

Fish Habitat:

Principles for Phase III Watershed Implementation Plans

This document is intended to inform Watershed Implementation Plan developers of the Best Management Practices (BMPs) most beneficial to Fish Habitat and natural resources in the Chesapeake Bay.

Improving Habitat Benefits People and Fish

Fish provide tremendous benefits to both our society and environment. They support multi-billion dollar industries including tourism, food service, commercial and recreational fishing, all while nourishing and sustaining the ecosystems in which they live. However, when watersheds are developed and nearshore areas hardened, fish habitat is threatened as well as the many benefits these fish provide to people.

Local land use decisions impact the production and sustainability of fish resources. While fishery managers can adjust the harvest of fish resources to ensure sustainable and healthy fish populations, these protective measures are limited by the availability and condition of fish habitat. For that reason, fish habitat depends on more than good water quality. Fish Habitat comprises the water or substrate necessary for fish or aquatic organisms to live and thrive, including areas for spawning, feeding, growing, or migrating. Fish need shade from trees to cool rivers to a livable temperature, roots and underwater grasses to inhabit as juveniles, unimpeded waters to spawn, and shallow areas to hide from aquatic predators.

Fortunately, many of these habitat requirements can be generated through infrastructure projects. If designed effectively, infrastructure projects can improve fish habitat, create resiliency to projected climate change impacts, and decrease erosion. Reducing contaminants into the water can also improve fish health and provide a healthier food product when fish are consumed. Recent research suggests that BMPs designed to trap sediment can effectively suspend non-soluble toxins.

Our future and the future of fish in the Chesapeake Bay are tied to the protection, restoration, and enhancement of our shared habitat. [Fishable and Swimmable](#) waters can be achieved with careful planning, conservation, and Total Maximum Daily Load (TMDL) reductions.

Water Quality Improvement Practices Benefit Fish Habitat

BMPs are designed to improve water quality and achieve the Chesapeake Bay TMDL, however many of these same measures have the potential to enhance fish habitat as well. With deliberate planning, you can maximize your water quality investment by implementing practices that result in the improvement of fish habitat and increased value of natural resources. Experts utilized their best professional judgement to appraise the benefit or detriment to natural resources from 143 different BMPs. A snapshot of this review is captured in the table below, focusing on the BMPs that were scored as having a positive impact on fish habitat of 3.5 or higher, on a scale of -5 to +5. The additional columns include natural resources that benefit from the selected BMPs. While this table provides a helpful estimate of the additional ecosystem value generated by these BMPs, it is recommended to conduct a case-by-case evaluation of co-benefits for individual sites.



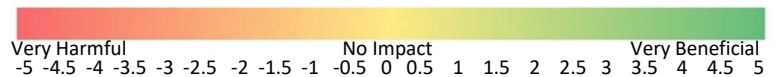
Tree Planting at Stream Restoration Site in Annapolis, MD - Will Parson



*Reedville VA Living Shoreline.
Photo: Northern Neck Master Gardeners*

Best Management Practice	Fish Habitat	Protected Lands	Habitat Biodiversity	Brook Trout	Blue Crab	Recreation	Forage Fish	Wetlands
Agricultural Forest Buffer	4.5	3.5	4	4.5	4.5	4	4	3.5
Narrow Forest Buffer	3.5	2	2.5	3.5	3	1.5	2	2
Streamside Forest Buffer	4.5	3	4	4.5	4	3	3	3
Urban Forest Buffer	4	3.5	5	5	2.5	3	3	3.5
Forest Conservation	4	5	5	4	3	3.5	3	2.5
Urban Shoreline Management	4.5	4.5	4	1.5	5	4.5	4.5	4.5
Wetland Restoration	3.5	3.5	3	1.5	2.5	2	1.5	5
Urban Stream Restoration	4	3	3.5	4	3	3	4.5	3.5

*Values were taken from the [Quantification of BMP Impact on the Chesapeake Bay Program Management Strategies](#) project by Tetra Tech [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 3.5 and higher for the Fish Habitat Outcome, however, not all of these BMPs would merit this score for all projects. Closer evaluation of project site designs, including those BMPs shown in the above table is warranted when interpreting these scores.**



Guiding Principles for Incorporating Fish Habitat

WIP Implementation Principles

1. Consider Existing Conditions and Stressors: Evaluate how site-specific conditions can influence overall BMP impact.

Conserve Habitat:

- Natural shorelines provide suitable habitat health for fish and other important watershed resources. Continuous habitat is more favorable for supporting fish and shellfish populations than fragmented habitat.
- Conserving high quality habitat will maintain ecosystem services at a lower cost than restoration.
- Fish are more responsive to restoration efforts in less developed areas.

Prevent Fish Habitat Degradation:

- Tree canopy cover lowers stream temperature by providing shade. However, some BMPs impound water, resulting in increased water temperature on sunny days. This adversely impacts sensitive aquatic species, such as brook trout.

Improve Water Quality:

- Nutrient reductions help reduce algae which improves oxygen resources for fish and shellfish. These reductions improve light conditions, which support healthy aquatic vegetation structure and function for fish diversity.
- BMPs that slow runoff flow benefits native fish communities while reducing impacts of nutrient and sediment loading.
- Reducing toxic contaminants supports improved survival, growth and reproduction of fish and shellfish, reduced water treatment costs, improved water quality, and reduced human health risks associated with fish and shellfish contaminant exposures through consumption.

2. Capitalize on Co-benefits: Prioritize BMPs that enhance fish habitat or offer other ecosystem benefits. Projects with ecosystem benefits such as maintaining stream health, enhancing wetland function, or conserving submerged aquatic vegetation often result in a positive impact.

3. Engage Partners: Use the fish habitat contacts provided below to help you plan a project that supports water quality improvements and protects or restores fish habitat. These contacts can help you determine if you have temperature sensitive species in your area.

Tools and Resources

A wide variety of fish habitat tools and datasets can help you capitalize on multiple ecosystem benefits when selecting and designing water quality improvement projects. Find a full listing of fish habitat mapping tools and spatial datasets [here](#).

- Link to detailed [BMP table](#)
- Link to [maps and datasets](#) with multiple ecosystem benefits
- Living Shorelines Resources : [Virginia](#), [Maryland](#), [Delaware](#)
- More information on Fish Habitat Outcome can be found at the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team [webpage](#).

Contacts for More Information

For more assistance on how to build fish habitat benefits into your water quality improvement projects, please reach out to your jurisdictional contact below or contact the Chesapeake Bay Program's Fish Habitat Action Team Chair, Gina Hunt at gina.hunt@maryland.gov.

Jurisdiction	Lead	Phone	Email
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