



2019 Chesapeake Watershed Forum Poster Abstracts

Welcome to the Ninth Annual Chesapeake Watershed Forum's Poster Session! We invite you to peruse the posters throughout the event, and to attend the poster session Saturday evening to mingle with poster presenters. At Saturday's poster session, you are invited to vote for the People's Choice Poster Award, and through your vote, enter to win a raffle prize. Posters will be judged both by you (the People's Choice Award) and by a panel of professional evaluators (Best Poster Award.) Poster prize winners will receive free registration to the 2020 Chesapeake Watershed Forum.

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NEW PROFESSIONALS CATEGORY

Poster #	Presenters	Affiliation	Title and Abstract
Restoration – Forestry, Oysters, Wetlands, and More			
1	Agboola, Victoria	Morgan State University PEARL	Setting Oyster Larvae on Existing Riprap in St. Leonard Creek, Maryland Chesapeake Bay oysters, though 99% depleted from their historic abundance, are important ecologically and economically. Consequently, oyster restoration efforts are a regional priority. Successful setting of oysters on rip rap could make use of hundreds of miles of hardened shorelines around the Bay, and greatly enhance restoration efforts. A field experiment was designed to test if oyster larvae can be successfully set in situ on existing riprap. If successful, these methods could be a new approach for larger-scale oyster restoration. Four experimental sites were constructed on existing rip rap. At each site, a rock (granite) was placed inside an impermeable curtain (minimized larvae escapement), and paired with a nearby (7m apart) control rock. Approximately 360,000 oyster larvae were released into each enclosure. 28 days after larvae release, settled oysters were counted inside premarked quadrats on both treatment and control rocks. Three out of four treatment rocks had young oysters, while control rocks had none. A single-tailed paired t-test was non-significant at the chosen level of 95% significance ($p(x \leq t) = 0.947$). Nevertheless, our work demonstrates that this new approach has potential for successful enrichment of rip rap shoreline throughout the Chesapeake Bay.
2	Franzluebbers, Leah	U.S. Fish and Wildlife Service	Green Your Riprap: A Simple, Low-Cost Technique to Retrofit Riprap Shorelines Over 18% of the Chesapeake Bay has been hardened, in many cases through riprap revetments. When a tidal shoreline is hardened, fringe marsh ecological benefits disappear. Replacement of fringe marsh areas with riprap has serious consequences for the ecology of shorelines. Green riprap is a small-scale, low-cost restoration technique for improving existing riprap shorelines, and involves planting riprap with tidal marsh plants. If a landowner wants a simple and low-cost way to improve the ecological and aesthetic value of their existing riprap shoreline, Green Riprap is a viable option.
3	Grauze, Karlis	Patapsco Heritage Greenway	Flooding and Erosion along the Historic Patapsco River The Patapsco River has been a reliable resource for many communities and cultures over the years. More recently, overdevelopment and storm water management issues among other things have paved the way for a series of detrimental flood events to occur in the Patapsco Valley, threatening what many have come to know and identify as a historic and intrinsically valuable area. In addition to damaging homes, businesses, and communities, floods and fast-moving waters leave a lasting impact on watersheds by significantly accelerating the process of erosion. While erosion occurs naturally and cannot be eliminated, human disturbances to a watershed can increase the frequency and magnitude of dangerous floods and runoff events. There are, however, ways to mitigate the erosion process in rivers and streams – one such way is through the creation of a riparian buffer zone. Using a variety of native plants and trees with different root depths in a riparian buffer intercepts pollution, slows surface storm water flow, and improves the overall stability of the streambank. I intend to design and implement a buffer zone with the help of volunteers in an interactive learning experience for participants and visitors alike.
4	Long, Nick	The National Aquarium in Baltimore	Thinking Outside the Box: Restoring Baltimore's Harbor This case study focuses on the unique restoration efforts in Baltimore's Inner Harbor. As the tidal portion of the Patapsco River, the Inner Harbor is intimately connected to the Chesapeake Bay. It faces challenges that include legacy industrial pollution, development, stormwater, sewer overflows, and trash. These lead to environmental quality, public health, and economic concerns such as habitat loss, low dissolved oxygen, harmful bacteria, and algal blooms. The Inner Harbor has seen improvements in the past few decades, but they are not without setbacks. The Institute of Marine and Environmental Technology, National Aquarium, Waterfront Partnership, Blue Water Baltimore, Maryland Department of Natural Resources, citizens of Baltimore, and others are working together to make the Inner Harbor more supportive of wildlife and humans. These restoration practices are constrained by the urban environment and must focus on creating and supporting habitats in areas with little capacity to do so. They have already been

			demonstrated to be successful, and it is pertinent that the environmental field documents progress in urban conservation and restoration. The global population is increasingly shifting towards urban centers and promoting sustainability in these highly developed landscapes requires novel techniques such as those in Baltimore.
5	Meoli, Christian	Audubon Naturalist Society of the Central Atlantic States	<p>Meadow-morphosis: Restoring Native Meadow Plant Communities at Woodend Nature Sanctuary</p> <p>Healthy meadows composed of native herbaceous wildflowers and grasses provide habitat for diverse species of insects and animals dependent upon these areas. Deciduous forests are the dominant vegetation type in the Eastern United States. Historically, meadows developed within forests after disturbances like fire created small canopy gaps. These woodland meadows supported important species of bees, butterflies, birds, and other wildlife. Shrubs and pioneer tree species ultimately would transition such meadows back to forest. In modern landscapes, the availability of meadow habitat is depleted due to urban development and the natural succession of meadows to forests in remaining natural areas. At Woodend four acres are dedicated to the preservation and establishment of meadows. Having evolved from agricultural pastures, the resulting meadows have been dominated by non-native species. In 2013, Audubon Naturalist Society intensely restored a quarter acre of meadow with native grasses and forbs. After restoration, bloom surveys were conducted in restored and unrestored areas to assess the results of restoration efforts. This data shows that since the restoration, there has been an increase in native species richness in the restored area. We are using what we have learned from this restoration to develop a multi-year restoration plan for all meadows.</p>
6	Pyfrom, Samara	Patuxent River Park	<p>Planting Baldcypress' at Patuxent River Park Campsites</p> <p>Patuxent River Park protects over 7,500 acres of land and wildlife along the Patuxent River. To continue to conserve land, the park capitalizes on engaging the community through various programs. Over the last 50-70 years, sedimentation in the Patuxent River has increased dramatically, due to erosion and run-off caused by agriculture and urbanization of surrounding land. In this restoration project, Bald cypress trees will be planted along Patuxent River Park shorelines and campsites to mitigate erosion. Additionally, this project will engage and educate local community members and guests of the park; campsites allow individuals to immerse themselves in nature and is a tool for the park to educate guests. At each campsite, signage will be used to teach visitors about the site around them, including any ongoing conservation projects at the park. One of the sites includes Iron Pot Landing, a campsite just downstream from a major wastewater treatment plant; Iron Pot Landing will be renovated and will include a sign with information about the wastewater treatment process, and ways we can help this process be more environmentally friendly. This project will restore shorelines and native plants as well as educate guests; and visitors of our campsites.</p>
7	Simpson, Bradley	Audubon Naturalist Society of the Central Atlantic States	<p>Restoring a Capital Beltway Treasure</p> <p>Woodend Sanctuary, the headquarters of the Audubon Naturalist Society (ANS), is home to a 30-acre secondary successional forest in the urban area inside the capital beltway. Impacts of urbanization such as browsing of overabundant deer, invasive pests like emerald ash borer, and intensifying stormwater runoff threaten the future of this forest, prompting ANS to plan restoration interventions. The organization has already excluded deer to address their devastating impact on understory vegetation and tree recruitment. Large-scale removal of invasive plants is also underway. Reference ecosystems and restoration goals were established in a master plan for the property. This past year, I led a comprehensive forest survey to establish baseline forest conditions to allow restoration progress to be evaluated. The survey demonstrated that two species, tulip tree (<i>Liriodendron tulipifera</i>) and Japanese maple (<i>Acer palmatum</i>), dominate the Woodend forest. The oaks and hickories, which are the prevalent species of the target reference ecosystems, are among the least common species currently. The Woodend forest survey will inform adaptive management strategies into the future, allowing ANS to track progress in improving biodiversity and ecosystem function.</p>
8	Sinclair, Megan	Frederick County Office of Sustainability	<p>Restoration: Frederick County Brook Trout Stream Restoration Projects</p> <p>In Frederick County, Maryland there are various freshwater streams that once held an abundance of Brook Trout (<i>Salvelinus fontinalis</i>). Recently, brook trout population found in these local waterways have dropped due to the physical and environmental changes</p>

		and Environmental Resources	made to their habitat. The Frederick County Office of Sustainability and Environmental Resources (OSER) has partnered with other organizations with the aim to protect and restore brook trout populations and their habitat, by working to alleviate the stressors brook trout are facing in our streams. Best Management Practices (BMPs) have been integrated into these stream restoration projects throughout the Frederick County waterways, with the intention to strengthen and expand the brook trout population throughout the Frederick County watersheds. The main focus of this poster is to outline the main goals OSER wishes to accomplish with brook trout restoration projects. Specifically, regarding past brook trout restoration projects in the Bennet Creek Watershed and upcoming brook trout restoration projects in the little Tuscarora Watershed. While also providing information about how future brook trout stream restoration projects will be beneficial to aid the protection and recovery of brook trout populations throughout Frederick County watersheds.
9	Sparacino, Nicholas	Environmental Concern	Creating a Living Shoreline at Environmental Concern: Process and Benefits Environmental Concern (EC) is a non-profit organization dedicated to the restoration and protection of Maryland's natural wetland habitats. Since being founded in 1972, EC has partaken in restoration projects that span the scale of their own backyard, to remote islands in the Chesapeake Bay. Regardless of the scope and size of the project, the propagation of native plant species, increase in floral coverage, and a return to a heightened amount of biodiversity remain some of the goals a living shoreline hopes to achieve. However, the restoration process has evolved over the 40+ years that EC has been established, incorporating new ideas and processes into the tried and true methods that continue to be used. The aesthetic change of restoration only scratches the surface of its benefits; the majority of which cannot be perceived by the naked eye. Benefits like; erosion control, nutrient filtering and recycling, photosynthesis, and an increase in soil quality, can all be found in a site after a restoration job has been completed. Then, the beauty and function of those wetlands can be enjoyed for generations to come.
10	Stahl, Katherine	U.S. Fish and Wildlife Service	Enhancement and Management of a Wetland Restoration Site Wetlands are a valuable part of our ecosystem providing carbon sequestration, flood resilience, improved water quality, and habitat for both aquatic and wildlife species. Throughout the 20th century, non-tidal wetlands dwindled due to agriculture and development. Currently tidal wetlands are diminishing as sea levels rise. A key conservation goal of the Chesapeake Bay Program is to restore 180,000 acres of wetlands across the watershed. Another key conservation goal is reducing invasive species. In recent years, wetlands have been plagued by invasive species which displace native plants, and do not offer the same beneficial habitat and resilience benefits. This project will focus on enhancement and management of a recently restored private wetland easement site in Caroline County. Management will include removing invasive species, specifically water primrose. Enhancement will include replanting native species, specifically duck and pollinator friendly vegetation. Replanting efforts will occur as part of an outreach event engaging local community members in restoration efforts as well as providing education on wetlands and invasive species.

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Outreach, Community Engagement, Stewardship and Volunteerism			
11	Bland, Amanda	Alliance for the Chesapeake Bay	<p>Community Resilience through Living Shorelines</p> <p>Living shorelines work to maintain natural shorelines and reduce erosion while simultaneously increasing habitat and creating resilient shorelines and communities. As a form of green infrastructure, they incorporate vegetation, native materials, and other natural elements to combat erosion while absorbing wave energy. Living shorelines can be used in combination with more hard or “grey” structures such as sills or rocks to stabilize the shorelines in areas with strong wave energy or surrounding infrastructure. In this way the materials, and design of each living shoreline will be unique and dependent upon existing habitat, wave energy, location, and community or landowner needs. Through utilizing vegetation shorelines can better withstand erosion, storm surges, and sea level rise. This is due to the “living” component. Through using native plants and creating habitat these green infrastructures become stronger, adaptable, and more resilient over time. This in turn creates communities that operate in the same fashion. Landowners can remain in their homes and implement infrastructure that works with the environment in their favor, rather than against it.</p>
12	Boddicker, Patrick	Howard County Office of Community Sustainability	<p>How Agrivoltaics Can Meet Our Energy Needs</p> <p>Solar photovoltaic systems (PV) are one of the most rapidly expanding methods of renewable energy production. However, continued growth of the solar PV market is limited by the amount of available suitable land. Ground mounted solar panels can be large and cost-effective, but identifying large swaths of undeveloped lands, unencumbered by other beneficial land uses like wildlife habitat, is difficult. Solar developers are increasingly looking toward agricultural lands but replacing agriculture with solar can be unpopular. The solution is agrivoltaics: solar energy generation on agricultural land above conventional agriculture. All over the world large areas are dedicated to agriculture and many of these areas are ideal for solar energy generation. Howard County is seeking opportunities to work collaboratively with solar providers, farmers, and farm advocacy groups to demonstrate agrivoltaics. Studies have shown that installing solar PV on just 1% of agricultural land worldwide would meet global energy needs. Agrivoltaics allows simultaneous food production and energy generation to meet both our food and energy needs, while reducing greenhouse gas emissions and adapting crop production to a warming climate.</p>
13	Tyrah Cobb-Davis	Frederick County Office of Sustainability and Environmental Resources	<p>Expansion of Renewable Energy Resources through Solar Co-Ops in Frederick County, MD</p> <p>Solar energy has become more popular in recent years and is a powerful tool in allowing homeowners and small business owners to consume energy more sustainably. Solar United Neighbors is a national organization that advocates for cleaner energy in many states and partners with local groups, such as Frederick County Office of Sustainability and Environmental Resources (OSER) in Maryland, to implement solar initiatives. OSER is supporting a 2019 partnership with Solar United Neighbors of Maryland primarily through promotion and outreach. Supporting the creation of solar co-ops makes renewable energy resources more accessible through collective purchasing power and reduced installation costs. Prior success can be seen in the 2017 solar co-op, where 85 people were reached in information sessions and a total of 32 solar systems were installed. Environmental benefits of going solar include reducing the demand for water at power generation plants and minimizing greenhouse gas emissions. Individual benefits include joining a community of citizens interested in solar, increasing home or business values, and saving money. The solar co-op program aims to provide opportunities for others to go solar, which will expand renewable energy practices throughout Frederick County.</p>
14	Derlan, Benjamin	The 6 th Branch	<p>Oliver Community Farm: A Model for Neighborhood-Scale Food Production and Observed Impacts</p> <p>Urban farming is greatly beneficial to both the environment and public health; city farms reduce greenhouse gas emissions from lessened food delivery miles, support pollinators and native birds, and increase access to fresh produce. Urban farms typically reduce the geographic footprint of their consumers drastically compared to industrial agriculture, to that of the same city rather than thousands of miles. But what about an even more direct</p>

			connection to consumers-- down to a scale of a few blocks? This poster will examine one such farm, what we will call a 'neighborhood-scale' farm, in the East Baltimore community of Oliver. Located in an area known as a 'food desert,' a place without access to adequate, healthy food, the farm aims to improve the access and autonomy of neighbors in relation to fresh produce. We will present: 1) the process of creating and maintaining a neighborhood farm 2) documentation of the farm's mission and values through interviews with partners, and 3) an examination of observed impacts after six growing seasons.
15	Fishburn, Callie	C&O Canal Trust	<p>Developing a Diversity, Equity and Inclusion Advisory Group at the C&O Canal Trust</p> <p>The C&O Canal National Historical Park (NHP) is a treasured recreational and historical icon, and one of the most visited parks in the National Park System, welcoming 5 million visitors annually. Despite this high visitation, the demographics of these 5 million visitors, as well as the workforce and partner organizations that support the Park, are not representative of the changing demographics of the region. For the C&O Canal NHP to remain relevant and beloved by future generations, the Park needs to ensure people from backgrounds traditionally underrepresented at the C&O Canal NHP are provided with equitable, inclusive, and relevant pathways to become Park visitors, volunteers, and staff. The C&O Canal Trust will work towards this goal by establishing a DEI advisory group, comprised of NPS and C&O Canal Trust staff, board members, and community partners to create a plan for a more inclusive and equitable C&O Canal. After the plan is complete, the advisory group will continue to monitor the C&O Canal Trust's progress towards its' established DEI goals and ensure that the plan is a living document that reflects the needs and values of stakeholders.</p>
16	Gallardo, Justin	North Baltimore Presbyterians	<p>Reducing Stormwater at Maryland Presbyterian Church</p> <p>Maryland Presbyterian Church (MPC) has gone through many changes over the past 2 years from electing a new pastor to the reorganization of the environmental focused organization, Stewardship Action Group for the Environment (SAGE). Issues associated with stormwater runoff are a huge concern in the greater community from falling trees, invasive species, and deteriorating stream water quality. Fortunately, by partnering with the Gunpowder Valley Conservancy (GVC) - the local land trust - MPC was able to receive grant funding. In order to receive those funds, the church hosted a rain barrel workshop, where members of the community learned to construct one and were able to take them home once completed. The church hosted a rain garden installation day where members of the community could install a native plant. Finally, GVC installed rain barrels at the church. There was great assistance through Towson University's the Big Event where students removed many invasive species from the church's woods. SAGE will continue its environmental mission by hosting workdays to remove invasive species, installing native plants in the woods, installing a deer fence to prevent understory depletion, renovating the stormwater spout system, and maintaining both the rain barrels and rain garden.</p>
17	Garrison, Maya	Howard County Conservancy	<p>Plastic: Un-Wasted</p> <p>The Howard County Conservancy in Maryland aims to decrease plastic pollution and marine debris through its campaign entitled "Take a pass on Plastics." The free program is offered to K-5th grade educators in Howard County, Maryland. Using the 4 R's of recycling and interactive lessons, participants learn how to reduce the use of and the impact of single use plastics on our ecosystems. To expand the breadth of the campaign, the program offered is not school exclusive. The conservancy locally extends the program to different community groups such as naturalist organizations and recreational or community centers. High schoolers are uniquely challenged to lead the next generation by example. Students are encouraged to join their school's Plastics Task Force which is sponsored by the Conservancy. On the task force, students who serve as ambassadors to their school complete weekly service projects with our staff and this program includes the opportunity to meet with county legislators on environmental issues. Both initiatives inspire students to be environmental leaders, conscious stewards, and an inspiration to their peers.</p>

18	LaLumia, Ethan	ShoreRivers	<p>Floating Wetlands and their Potential as Storm Water Runoff Solutions</p> <p>The use of floating wetlands is a relatively new method for managing urban storm water runoff that is being utilized around the world. This poster will delve into how floating wetlands are constructed, how they function, and what benefits they have on the aquatic environments they are placed in. In addition, this poster will suggest my own ideas about how these floating wetlands can be used to manage the runoff pollution in the Bay's tributaries on the Eastern Shore. These ideas mainly center around the concept that floating wetlands, being relatively easy to construct, offer a unique opportunity for property owners to become watershed stewards from the comfort of their own home. By placing small, modular floating wetlands along docks or just offshore, the homeowner can create a miniature ecosystem both above the water's surface and below it. By doing this, the property owner not only improves the aesthetics of their waterfront view, but they also contribute to the restoration of their waterways as well as the mitigation of storm water runoff.</p>
19	Lawal, Hadijah (Dede)	Anne Arundel County Department of Recreation and Parks: Jug Bay Wetlands Sanctuary	<p>Monitoring and Documenting Trash at Jug Bay Wetlands Sanctuary through Citizen Science</p> <p>Trash and dumping at Jug Bay Wetlands Sanctuary, an Anne Arundel County regional park, has been a significant environmental problem for many years. Sanctuary staff believes that more public education, awareness, and action is necessary, but to support such efforts we need to clearly understand and document the magnitude of the problem. Trash issues are not by any means unique to Jug Bay; in fact, we would like to adapt and use an existing citizen science program developed by the Ocean Conservancy. The main goal of this project is to create a similar volunteer-driven program at Jug Bay to help monitor, quantify, and better understand the trash issue. The project will be designed to address questions such as: Where are the Sanctuary's hot spots for trash? Is there a difference between the kinds of trash collected along the shoreline versus inland? and more. Participating volunteers will be trained to collect and report the data, which they will input into an international database. At the local level the data will promote the development of a more aggressive management and educational approach to address the trash issue at Jug Bay.</p>
20	Maull, Deaven	Environmental Concern	<p>Increasing Monarch Habitat: A how-to guide to harvest and store Milkweed seeds and decrease predation by Milkweed bugs and Aphids</p> <p>The Mid-Atlantic Monarch Initiative (MAMI) is a partnership formed by Environmental Concern (EC) that fosters collaboration and activates conservation initiatives through shared physical and educational resources to increase Monarch habitat. One of the programs through MAMI is the Seed Stewards for Monarchs program. The goal of the program is to increase milkweed seed inventory to grow more milkweed plants. Seed Steward volunteers receive three free plugs of either Swamp or Butterfly milkweed, depending on their soil conditions. When the milkweed pods have matured, the Seed Stewards collect and send the seeds back to EC, so that EC can produce more milkweed plugs to continue the program. This program fosters relationships with the community and among the Seed Stewards themselves. It also increases Monarch butterfly habitat. There is a need for a central manual that the Seed Stewards can refer to for things such as how plant the milkweed, how to harvest and store the seeds, and how to protect the plants from predation by Milkweed bugs and Aphids. This poster outlines a potential manual that can be used by the Seed Stewards program to further the efforts made by the Seed Stewards and EC to increase Monarch habitat.</p>
21	Pottian, Sajoy	Allegany County Government	<p>Cooking Oil Recycling in Allegany County</p> <p>The improper disposal of cooking oil is a major concern for Allegany County's Recycling Office. When cooking oil is improperly disposed, down the drain it can cause buildup and expensive repairs to not only residents but to the County's municipal sewer system; and dumping oil on the ground can suffocate plants and animals if ingested or deplete oxygen levels in our waterways. This oil eventually finds its way to local streams, then the Potomac River, and eventually flows into the Chesapeake Bay. My capstone project is to implement a residential cooking oil recycling program in Allegany County to prevent dumping and generate revenue. Currently, there are public no cooking oil recycling sites in the County. Final implementation will provide public education, signage and a convenient drop-off location, or two. An initial survey of over 150 residents has provides</p>

			data points which I plan to use to generate a GIS model to optimize the location(s) for public cooking oil recycling.
22	Sebold, Cheyenne	C&O Canal Trust	<p>Environmental Stewardship and Practices at the C&O Canal</p> <p>Environmental stewardship is a key part of protecting lands and waterways, while getting the community involved in understanding common threats to the environment. Acting as a 184.5-mile-long buffer between the land and Potomac River, the health of the C&O Canal is important to preserving the Chesapeake Bay. By creating an environmental workshop series that taught various methods of stewardship, community members and youth were able to learn about threats to the C&O Canal, their impacts to the Chesapeake Bay, and how simple stewardship tasks could immensely assist in the fight to preserve these resources. Arming the next generation of stewards and local community members with knowledge and materials to act on topics such as invasive species, vermicomposting, pollinators, and stormwater runoff at the C&O Canal was a useful introduction into the topic and established a program that can create more stewards for years to come.</p>
23	Spitzer, Suzi	University of Maryland Center for Environmental Science	<p>Collaborative Development of a Volunteer Monitoring Program for Chesapeake Bay Submerged Aquatic Vegetation</p> <p>Research on submerged aquatic vegetation (SAV) directly informs policy and management decisions in the Chesapeake Bay; however, limitations to professional scientists' data collection capabilities have left knowledge gaps that hinder scientific research and management efforts. Experts have called upon volunteers to help collect the local-scale data that is necessary for understanding SAV growth and species distribution within one of the world's largest estuaries. Building off a single-season pilot study, we worked with various stakeholders, including SAV experts, volunteer monitoring coordinators, and citizen scientists, to design a monitoring protocol that generates useful, scientifically-rigorous data for professional scientists, while also providing an engaging and educational experience for volunteers with varying interests and abilities. The new program will provide an avenue for citizen scientists to engage with their environment and with a broader community of SAV volunteer monitors, and will also support collaborative efforts to monitor SAV and contribute towards improving overall Bay health. This poster will describe the collaborative process of developing a multi-tiered monitoring protocol and training and certification program for citizen scientists monitoring SAV in the Chesapeake Bay, highlight several of the resources that were developed for this program, and share key insights learned throughout the process.</p>
24	Troy, Caroline	Morgan State University PEARL	<p>Citizen Science is Filling the Forage Data Gap for the Chesapeake Bay</p> <p>Small fish and invertebrates essential as food for Chesapeake Bay predators are collectively known as "forage." However, limited data exists on which forage types are expected in different shallow water habitats. This project extends work begun in 2017. Unbaited minnow traps were deployed in various physical habitats (submerged aquatic grasses, woody debris, sand, mud, and adjacent to riprap, marshes, piers, and bulkhead) for 1-3 days. Forage caught in each trap was identified, counted, and recorded, along with water quality. We can better determine which shoreline habitat types should receive priority protection with this information. About 300 observations from Chesapeake Bay citizen science (CS) groups and Morgan State University's PEARL (Patuxent Environmental & Aquatic Research Laboratory) have been recorded to date. This summer, we compiled all available project data, performed preliminary analyses, continued ongoing sampling at 9 southern Maryland sites, and engaged additional CS groups. Preliminary results in southern Maryland sampling sites in summer suggest the most important physical habitats for invertebrates (numbers) were phragmites marsh, and (diversity) riprap, and for vertebrate forage (numbers) were woody debris, phragmites marsh, and (diversity) riprap, and phragmites. Results are expected to vary by region, salinity, and season, and thus, are expected to be refined as our Chesapeake CS network grows.</p>

Poster #	Presenters	Affiliation	Title and Abstract
Science, Methods, Monitoring, and Evaluation			
25	Batho, Jamie	Maryland Environmental Service	<p>Algal Turf Scrubbers</p> <p>Algal Turf Scrubbers (ATS) are one of the most promising new BMP's for nutrient pollution reduction in the Chesapeake Bay, due to their small footprints, minimal operating constraints, and high nutrient removal rates. They work by flowing water down a slope covered in filamentous algae. As the water flows, the algae grow through photosynthesis while intaking nutrients like Nitrogen and Phosphorous. Outflow from these scrubbers is low in nutrients and high in dissolved oxygen, exactly what is needed for healthy watersheds. Traditionally, research on ATS has consisted of implementing a rudimentary pilot program in the hopes of designing a large-scale treatment facility. My capstone project, however, will focus on capitalizing on the already apparent benefits of the technology by developing an Automated Algal Turf Scrubber (AATS). By automating this type of BMP, specifically the harvesting process, AATS's could be deployed in remote areas such as next to farms. This would allow the BMP practice to reduce nutrient pollution more effectively by treating smaller volumes of more highly contaminated water. By focusing on treating the point sources of nutrient pollution with AATS's, we can improve water quality with minimal costs while producing a valuable byproduct, the algal biomass.</p>
26	Boone, Hannah	University of Maryland	<p>Integrating Social-Ecological Systems Framework and Behavior Change Theory to Understand and Inform Forest Buffer Outreach</p> <p>Riparian forest buffers serve as a cornerstone to Chesapeake Bay restoration by reducing nutrient and sediment pollution entering waterways. While landowner incentive programs help drive interest in buffers on private lands, implementation of forest buffers in the past decade has been below Bay-wide goals. Employing qualitative methods, we integrated a social-ecological systems framework into behavior change theory to better understand and inform riparian forest buffer outreach in the Maryland Potomac watershed. We conducted twenty semi-structured interviews with key stakeholders, followed by a focus group with outreach practitioners and participant evaluations from outreach events. Preliminary text analysis of the interviews indicates emergent themes of trust among practitioners and landowners, as well as social-ecological reciprocity between landowners and their riparian zones as key to effective outreach. Those themes are further supported by the focus group and results from outreach evaluations. While analysis is still underway, the preliminary results suggest that the integration of behavior change theory and a social ecological system framework can be an effective tool for framing outreach. Given the importance of trust in particular, this research supports a need for investment in consistent outreach to foster trusted connections.</p>
27	Dainton, Samuel	The Nature Conservancy (Cumberland)	<p>Forest Health through Prescribed Burning</p> <p>The utilization of fire as a means of promoting forest health and resilience dates back centuries. Releasing fire into the understory of forests clears debris and makes room for healthy plant growth. However, controlled burning in the United States has only been viewed as practical and worthwhile in recent years and there is still prejudice against controlled burning due to the destructive connotations associated with fire. Another reason against controlled burning is that its results can be unpredictable. This is due in part to the lack of research and resources dedicated to post-fire monitoring. A specific area that lacks research is the recovery of invasive species after a burn. It is important to learn how fire affects invasive species in order to prevent forests from being overtaken by invasive species after a burn takes place. This project seeks to evaluate previous methods used in monitoring and managing invasive species after the introduction of fire in order to gain a better understanding of how controlled burns impact the level of danger invasive species pose to their environment.</p>
28	Delbo, Rachel	American Chestnut Land Trust	<p>Assessing Hiking Trail Sustainability in the Parkers Creek Watershed</p> <p>Hiking trails are a great way for people to experience nature, but they can be prone to degradation from erosion, flooding, and heavy use. These issues are a growing concern during climate change, which will bring more severe weather events that threaten the integrity and quality of trails. By establishing trails with sustainability in mind, safe access to natural spaces that has minimal environmental impact can be ensured for years</p>

			to come. ACLT, a land trust with 22 miles of public trails in the Parkers Creek Watershed, aims to assess its current network of trails in order to identify areas of risk and develop methods to improve the trails for long term use. Avoiding areas with a high likelihood of flooding and working to minimize erosion are key objectives in achieving sustainability. Through remediation and preventative planning with consideration for climate change, ACLT can reduce the need for maintenance and the risk of degradation to trails and the surrounding habitat. These practices can then be adapted to improve the sustainability of trails in other parks and outdoor recreation areas.
29	Elliott, Jessica	Chesapeake Conservancy	<p>Open Space Preservation: An Economic and Environmental Opportunity for Flood Vulnerable Communities</p> <p>Flooding is the most frequent and widespread natural hazard facing the United States, causing extensive damage to property and livelihoods. One-way home and business owners can mitigate the costs of flooding is purchasing flood insurance from the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). The NFIP provides reasonably priced flood insurance to communities that meet the program's minimum standards for floodplain management. Communities may earn discounts on their flood insurance for additional floodplain management activities, including open space preservation, through the NFIP's Community Rating System (CRS). The purpose of this project is to identify parcels of land within Maryland NFIP communities that can be preserved as open space in order to earn discounts on NFIP flood insurance premiums as well as achieve a wide range of environmental benefits. We will accomplish this by mapping land parcels that meet the CRS's requirements for open space preservation in the floodplains of selected communities and calculating the discount the communities could earn as a result. A summary report will be created and distributed to the communities and Chesapeake Conservation Partnership partners in an effort to establish the funding and outreach resources necessary for preservation of identified parcels.</p>
30	Finch, Molly	Chesapeake Bay Foundation	<p>Using Spatial Analysis to Prioritize Ditch Retrofit Project Sites for Better Water Quality</p> <p>The goal of this work is to identify ditch sites where there would be the greatest benefit to water quality if the site was retrofitted to lower runoff pollution. Runoff pollution is linked with many different Land Use (LU) types including agriculture, turf grass, and impervious areas like buildings and parking lots. Using geospatial tools we can identify ditch sites along roads and create mini-watersheds, or drainage areas, for each ditch site that includes information on the total area and percent of total area of the LU type we are most interested in treating. To make sure the sites we choose are not just the ones that drained the most land we choose our top retrofit sites based on both if the land draining to that ditch has a high total LU area as well as if the LU area is a large percentage of the total area. We can further narrowed-down top ditch sites by choosing sites that are adjacent to property with ownership that would be easier to access for projects of this nature; examples include properties associated with the county government, schools, or congregations. These sites are shared with local partners for further site assessment.</p>
31	Gaudlip, Catherine	Hood College Center for Coastal and Watershed Studies	<p>Sampling Cyanobacteria at a D.C. Lake</p> <p>The Constitution Gardens Lake in Washington, D.C. experience summer algal and cyanobacteria blooms, which are likely the result of the combination of summer heat, stagnant water, and nearby nutrient runoff. Samples were taken monthly at 6 locations around the lake. Sampling techniques include grab samples for nutrient concentrations and photosynthetic pigments. Additionally, temperature, dissolved oxygen, and pH were taken for water quality parameters. The average pH and temperature (°C) for each sampling event was 9.58 and 28.68, respectively. The average dissolved oxygen for all sampling events was on average 9.62mg/L. Average chlorophyll fluorescence ranged from 36.09 in June to 257.49 in late September. Average phycocyanin fluorescence ranged from 15.51 in June to 56.75 in late September, with a peak fluorescence of 786.95 in late August. Average ammonia concentrations ranged from 0.046mg/L in June to 0.184mg/L in September, with a peak concentration of 0.260mg/L in late July. Average nitrate levels in June were 0.242mg/L; whereas, in September they were 0.310mg/L, which peaked in July at 0.3775mg/L. Average orthophosphate levels decreased from 0.209mg/L in June to 0.0095mg/L in September. Peroxide application would eliminate cyanobacteria as well as increase oxygen levels.</p>

32	Haley, Faith	Accokeek Foundation	<p>Invasive Species Management Model for Piscataway National Park Invasive species are one of Earth’s biggest threats to ecosystem health and biodiversity. Within the Chesapeake Bay Watershed, over 200 known invasive species threaten our ecosystems. These organisms inhabit environments not native to them and cause ecosystem and economic degradation. The establishment of these species within non-native ecosystems is generally rapid and aggressive because there are no predatory mechanisms to control their reproduction. Within Piscataway National Park, invasive plants have infiltrated vital ecosystems and have compromised the utilization of these areas. The riparian area located within the park filters nutrient runoff from pastures into the Potomac River; also, it protects the historical view shed of the Mount Vernon. Environments such as the riparian forest are a priority for management because invasive plants can deplete the succession of upper-story trees. Adequate control mechanisms that mitigate the exposure of these species are necessary for the implementation of a species management framework. This management plan blends science-based protocol and research with removal actions that will educate and engage communities. The management model for Piscataway Park is tailored and designed to prevent, identify, eradicate, and control the spread of invasive plants throughout the park.</p>
33	Ketcham, Isabelle (Izzie)	Severn River Association	<p>Waves of the Severn River Grass Through the summer, Submerged Aquatic Vegetation (SAV) has been growing at a greater rate in the Severn River than it has in decades. However, there is no definitive map showing where the grasses are expected to be found. Using drone footage, GIS mapping, and field research, this project will map the location of SAV throughout the Severn River. Focusing on Round Bay and the creeks branching off the river, an inventory of the grass locations, species identification, water conditions, and human impact level will be tracked from April to September. As the data is collected, a map will be created to give a more comprehensive image of the presence of SAV in the river. This map will become a baseline resource that can aid in determining the health of the river by tracking where the grasses are expected to be found.</p>
34	Kinnaman, Jay	Maryland Environmental Service	<p>Stormwater BMP Site Selection and Suitability Analysis Using GIS Slope, soil quality, proximity to streams, size of drainage area, and nearby impervious surfaces are just a few of the many factors that go into deciding what type of stormwater best management practice (BMP) is appropriate for a site. The most common procedure for making these decisions requires engineers to narrow down large areas into small potential sites, and then manually check each of these sites against criteria so that they can make a recommendation. This Chesapeake Conservation Corps capstone project, modeled after the Watershed Resources Registry, is the steppingstone towards automating much of that process using GIS software. The model set created looks at a group of 5 absolute factors to break down a large study area into potential BMP sites, and then 9 relative factors to rank the appropriateness of each of those potential sites for each of 15 different BMP categories. Designed to be iterative, the project has a lot of room for growth, but still provided promising results on its latest full run, finding 731 potential BMP sites within a 722-acre study area in St. Mary’s county at a raster resolution of 5m.</p>
35	Liu, Connor	The Nature Conservancy (Cumberland)	<p>Red Spruce Monitoring and Release During the 19th century, due to extensive timber harvesting, subsequent wildfires, and climate change, red spruce (<i>Picea rubens</i>) trees in the southern and central Appalachians have declined to 10% of their original range (Byers et al. 2010). Red spruce provides important and unique habitat for a variety of wildlife (USDA et al. 2002), and efficiently sequester carbon storing large quantities in their biomass and forest soil. As part of The Nature Conservancy’s (TNC) Resilient Forests Program, red spruce plantings have occurred at three TNC preserves in Western Maryland since 1996 (as shown in Figures 2 and 9) with the goal of restoring critical forest habitat and reducing the effects of climate change. Due to staff and resource constraints, no monitoring has been conducted on over 20 years’ worth of plantings. Monitoring is critical to evaluating project performance, justifying consistent funding, and steering the project in the future. In partnership with the Central Appalachian Spruce Restoration Initiative (CASRI) and the Chesapeake Bay Trust (CBT), I installed monitoring plots at Cranesville Swamp preserve to calculate red spruce survivorship for the first time in Maryland. In tandem with this project, I partnered with TNC-WV to experiment with hardwood canopy “release” on red spruce saplings to</p>

			accelerate their growth into the canopy. This restoration method is critical to the functionality of restored red spruce ecosystems in the face of global climate change.
36	McPhillips, Erin	University of Baltimore	<p>Effects of Tidal Resuspension with Oyster Biodeposits and Filtration in a Simulated Chesapeake Bay Ecosystem</p> <p>To test the effect of oysters and biodeposit resuspension on the nutrient and oxygen dynamics, we performed two 4-week experiments in three 1000 L shear turbulence resuspension mesocosm (STURM) tanks (R) and three 1000 L non-resuspension tanks (NR) in 2018 and 2019. All tanks contained defaunated muddy sediment and brackish estuarine water. In 2018, tanks received daily additions of oyster biodeposits, in 2019 they contained 35 oysters per tank. While bottom shear stress was low in the NR tanks, high instantaneous bottom shear produced sediment and biodeposit resuspension in the R tanks during the mixing-on cycles (4 hours on 2 hours off over 4 weeks) while not overmixing the water column.</p> <p>We found that seston and in-vivo fluorescence levels were higher in the R tanks compared to the NR tanks in 2019. Dissolved oxygen, in-vivo fluorescence and seston levels were lower in the NR tanks in 2019 than in 2018. The oyster growth between the two tanks was also higher in the NR tanks ($p \leq 0.05$). This might be because of lower seston levels, allowing for easier filtration. Possible higher filtration rates caused them to consume more food and grow at a faster rate. Nutrient and biogeochemical flux analyses are ongoing.</p>
37	Myers, Samantha	The Nature Conservancy (Bethesda)	<p>Examining the impacts of historical fire regimes on the regeneration of pine species at Sideling Hill Creek Preserve</p> <p>Poster Abstract: The decline of oak/pine-dominated forests across the central Appalachian region within the last century is hypothesized to be largely a result of a suppressed historical fire regime. This is evidenced by fire-adapted pine species, such as Table Mountain pine (<i>Pinus pungens</i>), which grows on barren, steep slopes and is highly dependent on fire for regeneration. However, to what extent does fire lead to successful regeneration of Table Mountain pine, and other fire-adapted pine species, versus other habitat characteristics associated with fire? I will compare pine stand composition at two sites with xeric, shale-barren southwest-facing slopes and differential abundances of pine species at Sideling Hill Creek Preserve in Allegany County, Maryland. At these sites I will construct a fire history using tree cores and cross-sections of remnant trees from three different pine species. I will then map historical and recent regeneration events and compare how Table Mountain, Virginia (<i>Pinus virginiana</i>), and pitch pine (<i>Pinus rigida</i>) regeneration has been influenced by fire or potentially other habitat disturbance-release events at the two sites. These results will help inform best management practices for the conservation of and return to diverse oak-pine stands on similar dry slopes in the central Appalachians.</p>
38	Neilson, Katherine	Morgan State University PEARL	<p>Zooplankton Population Dynamics in Saint Leonard Creek and Adjacent Patuxent River (Summer 2019)</p> <p>Zooplankton are an important component to the complex aquatic food web, acting as the connection between smaller phytoplankton and larger predators. As such, the dynamics of their populations in response to abiotic and biotic changes are important to understand. For the past 18 months there have been significantly lower salinities in the Patuxent River. Previous studies and models have shown that sea nettle (<i>Chrysaora quinquecirrha</i>) populations decrease/disappear under low salinity conditions. This could conceivably have top down impacts on other components of the zooplankton community. This study characterized the zooplankton populations by collecting samples weekly from June through August. The contents of stepped oblique net tows were used to assess gelatinous zooplankton and mesozooplankton populations. Results showed a marked decrease in the numbers of copepods and total mesozooplankton coinciding with the advent of increases in the ctenophore (<i>Mnemiopsis leidyi</i>) population. This showed the quite clear inverse relationship between copepods and ctenophores. Overall, lower salinity waters were the driving factor which caused a change in populations: less sea nettles, more ctenophores, and less copepods. This has implications for other planktivores (ie. bay anchovy <i>Anchoa mitchilli</i>) that will be faced with competition for these food resources.</p>

39	Parker, Virginia	Maryland Coastal Bays Program	<p>Assateague Living Shoreline Fish Survey The Living Shoreline at Assateague State Park is designed and engineered to prevent erosion, create additional wildlife habitat, and provide coastal resiliency. Boulders form the skeleton of the scalloped coastline, creating a series of headlands or type of “tombolo’s”. Clean sand, gravel and cobble vegetated with native marsh grasses were used to knit and stabilize the constructed areas. The project was designed by the Maryland Department of Natural Resources and constructed by Underwood and Associates, Annapolis, MD. The Maryland Coastal Bays Program conducts a fish survey to assess differences between the restored shoreline and an adjacent untouched, eroding shoreline. This poster compares species diversity between the two sites, with the hypothesis that diversity will be higher at the restored shoreline due to an increase in habitat types. Water quality monitoring took place before, during, and after construction and is presented.</p>
40	Pavlik, Robert	Audubon Naturalist Society of the Central Atlantic States	<p>Bug Detectives: An Insect Survey Protocol for Woodend Nature Sanctuary While biological surveys are essential in assessing the results of habitat restoration, designing protocols for volunteers to execute can be challenging. The goal of this project is to develop a detailed protocol for surveying insects in suburban meadow edges. The protocol will guide volunteers through a precise, straightforward method of data collection. The insect survey will be conducted along two separate meadow edges one located along a restored meadow and the other an unrestored meadow. Sweep netting will be conducted at marked points every 10m, along a 50m transect of meadow edge. In addition, surveyors will search intensively for insects at one of the sweep points during a ten-minute observation period. The collected insects will be identified to the family level, then released back into the meadow. Through the data collected in this survey, we hope to observe seasonal variety of insect species present in Woodend’s meadows, as well as compare the insect diversity and abundance of our restored and unrestored meadow edge habitats. In addition, we hope that the protocol is engaging and straightforward so that volunteer participation is consistent, allowing us to collect considerable insect data using precise methods.</p>
41	Schueler, Jenna	Chesapeake Bay Foundation	<p>Quantifying Environmental Benefits of Rotational Grazing in the Chesapeake Bay Watershed Rotational grazing involves raising livestock on pastures and actively moving animals among paddocks to promote healthy forage and soils. Planting grass instead of corn for feed can reduce farm nutrient and sediment runoff as well as greenhouse gas emissions (GHG). The Chesapeake Bay Foundation received a NRCS grant that included quantifying some of these environmental benefits on six “case study” farms. Farm scale models were used, COMET-Farm to estimate GHG emissions and the Chesapeake Bay Nutrient Trading Tool to estimate nutrient and sediment loads, to model farm outputs before and after the conversion to rotational grazing. Soil samples were collected on four farms and analyzed by the Cornell Soil Health Lab. Whole farm emissions of GHG were reduced by an average of 42% across all farms. Average reductions in nitrogen, phosphorus, and sediment were 63%, 67%, and 43%, respectively. Three out of four farms experienced statistically significant increases in aggregate stability and organic matter in their soils, indicating improvement of soil health. Results of this study will be used to promote the adoption of this practice and aid in the achievement of the Bay jurisdictions commitment to implement 1.2 million acres of rotational grazing in the watershed by 2025.</p>
42	Taillie, Dylan	University of Maryland	<p>Managing Forest Structure to Benefit Bird Species in and around the C&O Canal National Park Habitat (specifically, forest) management is a priority for the National Park Service (NPS) and their partners. However, it is sometimes difficult to understand the relative importance of conserving or making changes to different patches of forest and the relative conservation benefit of an action taken by the NPS. My project looks to explain how different management options would change the landscape and forest dynamics surrounding the C&O canal, and how changes to this landscape would effect habitat for sensitive species of birds such as the Cerulean Warbler, Wood Thrush, and Golden-Winged Warbler.</p>

43	Thomas, Christina	Susquehanna Heritage Corporation: The Zimmerman Center for Heritage	<p>The Waters of Life</p> <p>The Susquehanna River, the longest river on the east coast of the United States, flows 444 miles through New York and Pennsylvania, eventually draining into the Chesapeake Bay, where it provides half of the Bay's freshwater inflow. However, throughout the 27,500 square miles of land that the Susquehanna River drains, countless farms and manufacturing plants can be found along the shores of the river and its tributaries and many of them rely on this water to carry out their daily operations. York and Lancaster counties, which border the Lower Susquehanna, contain a total of 7,175 farms that cover 646,662 acres of land. These farms, as well as the 23,000 others that are located throughout the Susquehanna River Basin, must manage livestock waste while also utilizing pesticides, herbicides, and fertilizers to maintain crops. Unfortunately, many of these contaminants find their way into local waterways, eventually draining into the Susquehanna River and, ultimately, the Chesapeake Bay. This poster will assess the viability of instituting a water quality monitoring program along the lower Susquehanna River and discuss the ways in which this data can be used to improve the health of the river.</p>
44	Vorek, Emily	George Mason University	<p>Impacts of Road Salting Treatments on Shallow Groundwater Quality in Reston, Virginia</p> <p>The surface water quality impacts of road deicing salts have received increased attention in recent years. However, the cumulative impacts of road deicing salts on shallow groundwater quality are less well-studied. Previous research suggests that groundwater may serve as a "reservoir" for contaminants such as sodium chloride, and may impact long-term surface water quality through mechanisms such as seepage into streams.</p> <p>Sugarland Run in Reston, Virginia is a stream located within a larger region that is impacted by increasing construction of housing developments and their accompanying roadways. In addition, a primary highway that receives heavy applications of road deicing salt lies within Sugarland Run's watershed. In this 12-month study, we examine the month-to-month specific conductance and chloride concentrations of Sugarland Run's surface waters, as well as those of shallow groundwater adjacent to the stream. We expect to find that chloride concentrations and specific conductance of surface waters spike sharply during winter months in response to storm events and runoff. Further, we hypothesize that the chloride concentrations and specific conductance of shallow groundwater will follow a gradual upward trend, while perhaps not responding to winter storm events as sharply as surface water.</p>
45	Wood, Kyle	Morgan State University PEARL	<p>Interference of Baited Blue Crab (<i>Callinectes sapidus</i>) Traps on Neighboring Traps</p> <p>Blue crab (<i>Callinectes sapidus</i>) are heavily fished with "traps" (or "pots") throughout the Chesapeake Bay. To date, the influence of one trap on neighboring traps has not been determined for blue crab in the Chesapeake. This information could benefit harvesters to maximize catch and minimize costs (fuel, time fishing). A field experiment was designed to determine if the catch rate of baited traps fished independently were different from baited traps fished in pairs. If differences in catch rates are observed, a second phase of the experiment will estimate the distance that crab traps begin to fish independently. The experiment was performed in the Patuxent River, MD, where commercial trapping is prohibited, minimizing interference from commercial harvesters. A 2x2 Latin Squares survey design was applied to simultaneously control for nuisance factors, including side of the river fished, and site. A 2x2 design is over parameterized when run without replication, so sampling events always included a replicate sample at a second site. Expected differences in catch rates were observed at one experimental site but not the second, where dissolved oxygen and temperature appear to have confounded results. We are currently identifying an alternative sampling site with better water quality to repeat the experiment.</p>

46	Yancy, Briana	Maryland Department of Natural Resources (SAV)	<p>Monitoring Submerged Aquatic Vegetation in the Chesapeake Bay</p> <p>Submerged aquatic vegetation (SAV) is an important resource in the Chesapeake Bay. SAV provides food and habitat, stores carbon and takes up nutrients, anchors and oxidizes sediments, protects shorelines from erosion, and increases water clarity. Due to its ecological importance, the Chesapeake Bay Program (CBP) has set a 185,000-acre Bay-wide SAV restoration goal. To track progress towards this goal and assess ecosystem health, the CBP is working towards a three-tiered hierarchical SAV monitoring program. The first tier is the Bay-wide aerial survey that maps SAV throughout the Bay and its tributaries and has been ongoing since 1984. The second tier, the Chesapeake Bay SAV Watchers program, is the CBP's first official SAV monitoring program for volunteers. This program was designed to provide volunteers with an engaging and educational experience while also generating useful SAV data for scientists and managers. The third tier, the Chesapeake Bay Sentinel Site Monitoring Program for SAV, includes more intense data collection at a limited number of long-term SAV sentinel sites throughout the Bay. Each tier is specifically designed to help scientists and managers develop a more comprehensive understanding of SAV resilience and recovery and inform management decisions and strategies.</p>
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Poster #	Presenters	Affiliation	Title and Abstract
Environmental Education			
47	Bucci, Dionna	Fairfax County Stormwater Planning Watershed Education and Outreach	<p>My Field Journal: Getting Students Outside and Getting Your Message into the Classroom</p> <p>Fairfax County Stormwater Planning Watershed Education and Outreach (WEO) staff seeks to inspire students to become environmental stewards by connecting them to their local watershed and the Chesapeake Bay. To this end, WEO offers several free programs and specialized tools to Fairfax County Public Schools (FCPS). However, with over 180,000 students in the county, it is not possible for staff to physically teach every student. In order to overcome this challenge, Fairfax County has collaborated with FCPS curriculum writers and stewardship groups to create a Field Journal that allows WEO messages to reach thousands of students and provides schools with a much-needed tool to connect students to nature and create informed environmental citizens. The Field Journal allows students across grade levels to: learn about their watershed and the importance of stormwater management, learn about and apply science curriculum skills and concepts, and get outside to connect with, explore, and protect their natural world. The Field Journal is also not only applicable locally, but easily transferable to other jurisdictions across the country to assist with environmental awareness.</p>
48	Doerr, Jacqueline (Jackie)	Sultana Education Foundation	<p>Invasive Species Management and Education at the Lawrence Wetland Preserve</p> <p>Sultana Education Foundation recently acquired the Lawrence Wetland Preserve, an eight-acre property in historic Chestertown, MD. Currently in development, the foundation hopes to create a system of boardwalks, as well as a small building, to create a unique outdoor learning experience featuring the wetlands and surrounding ecosystems. The initial survey of the property revealed a few non-native species including phragmites, porcelain berry, and multi-flora rose. These non-native invasives present challenges and opportunities. While raising important questions about best management practices, they also provide a unique platform to educate the public. The complexities of invasive species management, as well as the non-native species themselves, could be powerful teaching tools. For example, school groups could compare the dense monocultures of phragmites to the diverse native communities. The Lawrence Wetland Preserve provides a unique, living classroom in which to educate about invasive species ecology and management.</p>
49	Joiner, Chandler	Maryland Coastal Bays Program	<p>Impacts of Outdoor Environmental Education on Local Students</p> <p>Maryland Coastal Bays Program (MCBP), in collaboration with the Worcester County public school system, offers a variety of environmentally focused field excursions for school children ages K-12 throughout the academic year. The purpose of these excursions is to engage students in hands-on environmental education activities that are designed to introduce, educate, and inspire students to care for the environment around them. Field excursions are typically conducted on one of Maryland Coastal Bays Programs (MCBP) eight restoration sites. The Worcester County public school teachers who partner with MCBP will be surveyed to gauge the impact these field excursions have on students. Outdoor education experiences have been proven to increase student creativity, restore depleted energy, and improve attention span. Students who spend time learning in nature also display fewer symptoms of behavioral conduct disorders than those who are solely educated in classrooms. By surveying teachers, MCBP will be able to better understand the impact these field excursions have on students and continue improving their outdoor education opportunities to foster student engagement and encourage an appreciation for the Maryland coastal bays.</p>
50	Kreizenbeck, Charles	American Chestnut Land Trust	<p>Native Edibles Garden: Re-discovering Food in Maryland's Wild</p> <p>The goal of this project is to create an edible garden using only plants native to the coastal plains' region of Maryland. This project aims to re-educate people visiting the American Chestnut Land Trust on the edible plants of our region, and to familiarize visitors with the local wild foodways. Interpretive signage around the plants will provide essential information about the edible native plants found in the garden. The project will make use of local plant nurseries for species that cannot be foraged from the preserved forest and meadowlands surrounding the edible garden. The layout of the garden will take advantage of the south-facing plot by planting large trees and shrubs in the back as to not shade out lower growing vegetation at the front of the garden. The garden will also be composed of</p>

			non-edibles that provide beneficial nutrients for the surrounding soil or attract helpful predatory insects and pollinators.
51	O'Donnell, Emma	Mayor and City Council of Baltimore, Department of Recreation and Parks – Carrie Murray Nature Center	<p>Carrie Murray Nature Center: A Prospective Green Center</p> <p>At 1,216 acres, Gwen Falls Leakin Park is the third-largest urban wilderness park in the United States - found in none other than Baltimore City, Maryland. It is also home of the Carrie Murray Nature Center, which serves over 30,000 visitors annually. We at the nature center realize that conservation is not the job of one person but humanity as a whole. We hope to strengthen our devotion to conservation and the community by becoming Baltimore City's first public green center. It is "we, not me" who can make an impact on our environment. The Green Center Certification comes from the Maryland Association for Environmental & Outdoor Education (M.A.E.O.E.), a statewide organization that recognizes facilities for best management practices and excellence in environmental education, as well as overall sustainability. We will work as a team to demonstrate how the Carrie Murray Nature Center is striving to represent all objectives set forth by M.A.E.O.E. If the center receives this recognition, it will become the first public facility in Baltimore City to hold such a privilege. The center staff are committed to sustaining such practices for the betterment of our environment, future generations and Baltimore City.</p>
52	Oladosu, Habibah	Morgan State University PEARL	<p>Effect of Eastern oyster, <i>Crassostrea virginica</i>, Biodeposit Resuspension on Zooplankton Abundance</p> <p>The STURM (Shear Turbulence Resuspension Mesocosm) system mimics real-life water column turbulence and bottom shear stress. We designed an experiment using the STURM system to discern the effect of biodeposit resuspension on zooplankton abundance. We performed a 4-week long experiment using two sets of triplicate 1000 L tanks (Resuspension tanks and non-resuspension tanks) with muddy sediment from the Patuxent River. Eastern oyster, <i>Crassostrea virginica</i>, biodeposits, collected outside the tanks, were added into each tank every day. Twice weekly, we pumped 40-L of water from the tanks using a diaphragm pump and filtered the water through a 63-μm mesh. We hypothesized that, as there were more water column nutrients in the resuspension tanks due to biodeposit resuspension, an increase in nutrients would cause an increase in phytoplankton. Zooplankton feeds on phytoplankton and this would cause an increase in the zooplankton population. Our results suggest that there was no significant difference ($p = 0.8466$) between the zooplankton population in resuspension and non-resuspension tanks. While biodeposit resuspension greatly affected the nutrient and dissolved oxygen dynamics in this experiment, resuspension had no greater effect on the abundance of zooplankton.</p>
53	Pickford, Jackie	ECO City Farms	<p>Keyhole Gardens: Closed-Loop Environmental Education</p> <p>Keyhole gardens are raised garden beds that utilize permaculture design practices to enable low cost, low maintenance, sustainable gardens. Typical keyhole gardens incorporate an indentation on one side allowing for easy access to the garden bed, as well as a basket in the center of the bed used for composting. Composting and soil layering within the garden bed cause keyhole gardens to be more productive and environmentally beneficial than conventional gardens, subsequently offering valuable environmental education possibilities. For example, keyhole gardens present a physical demonstration of closed-loop systems and offer possibilities of integrated curriculum by incorporating both growing and composting in a single entity. They also demonstrate a platform for intergenerational family and community engagement. Due to the gardens' accessibility, audiences can range from young kids to home growers to the elderly or disabled. Keyhole gardens also show versatility by remaining productive despite environmental factors such as poor soil, limited water, and limited space, allowing for successful growing in a wide range of areas. Furthermore, keyhole gardens exemplify both climate-smart agriculture and watershed protection by incorporating design practices that facilitate healthy soil, which, in turn, sequesters atmospheric carbon and minimizes pollutant runoff by reducing the use of fertilizer.</p>
54	Scott, Rachel	National Parks Service – Chesapeake Bay Office	<p>Chesapeake Bay Explorer</p> <p>When you were young did you know what you wanted to be when you grew up? Did you know that jobs in the Chesapeake Bay include a wildlife photographer, a tour guide, a waterman, a meteorologist, and much more? Kids, teenagers, and even adults are unaware</p>

			<p>of the array of jobs that are available in the environmental field. The Junior Ranger Program “Chesapeake Bay Explorer” will use various activities to teach students about various organisms, habitats, and careers found around the Bay. The Junior Ranger Program will be created in two different programs for grades K-5 and 6-8, and will be correlated with the Next Generation Science Standards. A compatible teacher’s guide will be created to provide resources on education of the Chesapeake Bay Watershed, and how to extend the Chesapeake Bay Explorer program into lessons for a formal and informal classroom. Activities will also include identifying human impacts on the Chesapeake Bay Watershed, and what they can do at school, their home, and throughout their communities to make a difference on the health of our environment.</p>
55	Walters, Aubryn	U.S. Fish and Wildlife Service – Patuxent Research Refuge	<p>Partnering Patuxent Research Refuge with Public Schools to Investigate and Protect Water Quality</p> <p>Patuxent Research Refuge is working to educate local fifth graders on water quality while creating bonds between the Refuge and the community surrounding it. This program will create four one-hour lessons to develop a background on what water quality is while connecting the lessons to their watershed. Lessons will center around what a watershed is, mapping their watershed, land use, and water quality testing. The lessons will be explorative and interactive, with students conducting experiments to see how watersheds function, then connecting what they learned to how the Chesapeake Bay is affected. The students will then come to Patuxent Research Refuge and conduct chemical and biological water quality tests, like dissolved oxygen, pH, temperature, nitrate, and searching for and identifying macroinvertebrates and their pollution sensitivity. They will also go on a tram tour, showing the different ecosystems around Patuxent, how they are interconnected, and how that impacts the water. Students will learn how choices humans make impacts water and what they can do to improve water quality in their neighborhood. The program additionally works as a form of outreach, as is designed to further connect students with the refuge, so they will continue to use it after the program is over.</p>

PROFESSIONALS CATEGORY

Poster #	Presenters	Affiliation	Title and Abstract
Restoration – Forestry, Oysters, Wetlands, and More			
P1	Hofmann, Bryan	Friends of the Rappahannock	<p>The Rappahannock Headwater Stream Initiative: Four Years On</p> <p>Like many Chesapeake tributaries, the Rappahannock River in Virginia faces many pollution challenges related to sedimentation and excess nutrients. One way to tackle these pollutants is to install riparian buffers along tributary streams. A number of different government and private partners are actively working to install these buffers; however, we are collectively falling well short of WIP goals for riparian reforestation across the Chesapeake Bay watershed. In 2016, Friends of the Rappahannock launched our Headwater Stream Initiative (HSI) program, which uses volunteer labor to provide willing landowners with 100% cost share for riparian plantings that aren't eligible for federal CRP or EQIP funding. Since its inception, the HSI program has installed about 50 acres of new forest and engaged hundreds of community volunteers including students in the upper Rappahannock Watershed. This poster will provide an overview of our HSI program and help us share our lessons learned as the program enters its 5th year.</p>

Poster #	Presenters	Affiliation	Title and Abstract
Outreach, Community Engagement, Stewardship and Volunteerism			
P2	Eckl, Eric	Water Words That Work LLC	<p>What Photos "Pop" for the Public?</p> <p>"We will summarize what 12 years of market research says about winning photo subjects and composition for outreach messages, including websites, brochures, advertisements, event displays, web ads, and more.</p> <p>Our research methods include: Our in-house message testing service, advertising and email A/B message testing, and multiple literature reviews. We will share the findings, which show that a handful of photo compositions produce the best results for recruiting volunteers, motivating activists, inspiring donors, and related purposes.</p> <p>If selected to produce a poster, graphic designer Amanda Podonsky will do the design and staff the poster for the session.</p> <p>We will print the poster in 3D (so the pictures ""pop"") and bring 3D glasses for viewers to use!"</p>
P3	Baker, Nancy	Walk in Penn's Woods Partnership	<p>Walk in Penn's Woods: Engaging the Public in Working Woodlands</p> <p>Since 2017, the Walk in Penn's Woods partnership (the Center for Private Forests at Penn State, the Pennsylvania Forestry Association, Penn State's Forestry and Wildlife Extension Team, Pennsylvania SFI Implementation Committee, PA Forest Stewards, PA DCNR Bureau of Forestry, and the Pennsylvania Chapter of the Association of Consulting Foresters) has been working to offer a statewide day of woods walks. The goal of these walks is to provide opportunity for the public to spend time in diverse working woodlands with a natural resources professional or knowledgeable landowner, to understand the myriad values we hold for the woods, and the work that goes into caring well for it. Well over 1,000 people attended each of the first two events, with over 60 walks offered around the state; the 2019 event is shaping up to engage similar numbers. Comments and evaluations have been overwhelmingly positive, with many participants joining for a fun day and surprised by how much they learn about the importance of Penn's Woods. Walks allow landowners to share their management with their neighbors, expand the outreach of woodland owners associations, invite participants onto land normally restricted, and showcase the efforts of those who care well for the woods.</p>

Poster #	Presenters	Affiliation	Title and Abstract
Science, Methods, Monitoring, and Evaluation			
P4	Thompson, Renee Roth, Nancy	USGS Chesapeake Bay Program	<p>Assessing Condition and Vulnerability of Healthy Watersheds in the Chesapeake Bay Region</p> <p>The Chesapeake Bay Program has a goal of maintaining the health of watersheds identified as healthy by its seven partner jurisdictions. Quantitative indicators are important to assess current watershed condition, track future condition, and assess vulnerability of these watersheds to future degradation. Building upon EPA's Preliminary Healthy Watershed Assessment (PHWA) framework, we assembled a set of Chesapeake specific metrics characterizing multiple aspects of landscape condition, hydrology, geomorphology, habitat, biological condition, and water quality, for integration into an overall watershed health index. Geospatial analyses were structured, where possible, to leverage data from EPA StreamCat, the National Fish Habitat Partnership, the Chesapeake Bay model for nutrient loads, and other regional sources. Vulnerability metrics were derived including future developed land use, forest loss, protected land status, and brook trout susceptibility to climate change. Metric values were compiled for nearly 84,000 NHDPlus catchments Bay-wide. This project could benefit multiple groups; threats to healthy watersheds threaten other outcomes and goals and a project like this can inform multiple CBP goals and outcomes including: Stream health, Fish Habitat, Protected Lands, Climate and Diversity. The indicators will be available to federal, state, and local managers as a geospatial tool, providing critical information for maintaining watershed health.</p>

Poster #	Presenters	Affiliation	Title and Abstract
Environmental Education			
P5	Lynch, Adam	Friends of the Rappahannock	<p>Standing up a project-based watershed education program at Orange County High School</p> <p>The Meaningful Watershed Educational Experience (MWEE) is a state-mandated curriculum centered on an investigative or experimental project relevant to the health of the Bay and its watershed. Over the past several years, Friends of the Rappahannock has been a state leader in standing up MWEE curricula and training and empowering public school teachers across the Rappahannock watershed. One of our most consistent school partners has been Orange County High School (OCHS). Each year, about 50-60 OCHS students per year have raised baby brook trout in their classroom, sampled water quality, planted riparian buffers, picked up litter on parks and trails, and paddled nearby rivers and lakes with Friends of the Rappahannock educators. In 2019, OCHS made environmental science courses mandatory for all freshman, with a strong emphasis on project based learning using the MWEE framework. During each semester of the 2018-2019 school year, about 130 students will do their MWEE projects with Friends of the Rappahannock, with an additional 45 students joining a yearlong intensive section that goes more in-depth into Bay health issues. Our poster will be a visual tour of Friends of the Rappahannock collaboration with OCHS and an overview of our lessons learned.</p>