BUILDING CAPACITY FOR STREAMBANK STABILIZATION

SUMMARY OF SITE SELECTION ROUNDTABLE

October 2023

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ACRONYMS & ABBREVIATIONS

Acronym/Abbreviation	Definition
CWP	Center for Watershed Protection
DEM	Digital Elevation Model
JRA	James River Association
KIR	Key Issues Report
NRCS	Natural Resources Conservation Service
RFP	Request for Projects
TMDL	Total Maximum Daily Load
TU	Trout Unlimited
Consortium	Upper and Middle James Riparian Consortium
USGS	United States Geological Survey
VA DCR	Virginia Department of Conservation and Recreation
VA DWR	Virginia Department of Wildlife Resources

INTRODUCTION & OVERVIEW

The Upper & Middle James Riparian Consortium (Consortium), convened by the James River Association (JRA), works to grow partnerships to create healthy streamside ecosystems for clean water in the James River today and tomorrow. Their focus geography is the Upper and Middle James River watersheds. From 2023 – 2024, the Consortium is leading a Streambank Stabilization Learning Journey that is accessible to all Consortium partners. The Learning Journey will walk Consortium partners through the entire process of a streambank stabilization project—including identifying potential sites, narrowing down sites to a project, navigating design and permitting, and observing installation. The Learning Journey is coupled with a Request for Projects (RFP), where JRA allocated $30,000 to contribute to a selected small-scale streambank stabilization project, which can be used alongside other funding from partners or programs. At the time of this report, the application period for the RFP is closed, and the JRA is working towards site selection and ultimately project implementation.

The goals of the Learning Journey are:

- To build capacity and knowledge of practitioners and landowners in the James River Watershed around streambank stabilization
- To document the need for further technical assistance support
- To identify a small-scale streambank stabilization project that utilizes bioengineering methods

The Center for Watershed Protection (CWP), as a partner with the Consortium and member of the Knowledge Network team, planned and hosted a virtual Streambank Stabilization Roundtable Discussion on June 27, 2023 to provide information on site selection considerations and encourage participation in the Consortium's Streambank Stabilization Learning Journey.

While the Streambank Stabilization Learning Journey has four phases that will extend through the entire project process, this Roundtable was part of Phase 1, so it focused on sharing information and resources about stream dynamics, watershed and land use impacts on streams, and site selection considerations for streambank stabilization projects. The contents of each of the four phases (subject to change) of the Learning Journey are listed below:

- Phase 1: Stream Basics and Identifying Potential Sites (April – June 2023)
    - RFP opened
    - Stream Walk event with Kip Mumaw (Ecosystem Services)
    - Building Capacity for Streambank Stabilization Roundtable Discussion (Introduction and Site Selection) hosted by CWP
    - RFP closed
- Phase 2: Site Visits and Project Selection(s) (July – September 2023)
    - RFP submission site visits with Louise Finger (VA DWR)
    - Virtual Consortium Implementation Team meeting to select project(s) for implementation and to share expertise on the decision-making and funding processes
- Phase 3: Design and Permitting (September 2023 – May 2024)

    - Develop agreements for selected project(s)
    - Virtual Consortium Implementation Team meetings to receive update on selected project(s) and design interventions that are being considered and to share final design and permitting process details
    - Building Capacity for Streambank Stabilization Roundtable Discussion (Design and Permitting) hosted by CWP
- Phase 4: Installation (June – December 2024)
    - Installation of selected project(s) with site visits
    - Project completion (possible extension through June 2025)

To fulfill the learning goals for Phase 1, the June 2023 Streambank Stabilization Roundtable was split into four main sections:

- An introduction to stream dynamics with background and history about the land management and sediment loading trends in the Upper & Middle James;
- An introduction and process overview of streambank stabilization projects;
- Highlighted examples of streambank stabilization projects in the Upper & Middle James and site selection criteria that were considered; and,
- A panel discussion with all presenters to answer questions from attendees, engage with discussion topics, and comment on potential streambank stabilization project sites that were submitted or gathered for this event.

This report provides a summary of the Roundtable presentations, discussion, and findings.

Audience

Registration for this Roundtable was open to all interested audiences within the Upper and Middle James watersheds (landowners, practitioners, nonprofits, state agencies, local and Tribal governments, educational institutions, and community organizations). The Roundtable was designed to include introductory background information for those who are newer to the concept of stream stabilization, as well as more technical content for participants who already had some experience with stream stabilization.

A total of 48 individuals registered to attend the 4-hour virtual Roundtable event, the majority of whom attended the event live. Attendees represented a variety of types of organizations and entities; however, the largest group of attendees were affiliated with state government agencies and nonprofit organizations (Table 1). Of these 48 individuals, 8 registrants were presenters and/or facilitators.

Table 1. Types of organizations represented by Roundtable registrants

Representation Type	Count of Registrants	% of Total Registrants
State Government Agency	12	25%
Nonprofit	11	23%
Soil & Water Conservation District or Land Conservancy	6	13%

Table 1. Types of organizations represented by Roundtable registrants		
Representation Type	**Count of Registrants**	**% of Total Registrants**
Federal Government Agency	5	10%
Private Consultant	5	10%
Private Landowner (or no specified representation)	5	10%
Local Government Agency	2	4%
University/Researcher/Academia	1	2%
Other	1	2%

SUMMARY OF PRESENTATIONS

The following section briefly summarizes each of the technical presentations at the Roundtable, including the panel discussion with all presenters. Full-length professional bios for each presenter are in the full agenda for the Roundtable event, which is provided in Appendix A. The links to access the presentation slides and event recording[1] can be found in Appendix B.

STREAMBANK STABILIZATION LEARNING JOURNEY INTRODUCTION – AMBER ELLIS (JRA)

Amber Ellis is the Restoration Director with JRA, and she serves as the convener for the Consortium.

The Consortium is a diverse group of private, nonprofit, and public partners with a vision to grow partnerships for healthy streamside ecosystems for clean water in the James River today and tomorrow. The Consortium shares expertise and resources to increase the implementation and awareness of riparian buffers and their value to landowners, with a priority focus on riparian forest buffers, across the Upper and Middle James watersheds. The focus geography is the freshwater/nontidal portion of the James River watershed, which is the Upper & Middle James. Interested partners elsewhere in the James River watershed are also encouraged to participate and take advantage of the Consortium's resources and learning opportunities. Consortium has a primary focus on riparian forest buffers, which are areas with woody vegetation along the borders of waterways. These buffers stabilize streambanks, improve water quality, provide shade to help regulate stream temperatures, provide habitat for wildlife, and provide recreational opportunities for local communities.

The Consortium is composed of a Planning Team, Steering Committee, and membership base. The Planning Team is led by JRA and Dialogue + Design Associates, and the Steering Committee is composed of a wide variety of public, private, and nonprofit organizations. The Consortium has over 300 members participating in action teams and other efforts across the watershed as well. The Consortium's four action teams and their overall goals are listed below.

- **Planning**: Increase collaboration and strengthen partnerships

[1] Event Recording Link: https://us06web.zoom.us/rec/share/paZ3hRqpwI22AXMPNAgoEJw0BxCvrxQzyAVSr7RpV8zc4M7mPS74PRkDYkA0wftb.ocggnKissgw6Ppi4. Recording Passcode: @jfMutS3

- **Knowledge Network**: Build knowledge and capacity
- **Targeting & Outreach**: Build awareness
- **Implementation**: Coordinate implementation and fill funding gaps

The Streambank Stabilization Roundtable is part of Phase 1 of the Consortium's Streambank Stabilization Learning Journey (April – June 2023). The RFP for a small-scale streambank stabilization project in the Upper & Middle James has been released, and Kip Mumaw (Ecosystem Services) has completed a stream walk in Lynchburg, VA. Shortly after the Roundtable, the RFP closed. At the time of this report, the submitted sites have been evaluated, and three potential streambank stabilization project sites have been selected for further assessment. In Phase 2 of the Learning Journey (July – August 2023), Louise Finger (VA DWR) is leading site visits to further evaluate the three prospective sites, which are located in Powhatan, Lexington, and Afton, VA. In November 2023, there will be a virtual Consortium meeting to discuss the decision-making process and available funding. Phase 3 of the Learning Journey (September 2023 – May 2024) includes agreements with partners and additional virtual meetings that will allow Consortium partners to follow along with the selected project. Towards the end of Phase 3, CWP will host another Streambank Stabilization Roundtable event, which will be focused on design and permitting. Phase 4 of the Learning Journey will include installation of the streambank stabilization project selected, with the goal of completion by December 2024.

History of Land Management in the Upper & Middle James River Watershed, pt. 1 – Louise Finger (VA DWR)

Louise Finger is a Stream Restoration Biologist with the Virginia Department of Wildlife Resources (VA DWR). Louise designs and constructs stream restoration projects, provides education and outreach on stream and riparian systems, and has a special interest in the enhancement of aquatic habitat and removal of dams.

Louise presented on the history of dams in the James River Watershed. Dams impact hydrology, sediment transport, floodplain dynamics, riparian vegetation, aquatic habitat, and populations of aquatic wildlife. The James River spinymussel (*Pleurobema collina*) was fairly common in the watershed previously; however, it is becoming increasingly rare and is currently federally endangered. The larvae of these mussels are carried by fish, so when fish passage is impeded by dams, both the fish and mussel populations are affected.

Dams were created in the James River Watershed to power a variety of different mills and industrial operations historically. Grist mills, which are used for flour production, were first documented in North America in Jamestown in 1621. These mills started off small, often serving only a single family or small community, but they became increasingly larger and more structurally resilient over time. Beginning in the late 1700s, waterpower was also used in industrial applications like sawmills, foundries, iron works, and textile mills. Dams were also created for the purposes of navigation and electricity generation. Dam, lock, and canal systems were used for transportation from the mid to late 1800s. In the late 1800s through present day, hydroelectric power stations have been used for electricity generation. The Middle James has the highest concentration of dams in the James River Watershed.

It is estimated that there were approximately 1,300 water-powered mills in the James River Watershed by 1840. There are at least 5,681 dams currently documented in the James River Watershed. There are persistent impacts from an untold number of dams that are no longer present on the James River and its tributaries today.

Introduction to Stream Dynamics and History of Land Management in the Upper & Middle James River Watershed, pt. 2 – Kip Mumaw (Ecosystem Services)

Kip Mumaw is the Principal Engineer and cofounder of Ecosystem Services, which is a natural resources consulting firm located in Charlottesville, Virginia. Kip has a Bachelor's degree in civil engineering with a concentration in environmental and water resources engineering. Kip and his multi-disciplinary team of environmental scientists, biologists, and engineers focus on designing ecological restoration projects and watershed retrofits that improve the health of their environment and the well-being of their communities.

Introduction to Stream Dynamics

Kip introduced the concepts of stream evolution and overall stream system functions. Stream systems are complex landforms that developed over the course of Earth's long history, and these systems are essential habitat for many organisms. Intervening in these systems to restore stability or water quality requires understanding the context of these stream systems in terms of their stage of evolution. A stream corridor is in dynamic equilibrium when it has slowly adjusted its shape to accommodate the sediment and water from its watershed so that it no longer aggrades or degrades excessively. However, when watershed conditions change and energy in the channel increases, a stream can degrade vertically to allow it to accommodate larger storms, and this ultimately results in a positive feedback loop causing more energy and more vertical bank degradation. Eventually, the stream again adjusts towards dynamic equilibrium, and excessive vertical and lateral degradation will cease. There is a larger, more detailed Stream Evolution Model that helps practitioners understand a stream system's morphological and ecological status and trajectory, which helps inform intervention.
The Stream Functions Pyramid is another useful model that describes how higher-level functions build on and are a response to lower-level functions and how all stream functions are interrelated. Healthy stream systems support and maintain basic functions associated with structure or processes (e.g., hydrology and geomorphology). Biodiversity and water quality are higher-level functions that are informed by a stream's lower-level functions, so it's important to look at driving factors to be able to modify a stream system in a way that will effectively meet project goals.

When explaining the overall concepts of stream evolution and functions, it is important to highlight that stream corridors are constantly changing, even when they're in a state of dynamic equilibrium, and aquatic and riparian systems co-evolved and collaborated to form rivers and streams. Additionally, watershed and in-corridor disturbances can alter the trajectory of a stream ecosystem, and functions can be gained or lost depending on the stage of stream evolution.

History of Land Management and How it Has Shaped Our Streams

Kip elaborated on the importance of understanding the temporal aspect of stream systems and how historical land management activities affected and continue to affect existing stream systems in the Upper and Middle James.

Stream conditions can be generally categorized as undisturbed, agricultural, and urban. Undisturbed stream ecosystems function to attenuate floods, regulate temperature, cycle nutrients, store sediment, sequester carbon, and support biological diversity and productivity. These functions are all relied upon by vegetation, wildlife, and local communities. Agricultural stream ecosystems typically have some combination of channel incision and over-widening, valley sedimentation, lack of bedform, eutrophication, and increased turbidity. These agricultural impacts can be caused by direct channel alterations, watershed land clearing, polluted runoff from adjacent land uses, and riparian disturbances. Urban stream ecosystems have a lack of riparian vegetation, excessive erosion, reduced organism passage, increased temperature, lack of physical habitat, and elevated pollutants from watershed sources and direct discharges. These urban impacts can be caused by channel alterations, watershed land cover changes, channel conflicts, and riparian disturbances. Kip also shared the Impervious Cover Model, which explains that as impervious cover in a watershed increases, the quality of its streams decreases.

All three highlighted stream conditions are a response to current and historical watershed conditions, and rapid anthropogenic impacts have altered our stream ecosystems. These impacts are cumulative due to the interconnectedness of different stream functions.

James River Basin Suspended Sediment Loads & Trends – Chris Mason (USGS VA and WV Water Science Center)

Chris Mason is a physical scientist with the US Geological Survey's Virginia and West Virginia Water Science Center. He has expertise in continuous water quality monitoring and long-term trends, hydrology, remote sensing, and data science.

Chris shared an overview of USGS's Non-tidal Network (NTN) Sites and River Input Monitoring (RIM) sites in the Chesapeake Bay Watershed, specifically highlighting the sites in the James River Watershed. USGS reports flow-normalized, daily loads of nitrogen, phosphorus, and sediment from their sites. Within the entire group of sites in Virginia from 2011 – 2020, four sites had improving suspended sediment loads, three sites had degrading loads, and four sites had no detectable trend in suspended sediment loading. There are four sites within the Upper & Middle James River Watersheds—two of these sites' suspended sediment loads are improving and two have no detectable trend. More information can be found in USGS' interactive geo-narrative.

Introduction to Streambank Stabilization – Lisa Fraley-McNeal (CWP)

Lisa Fraley-McNeal is a Research Specialist with the Center for Watershed Protection (CWP), and she has been working on watershed and stormwater management since 2006. Her areas of expertise include GIS and field methods for watershed assessment, watershed planning, stream restoration, Chesapeake Bay TMDL crediting, and applied research on topics related to watersheds and stormwater.

Lisa compared the definitions of stream restoration and streambank stabilization from different organizations and agencies. Streambank stabilization is one component of restoration, but stream restoration is a more comprehensive approach. Bank stabilization fixes a specific stream problem at a defined point or stream reach, but it has less potential for large-scale channel improvements. Streambank stabilization may result in the treatment of symptoms but not the underlying cause(s) of erosion in a stream system.

Streambank stabilization techniques work by either reducing the force of water against a streambank or increasing a streambank's resistance to the force of water. These stabilization techniques consist of "hard" (structural) practices and "soft" (bioengineered) practices. Hard practices are used along stream reaches where eroding streambanks threaten private property or infrastructure and where available space or highly erosive flows are a constraint. Hard stabilization practices typically involve the use of rock, logs, or manufactured materials that are not deformable and are intended to remain in place for decades. Soft practices, however, stabilize eroding streambanks through a combination of slope control, vegetation, and biodegradable fabrics that establish a stable but deformable bank over time.

Lisa explained some of the site selection considerations and best practices for streambank stabilization projects, which include:

- Consider the magnitude and extent of erosion
- Consider the possible causes of the observed streambank erosion
- Avoid sites where the watershed's expected rate and magnitude of future development and land use change is high
- Compare the tradeoffs between potential project benefits and any significant clearing of mature riparian vegetation for access
- Avoid high-quality areas, such as stable stream reaches, wetlands, seeps, good quality vegetative communities, rare or sensitive species, important historical or cultural features, specimen trees, etc.
- Consider project costs

There are also a number of datasets, tools, and field assessment techniques that can assist with site selection. Some useful resources and approaches for site selection in Virginia are described below:

- **Forest Conservation Values Model**: Identifies forest areas with the highest priority for conservation in Virginia
- **Virginia Natural Landscape Assessment**: Landscape-scale analysis for identifying, prioritizing, and linking natural lands, including the review of ecosystem impacts of proposed projects
- **Development Vulnerability Model**: Quantifies the risk facing greenspace (natural, rural, or other open space lands) of conversion to urbanized uses by presenting relative ranks of development potential
- **Watershed Impact Model**: Establishes priority areas for conservation, restoration, or the implementation of best management practices
- **James River Streamside Program Report Tool**: Provides information for landowners about streamside restoration opportunities on their property
- **Bank Erosion Hazard Index (BEHI)**: Field assessment technique used to estimate the susceptibility of a streambank to erosion

- **Digital Elevation Model (DEM) Differencing**: A type of desktop spatial analysis where elevation surfaces from two points in time can be compared to identify areas of erosion and deposition

Overview of Streambank Stabilization Key Issues Report – Emily Carlson (Dialogue + Design Associates)

Emily Carlson is a project manager and consultant with Dialogue + Design Associates supporting projects through facilitation, design, stakeholder engagement, and writing. She has professional experience in community watershed education, environmental education, field science, and social research, and she has a background in landscape architecture.

Emily presented a summary of the 2022 Key Issues Report (KIR) on Streambank Stabilization, developed for the Consortium, which evaluated the dynamics between riparian buffers and streambank erosion interventions. As part of the KIR, interviews were conducted with stream restoration practitioners and partners to learn about key challenges, concerns, resources, and future needs regarding streambank stabilization in the Upper and Middle James watershed. The interviews addressed a number of important questions about challenges associated with streambank stabilization projects, and a summary of responses and insights can be found in the full KIR.

One of the key insights from the KIR is that decision-making surrounding streambank stabilization is extremely site-specific. Whether a site should be a candidate for streambank stabilization largely depends on the unique characteristics and constraints at the site. Interventions in a stream's function for the purpose of erosion management depend on the defined objective, the identified cause and scale of erosion, and the project design to achieve an appropriate stream response. The KIR includes a useful matrix for considerations when determining whether a streambank stabilization project should be pursued at a site. Some of the KIR themes that were most impactful were the importance of restoring floodplain function and implementing projects in small, upstream watersheds.

As part of the KIR, future needs and opportunities were also evaluated. The highest priorities for the future include: 1) increasing the capacity of stream experts; 2) creating educational opportunities for landowners, governments, and practitioners; 3) increasing funding high-impact projects; and 4) coordinating with partners to implement streambank stabilization using as watershed-scale approach. The Consortium's Streambank Stabilization Learning Journey is moving some of these ideas forward.

Streambank Stabilization Process & Approaches – Kip Mumaw (Ecosystem Services)

Kip Mumaw (Principal Engineer and cofounder of Ecosystem Services) shared more detail on the specific types of streambank stabilization approaches and the key components of the streambank stabilization project process.

Using a medical metaphor, Kip explained how various stream intervention approaches are used depending on the urgency of a degrading site. The medical metaphors are listed below in order of most urgent to least urgent.

- Channel realignment, valley excavation, and/or profile alteration = Surgery
- Stabilization and structure installation = Casts and splints
- Planting = Physical therapy
- Adding structure (e.g., large wood) = Food/meals and exercise
- Watershed retrofits = Diet

It is important to think about stabilization approaches within the context of the Stream Evolution Model. For example, if a stream is in the degradation phase, stabilization approaches may be able to push it into "arrested degradation," which temporarily pauses the degradation to prevent further stream widening but is not permanent and does not restore all stream functions. Typically, the best stabilization approaches expedite a naturally occurring stream process to push the stream forward into the next, more stable phase of its evolution. The overall process for streambank stabilization projects is listed below:

- Identify sites and collect data
- Analyze constraints (legal, physical, environmental, and regulatory)
- Select stabilization practices and design
- Evaluate tradeoffs
- Evaluate if tradeoffs are acceptable and if project still meets intended goals

Kip noted the importance of understanding that restoring a habitat causes casualties. Successful stabilization projects are a matter of evaluating the tradeoffs and working to achieve specific and attainable goals. Kip also emphasized the importance of ensuring that the intervention is appropriate for the impairment and that the approach may require multiple practices to achieve goals.

Kip shared numerous examples of stabilization and restoration projects that Ecosystem Services has completed in Virginia. Some of these examples were more temporary, "band-aid" solutions, while others were more comprehensive restoration efforts that are intended to be longer lasting. Photos of the examples can be seen in the presentation slides or the recording of the Roundtable (see Appendix B for links; examples begin at 2:01:28 in the recording).

Examples of Small-Scale Bank-Stabilization Project Sites – Louise Finger (VA DWR)

Louise Finger (Stream Restoration Biologist with VA DWR) shared example photos and discussed conditions at several small-scale bank stabilization projects in the James River Basin. These examples were selected to be in line with the amount of funding available in JRA's streambank stabilization RFP. The examples can be seen in the presentation slides or the recording of the Roundtable (see Appendix B for links; presentation begins at 2:36:05 in the recording).

Streambank Stabilization Project Highlights from Trout Unlimited – Samuel Vest (TU)

Samuel Vest serves as the Upper James River Home Rivers Initiative Coordinator with Trout Unlimited. He works to implement habitat protection and restoration techniques to benefit native brook trout while engaging volunteers in hands-on conservation activities. He also works to coordinate volunteer activities in support of specific restoration projects and to conduct outreach and provide technical assistance to landowners in the watershed.

Samuel shared examples of several streambank stabilization projects implemented by Trout Unlimited, primarily focused within agricultural areas. The examples can be seen in the presentation slides or the recording of the Roundtable (see Appendix B for links; presentation begins at 2:47:55 in the recording).

Samuel also explained that different funding agencies typically have different priorities. For example, the Natural Resources Conservation Service (NRCS) tends to fund aquatic organism passage work to remove fish barriers without getting into intricate stream restoration designs. The VA Department of Conservation and Recreation (VA DCR) typically prioritizes protecting streambanks but not necessarily aquatic habitat. They typically pay for work up to the water's surface, but not above it. Staff are often required to assess projects in the field to ensure they will meet criteria before Soil and Water Conservation Districts will approve the projects.

Panel Discussion

Prepared Discussion Topics

The panel discussion began with all presenters engaging with a few prepared discussion topics about siting streambank stabilization projects.

Presenters were first asked how to decide when a site is most well-suited for a riparian buffer planting vs. a streambank stabilization project, including any clear threshold decisions or visual indicators that a site may be suited for a stabilization project. Kip Mumaw noted that soft material with rooted vegetation near the toe of slope and near-bank area can be an indicator that a buffer planting project will not be threatened by streambank erosion in the future.

Presenters were asked to comment on thresholds for permit requirements. Louise Finger (DWR) noted that most streambank stabilization work requires a permit. Certain types of work—like activity under a certain linear footage or under a minimum cubic footage of material moved—may not trigger reporting requirements. However, for the most part, activity that occurs below the ordinary high-water mark will require a permit application to ensure compliance with regulations. In her previous presentation, Louise shared only one site that did not require permits because it was less than 5 square miles. One attendee asked whether the Virginia Marine Resources Commission (VMRC) was still managing inland permits because they had heard that VA DEQ would be taking over in July 2023. Louise Finger confirmed this pending change and noted that VMRC would only be working on tidal permits in the near future; it is still unclear how DEQ will be managing this process.

The presenters also discussed "temporary fixes" or "band-aid solutions" that might prevent and/or minimize further erosion in cases where a streambank stabilization project is either not possible to implement or is taking a long time to reach the implementation stage. Landowners with eroding streambanks on online forums have described that they have considered placing riprap at the toe of the bank and then piling driftwood, root wads, and brush against the bank to provide surface protection; however, without a complete understanding of the stream's dynamics, that may worsen the problem or cause issues downstream. Kip Mumaw (Ecosystem Services) described that controlling and/or infiltrating runoff at the site is a good temporary action that may ameliorate some symptoms of an eroding streambank. Live staking can also be done without a permit in most cases; so long as care is taken to avoid using live stakes of invasive species in favor of appropriate native species. Live staking can slow erosive forces down, but they often wash away over time, so it is an impermanent solution.

Presenters were asked whether the presence of non-native, invasive species along an eroding streambank would make a site more or less suited for a stabilization project. Additionally, presenters were asked to comment on how native vegetation can be preserved during and after project implementation. Louise Finger (DWR) noted that invasive species are present to some degree nearly everywhere, so it is certainly a consideration, but the presence of invasive would not typically drive the decision to pursue a project in either direction. The management of invasives after implementation is very important, but it tends to go beyond the scope of available funding for streambank stabilization projects. This overall lack of funding for long-term management is one of the reasons that it is so important to have an invested and educated landowner who can take over after construction. It's also important to note that certain invasive species that have woody stems and relatively dense root systems count as surface protection when conducting BEHI assessments, so it's important to weigh the tradeoffs between ecological, biological, and stabilization considerations based on project goals. Lisa Fraley-McNeal (CWP) added that there was much discussion and disparity among experts' opinions on how invasive species impact site selection in the interviews conducted for CWP's Maintaining Forests in Stream Corridor Restoration research project—some experts noted that heavily vegetated sites should be avoided regardless of the nativity of vegetation, while others noted that sites with predominantly invasive vegetation would be better candidates for restoration work.

Specific Site Examples

Following the prepared discussion topics, the presenters commented on a handful of eroding stream sites where photos and site descriptions were submitted or collected for discussion in this Roundtable. These examples can be seen beginning at 3:30:00 in the recording of the Zoom event. Across all of the examples, presenters emphasized the importance of assessing conditions upstream and downstream of the eroding streambank when determining site suitability for streambank stabilization. The examples submitted or gathered for this discussion were largely just snapshots of the eroding segment itself, and it is challenging to determine if/how the site could be stabilized with limited information about the watershed and without being able to walk the site to examine upstream and downstream conditions.

Questions from Attendees

As the final component of the panel discussion, the presenters answered questions from attendees. Those questions and answers are summarized below.

1. Samuel Vest (TU) shared an example project during his presentation that combined the WP-2A with in-stream work, and one attendee asked whether the landowner paid for the in-stream work or whether another funding source was acquired to cover that. Samuel indicated that they try to arrange funding so that landowners do not have out-of-pocket expenses. Currently, the WP-2A pays for only 75%, and the cost-share is generally something that landowners are unwilling and/or unable to fund given the typical cost of these types of projects. So, Trout Unlimited (TU) works to arrange grant funding to cover that portion of the work.
2. One attendee asked for examples of other outside funding sources beyond the Virginia Agricultural Cost Share (VACS) Program. Kip Mumaw (Ecosystem Services) listed grant funding (e.g., NFWF), state funding for local governments (e.g., DEQ's stormwater local assistance fund), and private funding to do mitigation on sites. Amber Ellis (JRA) shared that The Nature Conservancy's (TNC) Aquatic Resource Trust is looking for areas to implement stream projects as well.
3. One participant asked whether part of the design process would most likely involve removing dams/culverts that are immediately upstream and downstream from an eroding stream site. Kip Mumaw (Ecosystem Services) replied that it depends on the goals of the project, since dams and culverts could be obstructions to aquatic organism passage, which could lead to an impairment.
4. When asked about sources of historical aerial imagery, the following tools and resources were shared: Google Earth; USGS' National Map; Albemarle County has historical aerial imagery that dates back to the late 1930s; National Archives.
5. The audience also inquired about maintenance requirements for streambank stabilization projects and which parties are responsible for paying for that maintenance. Louise Finger (DWR) noted that most projects require a hands-off approach where practitioners do not monitor or interfere with the site after project completion. Typical funding sources do not include funding for invasive species management, so that responsibility often falls on the landowner. Additionally, this means that there is no guarantee that stabilization projects will be repaired if they are damaged. Kip Mumaw (Ecosystem Services) reiterated that there are no guarantees with streambank stabilization projects on private properties. He noted that contractors will occasionally provide a one-year guarantee of workmanship for maintenance as part of an individual contract, but grant-funded projects tend not to include post-construction monitoring or maintenance. Most projects that have a Nationwide 27 permit from the Army Corps of Engineers will require monitoring for two to three years, and mitigation projects generally include 10 years of monitoring with designated funding for project maintenance. Projects completed by local governments that include state funding also often come with requirements to maintain the site, including invasive species management, so there is funding to support those requirements.
6. There were follow-up questions related to The Nature Conservancy's (TNC's) Aquatic Resource Trust Fund, specifically whether they complete the site visits and/or provide technical assessments for potential projects that may qualify for funding. Kip Mumaw

(Ecosystem Services) shared that they usually send out an RFP requesting a private, design-build company to handle the entire mitigation project—including land acquisition, easement acquisition, design, survey, maintenance, etc.—which can be referred to as "full delivery." In those cases, TNC won't necessarily go out to do site visits. Kip also noted that they do not solely cover restoration, and their funded work can include land acquisition and conservation for their projects. Amber Ellis noted that they have had TNC come evaluate sites to help narrow things down before contracting for specific projects.

Next Steps in Streambank Stabilization Learning Journey – Amber Ellis (JRA)

Amber Ellis (JRA) highlighted some of the next steps in the Streambank Stabilization Learning Journey's 2023 RFP, which has $30,000 available that can be combined with other funding sources. Amber walked through the submission form, including eligibility requirements and available tools to help those who are interested determine if they are eligible to apply for the RFP. Amber encouraged all submissions, even if applicants are unsure about site suitability, and she noted that the deadline for applications was Friday, June 30th at 5:00 PM (ET). At the time of this report, the evaluation of the submitted sites is complete, and three potential streambank stabilization project sites were selected for further assessment. In late August 2023, Louise Finger (VA DWR) led site visits to further evaluate the three prospective sites:

- State Farm Department of Corrections Property in Powhatan, VA
- Private Property in Lexington, VA
- Hope's Legacy Equine Rescue in Afton, VA (which was a location of a previous live staking workshop held by the Consortium in February 2022)

In September 2023, a project will be selected and will have a virtual meeting in November to discuss the decision-making process and available funding. Phase 3 of the Learning Journey (September 2023 – May 2024) includes agreements with partners and additional virtual meetings that will allow Consortium partners to follow along with the selected project. Towards the end of Phase 3, CWP will host another Streambank Stabilization Roundtable event, which will be focused on design and permitting. Phase 4 of the Learning Journey will include installation of the streambank stabilization project selected for RFP funding, with the goal of completion by December 2024.

SUMMARY OF FINDINGS & NEXT STEPS

The Upper and Middle James River Watershed includes a variety of land use practices that have historically and currently affected the condition of streams in the watershed. Understanding the temporal aspect of stream systems in the context of past and present land management activities is essential to protecting and restoring the James and its tributaries. Ongoing anthropogenic impacts (e.g., urbanization, agriculture, legacy impacts of mills, etc.) have influenced all parts of the Upper & Middle James River Watershed's natural resources, including its hydrology, sediment transport, floodplain dynamics, riparian vegetation, aquatic habitat, and wildlife populations. These impacts are cumulative due to the interconnectedness of different stream functions. The result is that many streams in the watershed have eroding, unstable banks, which contribute to increased sediment and nutrient loads, and in some instances an increased threat to human infrastructure and property.

Robust networks of in-stream monitoring stations maintained by USGS provide evidence of both short- and long-term trends in water quality throughout the Chesapeake Bay Watershed. Within the Upper & Middle James, USGS has reported varying trends in flow-normalized daily loads of sediment from their sites—some sites show improvements in sediment loading, while others show degradation or no detectable trend. Areas with elevated sediment loads and degraded downstream conditions can be considered for potential streambank stabilization projects. These projects are not only important from a water quality and TMDL perspective, but also from an ecological perspective in terms of preserved and/or restored diversity and productivity of wildlife and vegetation in riparian ecosystems.

In coordination with JRA and the Consortium, Dialogue + Design Associates developed a "Key Issues Report on Streambank Stabilization" (KIR) in May 2022. The KIR was developed to gain and share insights about core challenges, concerns, existing resources, and future needs surrounding streambank stabilization in the Upper & Middle James and the Chesapeake Bay Watershed as a whole. One of the key insights from the KIR was that decision-making surrounding streambank stabilization is extremely site-specific. Priorities from the KIR include increasing the capacity of stream experts, creating educational opportunities, increasing funding of high-impact projects, and coordinating with partners to implement streambank stabilization, all of which support the goals of the Streambank Stabilization Learning Journey as well.

While much of the Consortium's work to build capacity in the watershed is applicable to both streambank stabilization and full-scale stream restoration, the focus of the Learning Journey is on streambank stabilization, which is one component of restoration that fixes a specific stream problem at a defined point or stream reach. The focus on streambank stabilization provides support to landowners to help address concerns at small-scale sites that may not have access to technical knowledge or resources. There are many site selection considerations for streambank stabilization projects. The feasibility of prospective sites should include an evaluation of potential stream functional improvements, biological uplift, and funding and/or regulatory requirements. Projects should be avoided in high-quality areas like those with stable stream reaches, wetlands, seeps, rare or sensitive species, specimen trees, or important

historical or cultural features. Additionally, the cause, magnitude, extent, and trajectory of erosion should be considered; for example, projects should not be pursued where the watershed's expected rate and magnitude of future development and land use change is high. It is also important to note that different funding agencies have varying priorities for streambank stabilization projects. For example, the Natural Resources Conservation Service (NRCS) and VA Department of Conservation and Recreation (VA DCR) both fund streambank stabilization projects; however, NRCS tends to prioritize the removal of fish barriers while VA DCR tends to prioritize streambank protection more than aquatic habitat. When evaluating the feasibility of a prospective site, priorities for streambank stabilization should be contextualized with available funding opportunities.

Typically, the most effective stabilization approaches expedite a naturally occurring stream process to push the stream forward into the next, more stable phase of its evolution. Successful stabilization projects are a matter of evaluating the tradeoffs and working to achieve specific and attainable goals. It is important to ensure that the intervention is appropriate for the impairment and to understand that the approach may require multiple practices to achieve goals.

Panel discussions highlighted the need for further low- or no-cost technical assistance to facilitate the implementation of streambank stabilization projects in the Upper and Middle James. This need is particularly urgent with on-site assessments, which require a considerable amount of a technical provider's time. The costs associated with preliminary site assessments can be prohibitive to those who are unable or unwilling to contribute substantial funds to a prospective project that may not be suitable for implementation upon evaluation by an expert. As such, it is important for the Consortium to continue to work to identify and collaborate with more experts who have the capacity to provide low- or no-cost site assessments and technical assistance to property owners who are experiencing streambank erosion issues.

This Roundtable was part of Phase 1 of the Consortium's Streambank Stabilization Learning Journey and provided background information on stream dynamics and stabilization approaches. By providing insights on site selection considerations, the Roundtable was able to provide attendees with a better understanding of potential project locations that may be eligible for application to the Streambank Stabilization Learning Journey's 2023 RFP. The CWP will be hosting another Streambank Stabilization Roundtable event focused on design and permitting in the Spring of 2024 as part of Phase 3 of the Learning Journey, and Phase 4 will include installation of the streambank stabilization project selected for RFP funding, with the goal of completion by December 2024.

Appendix A. Agenda & Presenter Bios for the June 2023 Streambank Stabilization Roundtable

Building Capacity for Stream Stabilization Roundtable: Site Selection Learning Journey

Roundtable Goals & Description

Have you ever gone on a site visit and been faced with an eroding streambank but aren't sure of the next steps forward? **Join Consortium partners over the next year on a Streambank Stabilization Learning Journey where we will go through the process together to identify potential sites, narrow down a site for a project, learn about design and permitting, and observe installation.** The James River Association (JRA) also has $30,000 to contribute to the selected project!

As part of Phase 1 of the Streambank Stabilization Learning Journey, the Center for Watershed Protection (CWP) is hosting a **virtual Roundtable event on Tuesday, June 27, 2023, from 9:00 AM – 1:00 PM (ET)** for the Upper & Middle James Riparian Consortium. The Roundtable will include presentations from local researchers and practitioners, including an introduction to stream dynamics, history of land management and sediment loading in the Upper & Middle James, site selection considerations for stream stabilization projects, and more! There will also be a Panel Discussion with all presenters to answer questions, engage with requested discussion topics, and share/discuss pre-submitted questions about specific sites in the Upper & Middle James River watersheds. **Please send any questions, discussion topics, and questions/photos about specific sites with streambank erosion that you'd like to discuss with the panel to Jordan Fox (jf@cwp.org) by noon on June 26, 2023.**

This Roundtable event is open to all interested audiences within the Upper and Middle James watersheds (landowners, practitioners, nonprofits, state agencies, local and Tribal governments, educational institutions, and community organizations). There will be introductory background information for those who are newer to the concept of stream stabilization, as well as more technical content for folks who already have some experience with stream stabilization.

Zoom Event Details

You must register for this Zoom event in advance of the Roundtable event. After registering, you will receive the information to join the actual event via email. The link/passcode to view the event recording will be shared with all registered attendees via email after the event.

Tuesday, June 27, 2023 from 9:00 AM - 1:00 PM (ET).

You are invited to a Zoom meeting.
When: Jun 27, 2023 09:00 AM Eastern Time (US and Canada)

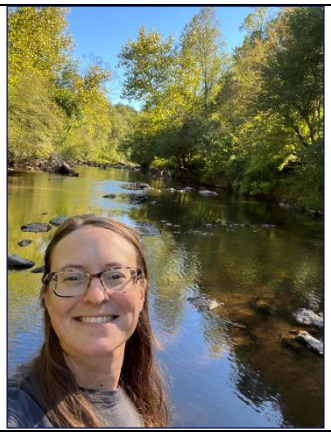
Register in advance for this meeting:
https://us06web.zoom.us/meeting/register/tZwrc-irrz8jGdTMI0EZNH5F6AqpNLO34tI7

Agenda

Timing	Presenter(s)	Topic
9:00 AM – 9:10 AM	**Amber Ellis** *James River Association (JRA)*	**Learning Journey Introduction** • Introduction to the Upper & Middle James Riparian Consortium Overview of Streambank Stabilization Learning Journey
9:10 AM – 9:20 AM	**Jordan Fox** *Center for Watershed Protection (CWP)*	**Facilitated Introductions** • Facilitated introductions of all presenters • Poll about participant/attendee affiliation (local government, NGO, consultant, landowner, etc.)
9:20 AM – 9:30 AM	**Kip Mumaw** *Ecosystem Services (ES)*	**Introduction to Stream Dynamics** • Overview of stream dynamics; briefly introduce general concepts of how watershed land use impacts streams and how stream stability affects water quality and wildlife
9:30 AM – 9:55 AM	**Kip Mumaw** *Ecosystem Services (ES)* **Louise Finger** *Virginia Department of Wildlife Resources (DWR)*	**History of Land Management in the Upper & Middle James River Watershed** • Summary of land management activities that have contributed/are contributing to the watershed-wide streambank erosion issues that have been observed by partners (Kip Mumaw, 15 minutes) • History of damming for transportation, milling, electricity, etc. (Louise Finger, 10 minutes)
9:55 AM – 10:10 AM	**Chris Mason** *USGS VA and WV Water Science Center*	**James River Basin Suspended Sediment Loads & Trends** • Summary of USGS' long-term sediment monitoring and load trend data at sites within the watershed
10:10 AM – 10:20 AM	**Break 1 (10 min)**	
10:20 AM – 10:35 AM	**Lisa Fraley-McNeal** *Center for Watershed Protection (CWP)*	**Introduction to Streambank Stabilization** • Differences between restoration and stabilization & purpose of stabilization work • Key considerations/best practices for the site selection process • Highlighted VA state mapping tools and datasets that may help with the site selection process
10:35 AM – 10:50 AM	**Emily Carlson** *Dialogue + Design Associates (D+D)*	**Overview of Streambank Stabilization Key Issues Report** • Key findings from the May 2022 Streambank Stabilization Key Issues Report
	Kip Mumaw	**Streambank Stabilization Process & Approaches**

Timing	Presenter(s)	Topic
10:50 AM – 11:20 AM	*Ecosystem Services (ES)*	• Overview of the stream stabilization project process • Examples of stream stabilization approaches • Lessons learned for site selection • Components of constructability checklist
11:20 AM – 11:35 AM	**Break 2 (15 min)**	
11:35 AM – 11:45 AM	**Louise Finger** *Virginia Department of Wildlife Resources (DWR)*	**Examples of Small-Scale Bank-Stabilization Project Sites** • Examples of sites that are considered to be good candidates for bank stabilization, highlighting site-selection criteria
11:45 AM – 12:00 PM	**Samuel Vest** *Trout Unlimited (TU)*	**Streambank Stabilization Project Highlights from Trout Unlimited** • Example streambank stabilization projects that were funded through VACS, SWCD, or NRCS with an agricultural focus
12:00 PM – 12:15 PM	**Break 3 (15 min)**	
12:15 PM – 12:45 PM	**All Presenters** *(Facilitated by CWP)*	**Panel Discussion** • Panel answers questions from attendees • Panel engages with discussion topics • Attendees screen-share photo(s) of streambank concerns and get input from panel **Please send any questions, discussion topics, and questions/photos about specific sites with streambank erosion that you'd like to discuss with the panel to Jordan Fox (jf@cwp.org) by noon on June 26, 2023.**
12:45 PM – 1:00 PM	**Amber Ellis** *James River Association (JRA)*	**Next Steps** • Next steps and timeframe for JRA's stream stabilization RFP • Upcoming site visits with Louise Finger

Presenter Details

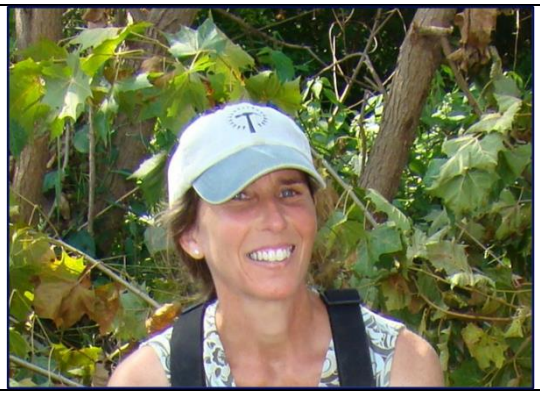


Amber Ellis
James River Association (JRA)

As Restoration Director with the James River Association, building diverse partnerships to get more projects on the ground is at the heart of Amber's work. Amber serves as the convener for the Upper & Middle James Riparian Consortium and the James River Buffer Program. She earned a Bachelor of Landscape Architecture from Virginia Tech, is a Professional Landscape Architect in Virginia, a Chesapeake Bay Landscape Professional, and has a certificate in Ecotherapy through the EarthBody Institute.

Kip Mumaw
Ecosystem Services

Kip Mumaw is the Principal Engineer and cofounder of Ecosystem Services, a natural resources consulting firm located in Charlottesville, Virginia. Kip received his Bachelor of Science from Virginia Tech in Civil Engineering with a concentration in environmental and water resources engineering. He is an alumnus of the North Carolina Stream Restoration Program and the Virginia Natural Resources Leadership Institute. Kip and his multi-disciplinary team of environmental scientists, biologists, and engineers focus on designing ecological restoration projects and watershed retrofits that improve the health of their environment and the well-being of their communities.

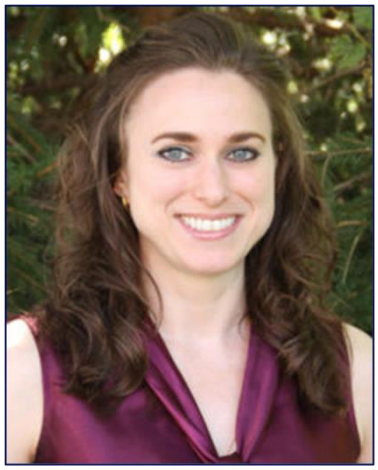


Louise Finger
Virginia Department of Wildlife Resources (VA DWR)

Louise Finger has been a Stream Restoration Biologist with the Virginia Department of Wildlife Resources since 2003. She designs and constructs stream-restoration projects, provides education and outreach on stream and riparian systems, and has special interest in enhancement of aquatic habitat and removal of dams.

Chris Mason
USGS Virginia and West Virginia Water Science Center

Chris Mason is a physical scientist with the US Geological Survey's Virginia and West Virginia Water Science Center. He has expertise in continuous water quality monitoring and long-term trends, hydrology, remote sensing, and data science.



Lisa Fraley-McNeal
Center for Watershed Protection, Inc. (CWP)

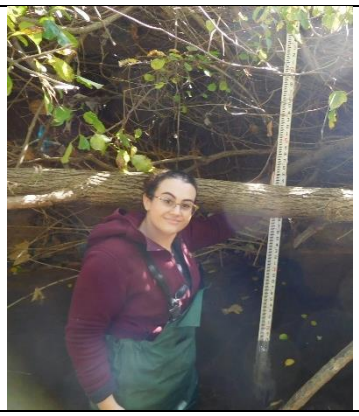
Lisa has been working on urban watershed and stormwater management since 2006. Her areas of expertise include GIS and field methods for watershed assessment, watershed planning, stream restoration, Chesapeake Bay TMDL crediting, and applied research on topics related to watersheds and stormwater. She has a B.S. degree in Geography and Environmental Systems, with a writing minor and cartography certificate from the University of Maryland, Baltimore County. Lisa also has a M.S. degree from the University of Maryland, Baltimore County in Marine and Estuarine Environmental Science.

Emily Carlson
Dialogue + Design Associates (D+D)

Emily Carlson is a project manager and consultant with Dialogue + Design Associates supporting projects through facilitation, design, stakeholder engagement, and writing. Emily possesses a Masters Degree from Penn State University in landscape architecture, and possesses experience specifically community design, green infrastructure, GIS, digital drawing and drafting, planting design, sustainable tourism planning, project management, community planning and economic development, and stream restoration. Her past professional experience in community watershed education, environmental education, field science, and social research merge with landscape architecture to transform spaces, minds and communities.

Samuel Vest
Trout Unlimited (TU)

Samuel serves as the Upper James River Home Rivers Initiative Coordinator with Trout Unlimited, and he has been with the organization since 2015. He works to implement habitat protection and restoration techniques to benefit native brook trout while engaging volunteers in hands-on conservation activities. He is responsible for developing and managing specific assessment, protection, restoration, and research projects. He also works to coordinate volunteer activities in support of specific restoration projects and to conduct outreach and provide technical assistance to landowners in the watershed.



Jordan Fox
Center for Watershed Protection, Inc. (CWP)

Jordan has been with the Center for 7 years. She has a B.S. in Environmental Science, a B.S. in Biology, and a minor in Chemistry. Her areas of expertise include GIS, field methods for watershed assessment and monitoring, and research on diverse watershed- and stormwater-related topics. Leveraging GIS technologies to support the creation of data-driven tools and deliverables are the projects that Jordan looks forward to the most.

Appendix B. Links to Presentation Slides & Event Recording

Zoom Recording of Roundtable Event

Link:
https://us06web.zoom.us/rec/share/paZ3hRqpwI22AXMPNAgoEJw0BxCvrxQzyAVSr7RpV8zc4M7mPS74PRkDYkA0wftb.ocggnKissgw6Ppi4

Passcode:
@jfMutS3

Links to Presentation Slides

- **Final Event Agenda & Presenter Bios**: Agenda & Presenter Info for Building Capacity for Stream Stabilization Roundtable_06-27-2023_final.pdf
- **Intro/Closing & Panel Discussion** (Jordan Fox, Center for Watershed Protection): Building Capacity for Streambank Stabilization_Overview Slides_06-27-23.pdf
- **1) Introduction to Stream Dynamics; 2) History of Land Management in the Upper & Middle James; and 3) Streambank Stabilization Process & Approaches** (Kip Mumaw, Ecosystem Services): Kip Mumaw_Stabilization Roundtable Slides.pdf
- **History of Dams on the James** (Louise Finger, VA DWR): Louise Finger_Presentation 1_History of Dams on the James.pptx
- **James River Basin Suspended Sediment Loads & Trends** (Chris Mason, USGS VA & WV Water Science Center): ChrisMason_JamesStreamStabilizationRoundtable_CAM_USGS_2023_v2.pdf
- **Introduction to Streambank Stabilization** (Lisa Fraley-McNeal, Center for Watershed Protection): Introduction to Stabilization_LFM.pdf
- **Overview of Streambank Stabilization Key Issues Report** (Emily Carlson, Dialogue + Design Associates): Emily Carlson_Streambank Stabilization Presentation_06-27-23.pdf
- **Examples of Small-Scale Bank-Stabilization Project Sites** (Louise Finger, VA DWR): Louise Finger_Presentation 2_Bank Stabilization_Consortium.pptx
- **Streambank Stabilization Project Highlights from Trout Unlimited** (Samuel Vest, Trout Unlimited): Samuel Vest_Trout Unlimited Site Examples.pdf