

# Stream Health

## Principles for Phase III Watershed Implementation Plans

### **Protecting streams for Human Health, Economic Development, and Infrastructure**

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The Chesapeake Bay watershed has over 100,000 miles of rivers and streams. They provide recreational opportunities such as canoeing and fishing, help crops to grow, replenish reservoirs, serve as critical habitat for valuable and endangered species, and provide essential natural services to the environment.

Our on the land directly influence the health of these valuable parts of the Bay watershed's landscape. Stream health can be improved by utilizing best management practices (BMPs) which stabilize banks, improve water quality through reduced sediment loading, improve fish and upland habitat, improve biodiversity and restore aesthetic value.

The types of BMPs implemented are dependent on principal stressors impacting a given stream. Stream bank erosion resulting from increased stormwater runoff related increased impervious surfaces (e.g., roads, rooftops, parking lots) result in significant sources of sediment and nutrients impacting the Bay. Locally, stream erosion and degradation results in the loss of land, habitats and decreases in species abundance and diversity. Degraded stream channels also pose safety hazards and impacts to infrastructure like utilities, roads, and buildings.

Human-impacted streams have altered water movement patterns and do not connect with other groundwater sources, leaving stagnant pools or preventing pollutants from filtering through the soil. Current stream restoration techniques can help remove steep banks which can lead to accidents (e.g., falling and drowning hazards). BMPs also help purify water by allowing groundwater reconnection, as well as incorporating floodplain areas that create diverse habitats and foster healthy ecosystem food chains.

Stream restoration projects and naturally healthy streams can become an economic cornerstone for a community. These projects provide an excellent opportunity for development of passive recreational facilities including walking paths, playgrounds and nature centers. Protecting stream valleys and utilizing these areas as parks is a valuable way to use open space. These parks can enhance surrounding property values, create a sense of community, or offer recreational thoroughfares and destinations, and may provide other types of recreational opportunities for hunting or fishing. These activities foster economic growth and development, as well as provide opportunities for individuals to invest in their communities.

Streams that are deeply incised and are disconnected from their floodplain are unable to have normal out-of-bank flow events which disperse the increased volumes and speeds of water. This can be a public safety hazard and result in increased downstream flooding. Current stream restoration techniques highlight the importance of reconnecting a stream to its floodplain. This is accomplished by creating areas where the stream can safely spill over the banks in high water situations. This design helps to provide flood protection for surrounding infrastructure and keeps water away from homes and businesses.

The benefits of functioning streams and adjacent wetlands, while significant on their own, are even more powerful when acting together in wetland/stream complexes on the landscape. Thus, these should be considered inextricably linked for planning and implementation purposes.

### **Best Management Practices with Stream Health in Mind**

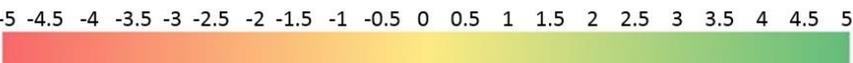
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Stream health reflects the biological, chemical and physical conditions of the stream and riparian corridor and watershed. Incorporating the protection or restoration of streams through effective land use policies and stormwater management does not necessarily require a wholesale change in implementation. There are many BMPs that address

the Bay TMDL, stream vulnerability, and other Chesapeake Bay Program outcomes. Evaluating projects for stream health vulnerabilities and developing a range of strategies to offset those vulnerabilities will increase effectiveness of BMPs, decrease maintenance costs, and still help to ensure you are meeting the Chesapeake Bay TMDL requirements into the future. See the table below for BMPs that have several co-benefits\* (the goal is to integrate various BMPs that will address the stressors affecting stream health).

Best Management Practice	Stream Health	Additional Co-Benefits				
		Brook Trout	Healthy Watersheds	Forest Buffers	Flood Control/ Mitigation	Protected Lands
Agricultural Stream Restoration	5	3	1	1	0	1
Alternative Water System	5	2	3	1	0	1
Forest Harvesting Practices	4	2	3	3.5	2.5	0.5
Forest Conservation	4	4	5	3.5	3.5	5
Agricultural Forest Buffer	4	4.5	4	5	3.5	3.5
Urban Forest Buffers	4	<u>5</u>	3.5	5	3.5	3.5
Urban Stream Restoration	3.5	<u>4</u>	4	3	3.5	3

\*Values were taken from the [Quantification of BMP Impact on the Chesapeake Bay Program Management Strategies](#) study by Tetra Tech and are based on the best professional judgement of subject matter experts. [Appendix E](#). Final Impact Scores evaluates BMP effects on outcomes on a scale of +5 (very beneficial) to -5 (very harmful). **This table shows select BMPs that scored a 3 or higher for the Stream Health Outcome; however, not all of these BMPs would merit the score of +3 for all projects. Closer evaluation of project site designs, including those from BMPs shown in the above table, is warranted when interpreting these scores. It is unlikely to find brook trout in urban streams, despite high BMP scoring (indicated by underlining and italics).**



## Guiding Principles for Incorporating Stream Health

### WIP Development

- Know where your healthy streams are and work towards identifying those that are restoration priorities.
- Capitalize on co-benefits: Select BMPs that protect healthy streams, maximize upland treatment and increase land conservation.
- Account for and consider existing stressors: Select BMPs that will contribute to reducing principal stressors.
- Consider how future population growth and land-use changes will affect BMPs.
- Align with existing climate resiliency plans (i.e., hazard mitigation plans, floodplain management programs).
- Engage partners: Work with government agencies, elected officials and NGOs to incorporate updated data and conservation efforts into existing WIPs.

### WIP Implementation

- Reduce vulnerability: Design BMPs to function with existing and future pollutant loads, land use and disturbances such as floods and wildfires.
- Maintain in-stream flows by reducing water demand and withdrawals.
- Build in flexibility and adaptability: Allow for adjustments in BMP implementation to consider a wider range of potential uncertainties and a richer set of response options.
- Adaptively manage: Allow for changes in design, construction and maintenance over time as new data regarding stream health and restoration processes becomes available.

## Tools and Resources

- Chesapeake Progress: [Stream Health Mapper](#)
- Chesapeake Bay Program, Scientific and Technical Advisory Committee: [Stream Restoration Design Workshop – 2014 Workshop Report](#)
- Maryland Biological Stream Survey ([MBSS](#)): Probability-based Random Design Stream Surveying
- [EPA Stressor Identification and Prioritization Tool](#)
- Maryland [Tier II High Quality Waters Map](#)
- Literature
  - Harman, W., R. Starr. 2011. [Natural Channel Design Review Checklist](#). US Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD and US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Wetlands Division. Washington, D.C. EPA 843-B-12-005
  - Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. [A Function-Based Framework for Stream Assessment and Restoration Projects](#). US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.
  - Palmer, M.A., Hondula, K.L. and Koch, B.J., 2014. [Ecological restoration of streams and rivers: shifting strategies and shifting goals](#). *Annual Review of Ecology, Evolution, and Systematics*, 45, pp.247-269.

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