Forested Riparian Zones and their Benefit to Anadromous Fish in Chesapeake Bay

When the colonist's first arrived on the shores of the Chesapeake Bay, over 95% of the watershed was covered with forests. Lining every stream and riffle, these living filters provided a physical and biological system yielding clean, clear waters and supporting a wide diversity of fish and wildlife. Today, less than 60% of the original forested areas remain. In addition, clearing for agriculture and urban sprawl have caused an uneven and fragmented distribution of these lands. Thousands of miles of streams have been left unprotected by their natural cover.

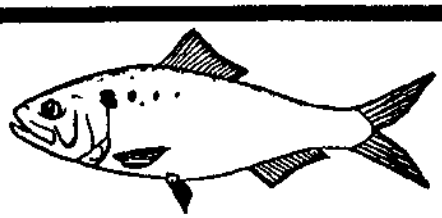
Riparian Forests are areas of trees, shrubs and other types of vegetation which can intercept surface runoff, subsurface flow and deeper groundwater flows for purposes of removing or buffering the effects from nutrients, pesticides or other pollutants which could otherwise enter streams and other larger bodies of water. These riparian forests are essential interfaces between terrestrial and aquatic ecosystems. Such ecologically diverse areas are uniquely situated to protect our streams and rivers from the adverse effects of land use changes within the drainage basin. While the overall impact of these corridors may be greatest in headwaters and smaller order streams, a complex and fragile linkage exists extending to the mainstem of the Bay. The ecological diversity of any portion of an aquatic system is directly dependent on its upstream feeder system. Therefore, degradation of any portion of a stream can have profound effects on water and habitat quality for living resources downstream.

Providing suitable spawning habitat is particularly crucial to anadromous fish. American shad, hickory shad, blueback herring, alewife, sturgeon, white and yellow perch, and striped bass all rely to various degrees on the freshwater tributaries of the Bay as spawning and nursery grounds. Most notably, perhaps, the shad and river herring whose historic runs once extended well up into the smaller order streams. Precipitous declines in several of these species have occurred over the last century, leading to losses in recreational opportunities and millions of dollars in commercial revenue.

The major causes of decline in our anadromous fish stocks have been linked to historic overharvest, stream blockages, and habitat loss and degradation. The majority of management efforts have centered around controlling the fishing effort (e.g.., moratoria and harvest restrictions) and more recently, providing passage around hydroelectric dams and other streamside impediments. The Chesapeake Bay Program has reopened over 160 miles of spawning and nursery areas in the major tributaries of the Bay with a goal of 1,357 total miles by the 1998. While these efforts will help return migratory fish to their historic spawning grounds, habitat issues must be considered to ensure reproductive success.

Forested riparian zones offer many direct and indirect benefits to our Chesapeake Bay migratory fish. Such areas filter nutrients and sediment, capture rainfall and regulate streamflow, moderate stream and air temperatures, stabilize stream banks, and create and maintain habitat.

Nutrients and Suspended Sediments - Runoff from agricultural and urban lands can have profound effects on the aquatic ecosystem. High levels of suspended sediments can abraid and clog the sensi-



tive gill tissues of fish thus disrupting functions of respiration and excretion. Also, sediments degrade spawning sites. Alosids are broadcast spawners, sending fertilized eggs into the water column to be carried downstream. Slightly heavier than water, and adhesive in the first few days, eggs may eventually settle to the bottom. Heavily silted substrate, and high turbidity can smother eggs. Additionally, excessive levels of these pollutants have been linked to reduced growth rates, resistance to disease, and reproductive rates.

Mounting evidence suggests forested buffers can greatly modify the infiltration of nutrients and sediments to these systems as well as the form and timing. Root structure along banks absorbs nutrients from the groundwater while the stabilizing stream banks and reducing erosion. Riparian areas also deliver seasonal pulses of dissolved leachates derived from terrestrial litter into streams. Forest litter and physical structure has been shown to trap runoff before entering streams. In addition, shedding of limbs and branches create small dams and pools which trap sediments within streams.

Streamflow - Generally, the current in productive spawning areas, usually riffles or extensive flats adjacent to deeper channels, ranges from 1 to more than 3 feet per second for American shad. Little data exists for blueback herring or alewife. In a natural stream, forested buffers help to lessen the impact of strong rain events, and release groundwater during periods of low flow. Shedding of tree limbs and stream bank structure also alter the hydrology of the region regulating flow in ways that are beneficial to anadromous fish.

Food - Larval and juvenile alosids, which are essentially opportunistic feeders, feed predominantly on aquatic and terrestrial insects and crustaceans, which are in turn attracted by various types of shoreline and underwater structure.

Temperature - Temperature is arguably the most important water quality parameter effecting alosid reproduction and success. It is associated with spawning migrations, spawning, development, and juvenile emigration. Survival of eggs and larvae is highly dependent on water temperature. Maximum hatching success occurs between 15.5 and 26.0 degrees Celsius with mortality and larval deformation occurring below 12.0 and above 26.7. Forested areas serve to mitigate the effects of temperature by shading.

Physical Habitat - Forest Buffers offer physical habitat for a variety of species, both above and below the waterline. Physical habitat can be in the form of underwater root structures, submerged vegetation, fallen tree branches and limbs, and bottom composition. These can serve as a means of slowing or redirecting current velocity during periods of high flow, adding to the organic layer, shading, protection, and being available for eggs to adhere to during early life stages. All of these issues lead to the basic necessities of food and shelter.

Habitat restoration in the Chesapeake Bay is extremely important to the successful return of our migratory fish stocks. While overharvest and stream impediments may be the major causes for their reduction, providing suitable spawning grounds is key to reproductive success and the rebuilding of these stocks. Absence of forested riparian zones could severely impact the quality of water and habitat for fish and wildlife. Programs, designed to help enhance these areas, continue to educate and manage through tree plantings and other restoration projects.

NOAA Chesapeake Bay Office
410 Severn Ave, Suite 107A
Annapolis, MD 21403
(410) 267 - 5676