as a partner at the law firm of Latham & Watkins, where he headed the firm's environmental practice in DC. Bob was a Senior Fellow at the Center for American Progress in 2008. He is currently Chair of the Interstate Commission for the Potomac River Basin, to which he was appointed as a federal Commissioner by President Obama. Bob is a magna cum laude 1969 graduate of Yale College and a 1973 graduate of Yale Law School. Bob has posted numerous blogs on the Brookings Institution Website and elsewhere and published articles in the Environmental Law Reporter and other publications

Katie Blackman, Potomac Conservancy

Katie Blackman (she/her) is the Vice President of Programs and Operations at Potomac Conservancy, overseeing programming directly related to achieving clean water goals in the Potomac and daily operations. In this role she ensures the programmatic alignment of the Conservancy's Land Conservation, Policy, and Community Conservation departments with the organization's Clean Potomac Plan. Additionally, she ensures daily internal operations keep pace with the organization's growth and mission work. Katie also directs the Conservancy's Diversity, Equity, Inclusion, and Justice efforts, including the management of the organization's internal DEIJ working groups and board committee.

Katie came to the Conservancy in 2015 and previously led the organization's community engagement efforts. She has a strong background in volunteer engagement formally managing programs for other local animal welfare and environmental nonprofits. She is also the founder of the Capital MOVE (Managers Of Volunteers for the Environment), a group of professionals who work with outdoor volunteers in the DC metro region. Katie has a BA from UMBC in history and elementary education and a master's degree from King's College of London in Tourism, Environment, and Development with a concentration on volunteer ecotourism. She lives with her family in Boyds, Maryland and is an avid sourdough baker (made with Potomac River tap water!) and enjoys hiking and canoeing on Little Seneca Lake.

Session 2: Trends in the Potomac Basin

Moderator Bio: Dr. R. Christian "Chris" Jones is Founder and Director of the Potomac Environmental Research and Education Center (PEREC) located on the tidal Occoquan River in Woodbridge, VA. PEREC is home to eight faculty researchers from the George Mason University's College of Science and three from GMU's College of Engineering and Computing. Dr. Jones has been a Potomac researcher since 1980 and founded the long term Ecological Study of Gunston Cove, which has been conducted annually since 1984, making it one of the longest continuous aquatic ecosystem studies in the world. He has published in major journals such as Estuaries and Coasts, Journal of Phycology, Ecology, Environmental Monitoring and Assessment, Hydrobiologia, and Inland Waters. He has mentored over 20 Ph.D. students and over 40 MS thesis students and been awarded the Jack Wood Award for Town-Gown Relations and the Earl C. Williams Presidential Medal for Excellence in Social Impact at GMU.

Cherie Schultz, ICPRB

Cherie Schultz, Ph.D., is Director of Operations for the Section for Cooperative Water Supply Operations on the Potomac (CO-OP) at the Interstate Commission on the Potomac River Basin (ICPRB). ICPRB's CO-OP Section provides support to the Washington metropolitan area's regional water supply system, which includes suppliers in Maryland, Virginia, and the District of Columbia. Dr. Schultz is responsible for water demand and availability forecasts for the region, conducted every five years, which include estimates of the impact of upstream consumptive use on Potomac River flows and the potential impact of climate change on future supplies. She is also responsible for management of metropolitan area water supplies and operations during periods of drought. Dr. Schultz holds a bachelor's degree in physics from Stanford University, a doctoral degree in physics from the State University of New York at Stony Brook, and a master's degree in civil engineering from the University of Maryland.



Nathaniel Hitt, USGS



Dr. Nathaniel (Than) Hitt is a Research Fish Biologist at the USGS Eastern Ecological Science Center in Kearneysville, West Virginia. Dr. Hitt's research investigates freshwater fish ecology from a landscape perspective, focusing on stream ecosystems in the Appalachian highlands.

Elgin Perry, Consultant to EPA CBP

Dr. Perry is a statistics consultant providing experimental design and data analysis expertise to researchers conducting environmental investigations. His education includes training in both the theoretical and applied aspects of statistics as well as basic ecology. His career as an environmental statistician spans more than 45 years and includes positions with EA Engineering, The Academy of Natural Sciences of Philadelphia, and The University of Maryland, prior to becoming a full time consultant in 1988. Currently, Dr. Perry is working with the EPA Chesapeake Bay Program on identifying patterns in water quality parameters.

Dann Sklarew, GMU



George Mason University Professor Dann Sklarew has been a tiny, sentient tributary of the Potomac River for over 40 years. From adolescent swims in Lake Thoreau through researching impacts of climate change and de-fertilization on the tidal freshwater Potomac ecosystem, Dr. Sklarew aims to give some back to the waters which sustain us here. He has taught aquatic ecology college students and neighbors alike to be mindful of our habits with respect to our shared Potomac watershed habitat. In collaboration with ICPRB's Curtis Dalpra (RIP), he designed and hosted the original 1995-era websites for the Potomac River Commission and Potomac River Reporter. After 8 years with the United Nations, Dr. Sklarew served as an alternate ICPRB commissioner then as the first Potomac River friendship ambassador to our Arakawa sister river in Japan. Dr. Sklarew, colleagues and mentees also studied microplastics in the tidal Potomac. He is presently co-creating a riparian "foragers' forest" of edible native flora to help ecologically restore formerly developed land on Mason's Fairfax campus. Dr. Sklarew and family reside nearby, adjacent to a Fairfax stream which flows into Royal Lake then onward to the tidal Potomac River.

Alex Gunnerson, CRC CBP



Alex Gunnerson is an environmental management staffer at Chesapeake Research Consortium. In this role he works with the Chesapeake Bay Program's Scientific, Technical Assessment and Reporting (STAR) team to support the modeling and monitoring of water quality in the Chesapeake Bay watershed, in addition to supporting all outcomes of the 2014 Chesapeake Bay Watershed Agreement by tracking their science needs. Alex has a background and interests in geography, water resources, GIS, remote sensing, and international affairs. In his free time, he enjoys cycling, camping, hiking, and reading.



Session 3: Regional Resilience



Moderator Bio: As Executive Director of Planning & Water Resources for Loudoun Water, Pam Kenel is responsible for long term planning, development of new programs and coordinating strategic issues related to water resources, research, and regulatory compliance. Pam previously served as a consulting practice leader for water resources and sustainability issues, working with water utilities across the United States. For the Washington Metropolitan Area water utilities, Pam managed the 2016 assessment of water supply system redundancy and resilience. A long-time AWWA member, she chairs the technical advisory workgroup on Climate Change & Sustainability for the association's Water Utility Council.



Anouk Savineau, LimnoTech

Anouk Savineau is a Principal and Senior Water Resources Engineer with LimnoTech. Anouk lives in Washington DC close to the Anacostia River and has been supporting DOEE's MS4 program for the past 10 years. Her professional expertise is primarily focused on water quantity and quality issues in urban watershed settings. When not working on urban water issues, Anouk can be found biking along DC's many bike trails, exploring camping sites in the Chesapeake Bay, enjoying DC's restaurant scene, or attending and volunteering at her kid's various activities.



Matt Gallagher, DOEE

Matt Gallagher (he/him) has been serving as the Planning and Reporting Branch Chief in the Water Quality Division at the District Department of Energy and Environment (DOEE) for the last 3 years. In this role, Matt oversees administration of the District's Municipal Separate Storm Sewer System (MS4) permit and State Revolving Fund programs. Prior to his time at DOEE, Matt managed a variety of environmental restoration, monitoring, and outreach programs at several organizations including the Golden Triangle Business Improvement District, Anacostia Watershed Society, and the Metropolitan Washington Council of Governments. He holds a BS in Biology from Dickinson College and an MS in Ecology from Towson University.

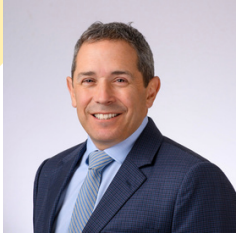


Susan Minnemeyer, Nature Plus

Susan Minnemeyer, an environmental consultant and founder of Nature Plus, has more than 25 years of experience in geospatial analysis and research supporting forest conservation and improved land use planning. In 2021 and 2022, she led the Technical Study on Changes in Forest and Tree Canopy in Maryland, an effort by the Hughes Center for Agro-Ecology of the University of Maryland, Chesapeake Conservancy, and the University of Vermont. Prior to founding Nature Plus, Susan spent four years with the Chesapeake Conservancy, where she led the Conservation Innovation Center and developed an organizational climate strategy. Previously she served nearly 20 years with the World Resources Institute's Global Forest Watch initiative. Susan has a Master's from Duke University's Nicholas School of the Environment and a Biology degree from UNC-Chapel Hill and lives with her family in Severna Park.



Session 4: Government Innovation




Moderator Bio: Jeffrey Seltzer is the Deputy Director for the Natural Resources Administration where he is responsible for programs that conserve, protect, and improve the water, soil, and living resources of the District of Columbia. Jeffrey has been with the agency since 2010 and previously served as the Associate Director of the Stormwater Management and Water Quality Divisions where he led efforts to update the District's water quality planning documents and accelerate retrofitting the built environment with green infrastructure. Jeffrey is a Professional Civil Engineer with over thirty years of experience in environmental restoration and resource management in both the private and public sector. Jeffrey earned his bachelor's degree from the Pennsylvania State University and is a graduate of the George Washington University executive leadership program. Jeffrey lives in the District with his wife and two children. He looks forward to the continued improvement of our local environment to provide access to healthy natural resources, resiliency to climate change, and equity for the residents of the District.



Christopher Beck (MDE)


Christopher Beck serves as the Deputy Manager of the Climate Change Program at Maryland Department of the Environment, leading the program's Policy division. He has developed several state-wide plans to mitigate the impact of climate change. With the most ambitious GHG emissions reduction goals of any US state, he has had to shift the climate change policy design conversation into high gear around progressive emission reduction policies to meet a 60% reduction in state-wide GHG emissions by 2031. He has provided key support to the Maryland Commission on Climate Change, serving as the point of contact for many aspects of the Commission's reports to the Governor and Elected officials. Chris is a graduate of Johns Hopkins University with a degree in Public Health.



Erin Garnaas-Holmes (DOEE)

Erin Garnaas-Holmes coordinates implementation of the District of Columbia's climate adaptation plans with the Department of Energy and Environment's Urban Sustainability Administration. His work includes Climate Ready DC, the District's climate adaptation plan, and Keep Cool DC, the District's extreme heat adaptation strategy.

With graduate degrees in landscape architecture and urban planning, Erin has advanced equitable planning and ecological design for over ten years. Before joining DOEE, Erin served as the Ambassador for the Anacostia Watershed's Urban Waters Federal Partnership, directed planning efforts at the Anacostia Waterfront Trust, and consulted on waterfront and downtown development projects around the country with Stantec's Urban Places Group.



Katherine Rainone (MWCOG)

Katherine Rainone is the Transportation Resilience Planner at the Metropolitan Washington Council of Governments (MWOG). Her work includes incorporating adaptation to the impacts of natural hazards on the National Capital Region's transportation system with the creation of a transportation resilience planning program and spearheading the first regional Transportation Resilience Improvement Plan (TRIP) – an effort to prepare the region for access to PROTECT program funding.

With graduate degrees in Environmental Planning and Management from Johns Hopkins University and Marine Biodiversity and Conservation from Scripps Institution of Oceanography, Katherine has worked at the intersection of society and environmental and climate impacts for the entirety of her career. She worked at non-profit organizations like The Climate Reality Project and the U.S. Green Building Council before pivoting to regional planning at the Hampton Roads Planning District Commission and now MWCOG.





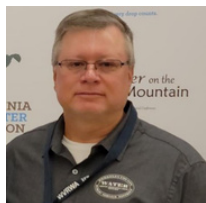
Megan Porta (PA DEP)

Megan Porta is an Energy Program Specialist with the Energy Programs Office at the Pennsylvania Department of Environmental Protection. In her role, she assists with climate change resiliency goals in the Climate Change Program and manages the Alternative Energy Portfolio Standard for Pennsylvania. Megan works on several initiatives, including greenhouse gas inventories, federal grant planning, and is heading the effort for PA's 2024 Climate Action Plan and Climate Impacts Assessment.

Megan has been with the Department of Environmental Protection for over 11 years, and prior to joining the Energy Programs Office she was a Water Program Specialist in the Chesapeake Bay Program. She earned a Bachelor of Science in Biology at York College and a Master of Science in Environmental Sciences and Policy with a concentration in Watershed Studies from the Johns Hopkins University.

Session 5: Implementation

Moderator Bio: Steve De Ridder has been the Superintendent of Operations with Berkeley County PSWD for 23 years ; Adjunct Blue Ridge Community College. Hobbies- Fishing

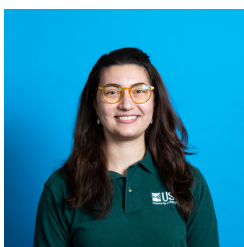


Jenny Willoughby, The City of Frederick

Jenny Willoughby is the Sustainability Manager for City of Frederick, where she manages the 7500-acre Watershed, the Tree Frederick Program, and stream restorations, among other tasks. She is an ISA Board Certified Master Arborist and earned a BS in Forestry and Wildlife from Virginia Tech and an MS in Geographic and Cartographic Sciences from George Mason University.



Leah Staub, Andrew Sekellick, and Tristan Mohs, USGS



Leah Staub, Andrew Sekellick and Tristan Mohs are all Physical Scientists with the USGS at the MD-DE-DC Water Science Center and are all members of the Justice, Equity, Diversity, and Inclusion committee. Leah primarily has experience tracking sediment sources in select watersheds and working with various spatial data types. Andrew's current work focuses on developing and implementing innovative water quality modeling techniques, enhancing monitoring network design, and spatial data development. Tristan has a background in land surveying, flood science, and geomorphology and is interested in work related to the pairing of biotic and abiotic factors in an ecosystem.



Poster Session



Sam Miller (he/him) is a hydrologist in the Watershed Studies Section at the Virginia and West Virginia Water Science Center located in Richmond, VA. Sam began working with the US Geological Survey in 2021. His research focuses on watershed-scale processes that affect downstream hydrologic response in urban, agricultural, and natural settings and is interested in how watershed management impacts changes in water quality and ecological health. Sam has a BS in Environmental Geography and Environmental Geology from Ohio University, an MS in Geology from Ohio University, and a PhD in Hydrology from the University of Wyoming. **Kaycee Faunce** (she/her) is a geographer with the Virginia and West Virginia Water Science Center, U.S. Geological Survey. Since joining the bureau, her work has focused on the use of GIS data to assess the fate and occurrence of aquatic contaminants across multiple spatial scales as well as the development of decision support tools to support water management decisions. She holds a BS in biology from the University of Mary Washington and an MS in Environmental Studies from Virginia Commonwealth University. **Daniel Burns** (he/him) is a Hydrologic Technician with the Virginia and West Virginia Water Science Center, U.S Geological Survey. He is part of the Watershed Monitoring Studies section and coordinates field efforts to collect hydrologic data to support many ongoing projects across the State. He holds a BS in Chemistry and Environmental Science from Seton Hall University.



Dr. Amy Fowler is Associate Director of PEREC and Tenured Associate Professor in the Department of Environmental Science and Policy (ESP) at George Mason University. Dr. Fowler is an invertebrate ecologist whose research focuses on invasive species and their impact on estuarine and tidal freshwater food webs. This year Dr. Fowler has taken on the job of Interim Chair of the ESP department. She is a world leader in studies of invasion biology and the effects of invasive aquatic invertebrates on how these non-native species may alter food webs and perhaps overcome native species. She has published in journals such as *Aquatic Invasions*, *Marine Ecology Progress Series*, *Biological Invasions*, and *Freshwater Biology*. She is active in her profession, serving as Deputy Editor-in-Chief of three journals. She has been an active collaborator in the Ecological Study of Gunston Cove for the past six years.

Dr. Sujata Poudel received her Ph.D. from George Mason University in 2021 working on basic ecology and phenology of the invasive water chestnut (*Trapa bispinosa* Roxb. Var *linumai* Nakano) under the mentorship of Dr. R.C. Jones and Dr. Nancy Rybicki. She published her results in *Journal of Aquatic Plant Management*. She has been an adjunct professor at George Mason University and currently works at Virginia Department of Environmental Quality.



Morgan Bench holds a B.A. from Washington College in Chestertown, MD, where they double majored in Environmental Studies & Studio Art. They joined Potomac Riverkeeper Network in 2020 as an intern and were brought on full-time in 2021 as Volunteer Coordinator, where they oversee the Community Science Water Quality Monitoring Program, Trash Free Potomac Program, and Pollution Rapid Response Teams. Morgan's passion for the environment stems from their childhood spent exploring the Chesapeake Bay Watershed. Growing up learning about the many beautiful, unique, & delicate ecosystems throughout the region and how they are interconnected inspired them to pursue a career helping protect & defend our waterways. Morgan is an avid outdoors enthusiast & environmentalist. In their spare time they can be found hiking, camping, kayaking, sailing, birding – or any activity that gets them outside.



Lisa Lyle Wu serves as the Lab Manager aboard the Potomac Riverkeeper Network's, M/V Sea Dog, anchored in National Harbor, in Oxen Hill, Maryland. From this location, she organizes and has trained area volunteers as community scientists. Data analysis aboard the Sea Dog's Tier III certified lab is uploaded to public available databases- Swim Guide and the Chesapeake Monitoring Cooperative. This data provides reliable and accessible information on recreational water quality for swimmable, drinkable, and fishable water.



Research interests stem from her past life, when she taught marine biology and was the lab director for the Oceanography & Geophysical Systems Lab at the Thomas Jefferson High School for Science and Technology in Alexandria, VA. In her lab, she facilitated authentic research with students and scientists from the military, Federal and State agencies, university labs, and museums. Her current research interests include bioluminescence, coral rugosity, harmful algal blooms, improving our coastal and freshwater environments, remote sensing, and promoting women in STEM.

Lisa was a volunteer diver at the National Aquarium in Baltimore for ten years and served as Teacher at Sea for NOAA. She is also a member of the Corps of Exploration for the E/V Nautilus and participated in the Puerto Rico Trench and Lesser Antilles expedition. Most recently field studies included Indonesia and Cuba with Operation Wallacea, a research collaborative working with scientists from over 200 research institutes around the world. Unable to give up the pipette for the pen, Lisa has recently certified as an ecotour guide and is on the Executive Board of the Women's Aquatic Network.



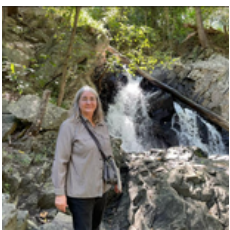
T. Reid Nelson is an assistant professor in the department of Environmental Science and Policy at George Mason University as well as a faculty fellow at the Potomac Environmental Research and Education Center. He is a fisheries ecologist with research interests in basic fields of ecology, applied aspects of fisheries and aquatic resource management, and the intersection of these two avenues. Along those lines he is interested in movement and migration, life history diversity, age and growth, population dynamics, predator-prey interactions, and anthropogenic impacts on fishes and aquatic ecosystems. He has worked in freshwater, estuarine, and marine ecosystems and has experience along the Atlantic, Gulf, and Pacific coasts of the United States. Current research includes long-term ecological studies of Gunston Cove and Hunting Creek on the tidal Potomac River, estimation of Striped Bass post-release mortality, and River Herring migration.



Dr. Nancy Rybicki is an aquatic plant ecologist and affiliate professor at George Mason University. She is retired from the US Geological Survey, Water Mission Area, Reston VA, but she continues her research as a scientist emerita. Dr. Rybicki will report on investigations into a recently discovered and newly identified species of water chestnut from Asia. This plant is a non-native floating aquatic plant that was first observed in 2014 in the Potomac River watershed.



Lynn Crump, PLA, is a landscape architect whose recent focus has been on Virginia's Scenic Resources. She retired from the Department of Conservation and Recreation where she administered the Virginia Scenic Rivers Program and co-administered the Virginia Byways Program. Currently she is working with Scenic Virginia on their Viewshed Program, a statewide scenic recognition program. She volunteers with the American Society of Landscape Architects (ASLA) and has served on the national Viewshed Working Group highlighting the role of landscape architects in scenic resource protection and enhancement.



Recently retired from the Virginia Department of Conservation and Recreation after serving for 18 years as trails coordinator, **Jennifer Wampler** is completing a project for the Virginia Walkability Action Institute in her neighborhood and contemplating future adventure travel and advocacy work.



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Date: Thursday, September 21, 2023, 8:30 am - 3:30 pm

Location: Fairfax Water, 9600 Ox Road, Lorton, Va.

Agenda with Abstracts

Coffee and Registration (8:30 am)

Session 1: Opening (9:00 am)

Moderator - Michael Nardolilli, ICPRB

- In Memoriam Curtis Dalpra - Michael Nardolilli, ICPRB
- Welcome to Fairfax Water - Jamie Hedges, Fairfax Water
- Welcome to the 2023 Potomac River Conference - Robert Sussman, ICPRB Chair

Keynote Speaker: The Climate Crisis and Potomac River Communities - Katie Blackman, Potomac Conservancy

This talk will dive into the importance of building local community in the face of the challenges that are here and what is to come.

Session 2: Trends in the Potomac Basin (9:45 am)

Moderator - Chris Jones, GMU

Climate Change: Trends & Projections for the Potomac River Basin - Cherie Schultz, ICPRB

Abstract: ICPRB's CO-OP Section developed projections for annual Potomac River flows under a suite of future climate change scenarios in support of its most recent water demand and availability forecasts for the Washington metropolitan area cooperative water supply system. We've found that long-term average precipitation and flows are both projected to rise modestly in the basin during the 21st century. But the impacts on river flows of rising temperatures coupled with the inherent year to year variability of precipitation is complex. We've used a large ensemble of downscaled climate projections along with a quantile scaling approach to estimate the disparate impacts of future climate on annual river flow in dry, medium, and wet years. For the two planning periods, 2040-2069 and 2070-2099, results indicate that though long-term mean river flow will increase modestly in future years, annual flows in an extreme drought year may decrease substantially.

Agenda continues on the following page.

Agenda (Cont.)

Temporal trends in Potomac River fish abundance indicate a changing flow regime - Nathaniel Hitt, USGS

Abstract: Fish species strategies for survival and reproduction are often closely linked to riverine flow regimes. We evaluated fish abundance data from the Potomac River collected from 10 sites over 4 decades to investigate (1) if fish populations were stable, decreasing, or increasing, and (2) to explore the links to temporal trends in river flows. Results revealed significant temporal changes for 13 of 28 species in the analysis (46%), of which 9 species increased and 4 species decreased over time. Temporal changes coincided with increasing peak flows during fish spawning, egg incubation, and larval development periods, suggesting important ecological effects of a changing flow regime in the Potomac River.

Using Cluster Analysis to Detect Changes in Seasonality of Estuarine Water Quality Over Time - Elgin Perry, Consultant to EPA CBP

Abstract: This presentation will present a graphical explanation of the water quality trend models used by the Chesapeake Bay Program and how cluster analysis of the seasonal component of these trend results can be used to detect the systems response to climate change. Examples will be developed using Potomac River water quality parameters including TN, TP, Chlorophyll, Water Clarity, and Dissolved Oxygen.

Oligotrophication of the Tidal Freshwater Potomac River in a Changing Climate - Dann Sklarew and Chris Jones, GMU

Abstract: Eutrophication impacted the urban tidal freshwater Potomac River throughout the 20th Century. Management since the 1980s contributed to declining nutrient inputs, likely improving water quality. This study examines trajectories of oligotrophication in the Potomac River and factors that have contributed to this recovery.

Prior research examined potential factors affecting ambient Nitrogen, Phosphorus and algal blooms, such as wastewater nutrient loads, a regional ban on P in laundry detergents, and riparian buffer zone protection. Hydrometeorology was an important co-factor.

We apply similar methods to recent data (1997-2022) to assess when and how the ecosystem transitioned – or may transition -- to mesotrophic or oligotrophic states. We also postulate how such a change could affect estuarine Carbon sequestration.

Finally, we consider how rising tides, more punctuated and tropical weather could impact water quality. Appropriately “weatherized” nutrient management may be a viable approach to protecting this aquatic ecosystem from adverse effects of climate change.

Agenda (Cont.)

CBP Tributary Summaries: Communication tool on water quality changes to inform management decisions - Alex Gunnerson, CRC CBP

Abstract: The Chesapeake Bay Program and its partners compiled tributary basin summaries for 12 major tributaries or tributary groups in the Chesapeake Bay Watershed. These documents summarize and compile the monitoring and research data federal, state, and academic partners do all in one place. They are technical documents made for technical managers within jurisdictions and local watershed organizations to help them answer the overall questions: 1) How tidal water quality changes over time; 2) How factors that drive those changes change over time; and, 3) Current state of the science on connecting change in aquatic conditions to its drivers. The tributary summaries include a suite of monitored tidal water quality parameters (i.e. surface total nitrogen (TN), surface total phosphorus (TP), spring and summer surface chlorophyll a, summer bottom dissolved oxygen (DO) concentrations, and Secchi disk depth) and associated potential drivers to those trends for the time period 1985 – 2018. They will be updated on a rotating basis to provide the up-to-date results that can drive the direction for future management actions. The tributary summaries are available on the Chesapeake Assessment Scenario Tool (CAST), and the CBP is looking to disseminate these documents to managers and planners to use as a tool to measure actual progress and transform the monitoring findings into actionable information. Continuing to track water quality response and investigating influencing factors are important steps to understand water quality patterns and changes in the Bay tributaries.

Session 3: Regional Resilience (11:15 am)

Moderator - Pam Kenel, Loudoun Water

Climate Change Considerations for MS4 utilities: a District of Columbia case study - Anouk Savineau, LimnoTech and Matt Gallagher, DOEE

This presentation will provide a case study of how one MS4 utility in the Potomac River Basin – the District of Columbia – is assessing and preparing for future climate change conditions. The presentation will include:

- an analysis of predicted climate change impacts on meeting MS4 WLAs and NPDES permit requirements, and the impact on the predicted TMDL attainment timeline;
- an assessment of trends in MS4 outfall, ambient, and flow monitoring data in DC, and nexus to climate change;
- an assessment of what climate change may mean for peak-discharge and volume retention requirements; and,
- a discussion of DC's MS4 program management as seen through the lens of climate change, including discussions related to adaptive management, updating GI design standards, expected funding needs, infrastructure and social resilience, flooding, racial equity, etc.

Agenda continues on the following page.

Agenda (Cont.)

MD's Forests and New Forest Conservation Legislation - Susan Minnemeyer, Nature Plus

The Maryland Forest Study found the state slowed net forest loss over the past 30 years, but the state is still losing and fragmenting forest, due largely to development in the metropolitan Washington and Baltimore regions. With slowing of forest loss, the study advised the state of the opportunity to reverse loss and achieve net forest gain. Maryland passed the Natural Resources Forest Preservation and Retention Bill (SB 526/HB 723) in April 2023. The new law revises and strengthens the 1991 Forest Conservation Act (FCA), increasing forest conservation and planting requirements for new development. For the first time, Maryland has set a statewide goal to achieve net forest and tree canopy gain and requires each county to achieve no net forest loss. This new law will contribute to state goals to protect water quality, reduce urban heat, provide wildlife habitat, mitigate climate change and support climate resilience.

Lunch, Posters, and Networking (12:00 pm)

Reflections on Curtis Dalpra will occur during the lunch hour. We invite you to share your thoughts.

Session 4: Government Innovation (1:00 pm)

Moderator - Jeffery Seltzer, DOEE

**Christopher Beck (MDE); Erin Garnaas-Holmes (DOEE);
Katherine Rainone (MWCOG); Megan Porta (PA DEP)**

Session 5: Implementation (2:00 pm)

Moderator - Steve DeRidder, Berkeley County PSWD

Watershed Forest Management Challenges for Water Supply - Jenny Willoughby, Frederick, MD

Abstract: There is a big push for forest management and increased canopy to help improve water quality throughout the Chesapeake Bay region. But it's not a simple task. There are invasive species, mystery tree syndromes, aggressive user groups, and access issues that must be balanced with the water quality. Most of this work is done with very few resources and aging land managers that are not being replaced by young specialists. This will be a chance to hear from a land manager about the challenges we encounter in the field every day.

Water Quality Modeling and Monitoring in Vulnerable Communities within the Chesapeake Bay Watershed - Leah Staub, Andrew Sekellick, and Tristan Mohs, USGS

Abstract: The conditions that affect public health often disproportionately impact historically neglected and marginalized communities. The social vulnerability index (SVI) is a measure used by the Centers for Disease Control to quantify the factors that increase a community's vulnerability to disasters or environmental hazards. This index can be used alongside an existing SPAtially Referenced Regression On Watershed attributes (SPARROW) water quality model to examine stream health in vulnerable communities within the Chesapeake Bay watershed. For example, areas above the 90th percentile for select SVI factors, including minority status and English proficiency, can be compared with water quality predictions to determine if vulnerable communities are more likely to be exposed to degraded conditions.

Session 6: Closing (2:35 pm)

Michael Nardolilli, ICPRB Executive Director

Agenda (Cont.)

Poster Session (2:45-3:45 pm)

A New Primary Producer Enters the Tidal Freshwater Potomac: Seasonal Dynamics of the Benthic Cyanobacterium *Microseira (Lyngbya) wollei* - Chris Jones, GMU, and Sam Mohny, GMU

The increased water clarity in the tidal freshwater Potomac, especially in beds of submersed aquatic vegetation (SAV), has allowed an unexpected primary producer community, benthic algae, to develop to high abundances in parts of the river. In particular, the cyanobacterium *Microseira wollei* has annually formed large, coarse mats coating the bottom of SAV beds in certain parts of the river including the tidal Occoquan River in recent years. We report on two years of study including seasonal patterns of biomass dynamics and primary production of *M. wollei* in the tidal Occoquan as well as initial data on toxin and odor production as well as community analysis of the rich epiphyte community hosted by this cyanobacterium.

Assessing the sources of pesticides in the Potomac River Watershed through wastewater reuse modeling - Samuel Miller, Daniel Burns, and Kaycee Faunce, USGS

Abstract: Wastewater treatment plant (WWTP) discharges, although treated and in compliance of existing regulations, can be a continuous source of organic contaminants, including pesticides, to rivers. Because the contributions of individual WWTP discharges are accumulative in surface waters, the amount of wastewater in a given stream segment reflects all upstream discharges. Pesticides can be introduced to WWTPs through down-the-drain sources from households and businesses, including washing and disposal of food, urine/feces, source tap water, and pet treatments. Pesticides are not widely regulated or monitored in surface waters despite their proven acute and chronic ecotoxicological effects in multiple aquatic taxa. An integrated model was developed for the Potomac River watershed to determine the amount of accumulated wastewater (ACCWW) and calculate predicted environmental concentrations (PECs) for 14 contemporary pesticides in each non-tidal National Hydrography Dataset Plus Version 2.1 stream segment. The PECs were compared to measured environmental concentrations (MECs) from 32 stream sites spanning a range of ACCWW and land uses to assess possible landscape sources of pesticides in Potomac River stream waters beyond WWTPs. MECs were characterized by use classes (fungicides, herbicides, and insecticides) and compared to toxicity thresholds to evaluate potential ecotoxicological risk. Agreement between MECs and PECs was strongest for insecticides, followed by fungicides and herbicides. Insecticide PECs made up a greater proportion of MECs, followed by fungicides and herbicides; however, these percentages were generally low, indicating other dominant landscape sources beyond WWTP discharges. Estimated pesticide use in agricultural areas was correlated to herbicides, but not insecticides or fungicides, suggesting dominant sources beyond agriculture for these classes. Cumulative toxicity was generally higher for sites with greater ACCWW and/or located in developed areas. Imidacloprid and fipronil accounted for the majority of toxicity across most of the sites and frequently exceeded chronic aquatic life toxicity benchmarks for freshwater invertebrates. Our model can be used as a screening-level assessment to identify stream segments within the Potomac River watershed that are susceptible to cumulative WWTP discharges and associated risks to aquatic life from contaminants of emerging concern, including contemporary pesticides.

Poster session information continues on the following page.

Agenda (Cont.)

A Tale of Two Embayments: Interaction of Nutrients, Water Clarity, Phytoplankton, and Submersed Aquatic Vegetation Drives Ecosystem Structure - Chris Jones, GMU

Shallow freshwater ecosystems have been shown to cluster in two foci: phytoplankton-dominated "turbid water" state or a SAV-dominated "clear water" state. Once established a system does not readily change from one state to the other, but significant changes in nutrient loading or in suspended sediment concentrations may lead to a state shift. Data collected on two embayments in the tidal Potomac River over the last 40+ years indicate that each has shifted state: one from turbid water to clear water and visa versa. We look at the factors responsible for the shifts and the impact on other ecosystem components and discuss management implications.

Chemical prioritization of contaminants in the Potomac River - Scott Glaberman, GMU

New approach methodologies are emerging to assess ecological and human health risks of contaminants in environmental matrices. We will present a series of projects we have been conducted looking at pharmaceuticals and personal care products, per and polyfluoroalkyl substances, and pesticides in the Potomac River and other tributaries of the Chesapeake Bay. We especially focus on influences of water treatment, combined sewer overflows, and agriculture on water quality.

Field surveys and comparative parasitology of freshwater native and invasive snails in the Potomac River and its watershed - Amy Fowler, GMU

Exotic freshwater gastropods, and their parasites, have invaded ecosystems through deliberate introductions and/or accidental transfer. We investigated whether Japanese mystery snails, *Heterogen japonica*, experience parasite release in introduced populations. Six locations from Richmond, Virginia to Washington, D.C. were surveyed in 2018 and 2019. A random subset of each snail species encountered was measured, dissected, sexed, and examined for trematode parasites. Brooding embryos were also counted. Populations of *H. japonica* have experienced a genetic bottleneck in the introduced range and were female skewed; brooding females were the largest in size. Trematode diversity was higher in indigenous snails but depended on site, snail sex, and snail species. *Heterogen japonica* had up to 34% prevalence of aspidogastrean trematodes at two sites where they co-occurred with indigenous snails (*Elimia virginica*). Females infected with aspidogastreans had significantly fewer broods. Genetic data found two cryptic lineages of aspidogastreans; one was shared between *H. japonica* and *E. virginica*, suggesting host-switching has occurred. Parasites can play powerful roles in interspecific relationships, influence species interactions, and even impact ecosystem functioning. The ability of parasites to host switch could further influence community interactions in this system, particularly if *H. japonica* continues to spread.

Poster session information continues on the following page.

Agenda (Cont.)

Phenology of Two-horned Water Chestnut (*Trapa bispinosa* Roxb. var *iinumai* Nakano) in Northern Va. Ponds - Sujata Poudel, GMU, Chris Jones, GMU, and Nancy Rybicki, USGS/GMU

Eurasian water chestnut have plagued the northeastern US, including the tidal Potomac for over 100 years. In 2014, a new variety of water chestnut was identified as two-horned water chestnut (*Trapa bispinosa* Roxb. var *iinumai* Nakano) in the Potomac River and in subsequent years it has spread to nearby waterbodies. *Trapa* depletes the dissolved oxygen of water, affects the water quality and displaces the native vegetation. To understand its phenology, structured observational studies were conducted at two ponds in northern Virginia in 2019 and 2020. *Trapa* initiated growth in late April, increasing rapidly to a maximum of 100% cover in June. Rosette diameters increased gradually from late April to a maximum in August and September. Flower counts were zero from April through June, then increased rapidly to maximum in late August. Fruit counts were zero from April through June; fruit started to appear in July, and counts increased to a maximum in early September. Since the species is annual and dependent on sexual reproduction, control efforts for *T. bispinosa* should be initiated before fruits are produced. Based upon our data, in the mid-Atlantic region, May would be an ideal time to begin the treatment process for its control.

Potomac Riverkeeper Network's Community Science Water Quality Monitoring Program and Public Health - Morgan Bench and Lisa Wu, Potomac Riverkeeper Network

Potomac Riverkeeper Networks Community Science Water Quality Monitoring Program was formed to fill a gap in water quality reporting to the public in high-use recreation areas along the Potomac River. Now in its 5th year, the program has expanded to more than 30 sites throughout both the upper and lower Potomac River, and the data has been viewed more than 131,700 times on Swim Guide*. With outdoor recreation becoming increasingly popular, and the predicted negative impacts of climate change on water quality from increased frequency and severity of storms to rising temperatures, corrosion of infrastructure, and changes in migration along the watershed, it is increasingly important for organizations to share with the public when and where it is safe for primary contact recreation. Learn our latest findings and trends as we monitor the river and build a force of river stewards.

*Web traffic results from PRKN sample sites on Swim Guide as of June 28th, 2023

Shifts in the community structure of tidal freshwater fishes associated with alternate stable states - T. Reid Nelson, GMU

Tidal freshwater ecosystems are the most landward reaches of estuaries, providing valuable habitat for fishes, while experiencing multiple environmental stressors. Here, we assessed changes in the community structure of tidal freshwater fishes downstream of Washington DC throughout the last decade at Hunting Creek. Concurrent with a shift in primary producers from a state dominated by submerged aquatic vegetation (SAV, years 1 – 5) to a phytoplankton dominated state (years 6 – 10), the fish community changed from Banded Killifish dominance to one dominated by White Perch. We also found increased abundance of *Alosa* sp., Gizzard Shad, and Blue Catfish in recent years. Our results mirror the response in Gunston Cove, where decreased nutrient loads resulted in SAV establishment concurrent with increased Banded Killifish and decreased White Perch abundance. These results support alternate stable states, a phytoplankton-dominated turbid water state or a SAV-dominated clear water state with clear differences in fish community structure.

Agenda (Cont.)

Short-term risk assessment for a newly introduced water chestnut, *Trapa bispinosa* Roxb., entering the Potomac River, U.S. - Nancy Rybicki, USGS/GMU

A new species of water chestnut (*Trapa L.*) was discovered in the Potomac River basin in 2014 by USGS and Virginia Department of Wildlife Resources officials. This species was later determined to be two-horned water chestnut (*Trapa bispinosa* Roxb.). By 2021, a total of 75 colonies were verified in lakes and ponds in four counties of northeast Virginia, as well as in Pohick Bay on the tidal Potomac River and on the non-tidal reservoir of the Occoquan River. The *T. bispinosa* distribution map is available on the Nonindigenous Aquatic Species database (nas.er.usgs.gov). An early 20th Century introduction of Eurasian water chestnut (*Trapa natans L.*) in the Potomac River had detrimental impacts to native submerged vegetation and to commercial and recreational boat traffic along the river, and it took several decades and millions of dollars to eradicate the species from the basin. If it becomes established in the Potomac River, this introduction of *T. bispinosa* could be as detrimental as the previous introduction of *T. natans*. Thus, we assessed the short-term risk of *T. bispinosa* entering the Potomac River. We identified three potential vectors for dispersal of *T. bispinosa*: primarily epizoochory on waterfowl plumage, followed by hydrochory into downstream waterways and potentially hitchhiking on recreational boats and boat trailers. We determined the oldest and most centrally located of all the current populations was at Fairfax County Park Authority's Twin Lakes Golf Course. This location in the Lower Bull Run drainage, colonized since 2000, is considered the epicenter and likely source for waterfowl-dispersed introductions to nearby waterbodies. All other known introductions since 2000 were within 30 km from this source and this distance was thus assumed to be the maximum waterfowl dispersal risk radius. We analyzed the distribution of *T. bispinosa* with respect to geospatial parameters within the 30 km dispersal radius including waterbodies and streams from the USGS National Hydrography Dataset, active dams from the USGS National Anthropogenic Barrier Dataset, and public boat launches from Virginia state agencies. We also recognized the colonies that are likely to spread because they are in stream networks without impediments to downstream dispersal of floating plants and more likely to reach the Potomac River. The shortest unimpeded downstream distance from a colony to the Potomac River was 3.6 km in the Nichols Run drainage, with the next shortest distance of 12.3 km in the Cameron Run and Accotink Creek drainages. We located 1,063 waterbodies within 15 km and 3,745 waterbodies within 30 km of the epicenter. These at-risk waterbodies (mostly private ponds) were in one county in Maryland, in seven counties in Virginia, and in the District of Columbia. Twenty public boat launches were within 30 km of the epicenter, of which 18 were on the Occoquan and Potomac Rivers. Our results identify the number and locations of at-risk waterbodies and boat launches that state and local managers can prioritize outreach, management, signage, and monitoring efforts for early detection and rapid response of *T. bispinosa* in the U.S.

Why Viewsheds matter to planning for land use change - Lynn Crump and Jennifer Wampler, Scenic Virginia

Viewsheds create a sense of place and help with emotional and physical health. As the pressures for development, especially along rivers, increase and available land decreases where and how development happens can become a contentious discussion. Often the treasured viewsheds of a place are overlooked until the development is well along the track to final design and layout. Identifying those scenic assets early and mapping them helps to provide an understanding of what is valued to localities and reduces the possibility of conflict thus insuring an outcome that highlights and acknowledges treasured views while allowing for development. The NPS and Virginia DCR worked together to map the significant views along the Potomac Heritage national Scenic Trail so future planning will address those views respectfully. Possible outcomes also include creating development policies that consider treasured views and add them early into the planning process.