stream habitat. Hundreds of tons of valuable topsoil are lost each year to bank erosion that could easily be remedied by riparian restoration. **Riparian restoration** involves replacing the native riparian vegetation that has been removed from a degraded stream. Riparian restoration not only increases the ecological value and overall health of a stream, but it also increases the aesthetic value of the entire stream corridor.



Photo courtesy of CEC

Livestock Exclusion Insensitively managed livestock operations can have a negative impact on water quality. Unrestricted livestock access often results in excessive sedimentation from trampled banks, nutrient loading from livestock waste, as well as the elimination of in-stream habitat and



riparian vegetation. **Livestock exclusion** involves protecting streams from unrestricted livestock access in areas where their presence has significantly degraded the stream. Livestock exclusion is often accomplished by constructing fences with limited-access crossings and providing landowners with alternative off-stream watering systems.

Photo courtesy of CEC

· · · · · · · · · · PROJECT SELECTION

The TSMP funds only projects that have been approved by the SMRT. Preference is given to larger mitigation projects providing the greatest ecological benefit. Often, these projects will include publicly owned lands or multiple privately owned lands. Projects are selected, approved, and funded based on the following criteria:

- Preference is given to projects in the same Level III Ecoregion (Griffith, G.E., et al., 1997), six-digit HUC, or, ideally, same eight-digit HUC as the impacts.
- Projects will generally be located on streams within one stream order of the impact streams.
- The ratio of urban to rural streams impacted should be generally replicated in project locations.
- All other factors being equal, priority should be given to 303(d) streams for which stream
 mitigation efforts may provide a means to alleviate the causes or sources of water quality
 and/or habitat impairment.

CONSERVATION EASEMENTS & LANDOWNER BENEFITS

The TSMP provides numerous benefits to participating landowners. The most direct, measurable benefits are the restoration of a degraded stream, the repair of eroding stream banks, and the reclamation of a riparian buffer. TSMP mitigation projects stop the wasteful erosion that carries away valuable land and prevent participating landowners from watching helplessly as their riparian property washes downstream. TSMP projects increase both the monetary and aesthetic value of riparian lands and allow tax incentives for participating landowners. The TSMP is required to protect every mitigation project with a conservation easement. Conservation easements can ensure that the mitigation projects are protected in perpetuity by prohibiting certain activities or land uses within the designated area, while allowing landowners to retain ownership of the property. Additionally, landowners may deduct the value of the donated easement as a charitable contribution.

· · · · · CONTACT THE TSMP

The TSMP encourages landowners, environmental groups, and others to submit proposed mitigation project sites that will be evaluated against the mitigation requirements within a given watershed and the project selection criteria. Interested parties may obtain project applications directly from the TSMP or local NRCS offices. For more information, including downloadable applications in PDF format, visit the TSMP website.



Tennessee Stream Mitigation Program
Ellington Agricultural Center
P.O. Box 41489
Nashville, TN 37204-0747
(615) 831-9311
www.tnstreammitigationprogram.com

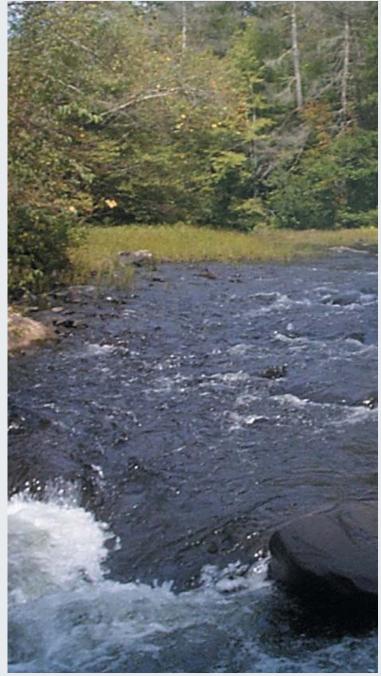


Photo by Jonathon Burr, TDEC



· · · · · · INTRODUCTION

The southeastern United States boasts some of the most diverse freshwater habitats in the world. Tennessee alone has more than 60,000 miles of freshwater streams, but these seemingly endless aquatic resources are being altered at an alarming rate. From the dark, slow-moving bayous meandering through the bottomland hardwoods of West Tennessee to the rushing trout streams cascading down the Appalachian Mountains in East Tennessee, these resources are seriously threatened by human activities. Many of the problems facing aquatic habitats are caused by changes in land use, including agricultural and forestry practices, mining operations, impoundments, and mechanized land clearing associated with development. These changes have had a profound impact on both physical and chemical water quality and have resulted in the elimination or significant degradation of the aquatic habitat that supports Tennessee's rich aquatic biodiversity.

Though many of the activities that threaten aquatic resources are not regulated, direct physical alterations to Tennessee's streams are regulated by both state and federal agencies. The U.S. Army Corps of Engineers (USACE) regulates dredge and fill activities under §404 of the federal Clean Water Act (CWA). The Tennessee Department of Environment and Conservation's (TDEC) Division of Water Pollution Control regulates physical alterations under §401 CWA and the Tennessee Water Quality Control Act of 1977 (TWQCA). The Tennessee Valley Authority (TVA) asserts jurisdiction over alterations to the Tennessee River and its tributaries under §26a of the Tennessee Valley Authority Act (TVA Act). These regulations state that for any permitted alteration that results in a loss or degradation, agencies will require compensatory mitigation, which is the process of replacing or enhancing the resource value of degraded systems. Permitted alterations that could require compensatory mitigation include

fill, encapsulation, channel modifications, channel relocations, and impoundments.

Until recently, compensatory mitigation has been solely the responsibility of the permittee. The result has often been poorly designed projects that fail to fully offset impacts. The Tennessee Stream Mitigation Program (TSMP) was created to reverse this trend by placing the obligation of compensatory mitigation in the hands of resource managers with the knowledge and expertise to implement mitigation projects that adequately offset permitted physical impacts.

· · · · · ABOUT THE TSMP

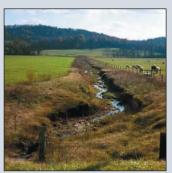
The Tennessee Stream Mitigation Program (TSMP) is a product of the Stream Mitigation Review Team (SMRT), an interagency committee composed of resource managers from the USACE, TDEC, the U.S. Environmental Protection Agency (EPA), TVA, the U.S. Fish and Wildlife Service (USFWS), and the Tennessee Wildlife Resources Agency (TWRA). Through this program, a permittee has the option to pay a fee to the TSMP to provide the compensatory stream mitigation required. The advantage of this mitigation option is that the work is performed by experienced professionals under the direction of the SMRT. The SMRT directs the establishment, use, and operation of the TSMP. As such, the result should be meaningful compensatory mitigation that benefits habitat and water quality throughout the state.

The Tennessee Wildlife Resources Foundation (TWRF) sponsors this new program. Founded in 1999, the TWRF is a nonprofit organization that supports the interests of the Tennessee Wildlife Resources Agency. The TWRF raises money by soliciting gifts, donations, grants, contracts, and memorial bequests to be used for land acquisition, educational programs, and research. The TWRF is an ideal host for this program because both it and the TSMP share one overriding objective: to conserve and protect Tennessee's unique and threatened natural resources.

· · · · · · · · · · · · · · HOW THE TSMP WORKS

The TSMP funds mitigation projects on degraded streams throughout the state. Through valuable partnerships with government agencies such as the Natural Resources Conservation Service (NRCS), TDEC, the Tennessee Department of Agriculture (TDA), and nonprofit conservation groups, the TSMP identifies streams where the physical habitat has been impaired or degraded. With permission and cooperation from participating riparian landowners, the TSMP designs and implements mitigation projects that benefit both the stream and the landowner. All TSMP projects are constructed at no cost to the landowner. Mitigation projects are monitored for success over a period of two to five years and must be protected by perpetual conservation easements held by the TWRF. Some examples of mitigation opportunities and techniques are listed below.

Stream Restoration Changes in land use have had a profound effect on Tennessee's streams. Riparian forests were converted to agricultural lands, and streams were channelized to facilitate drainage and abate flooding. As a result, many of the natural functions of these altered streams have been destroyed. **Stream restoration** is the process of returning a significantly degraded, disturbed, or totally altered stream, including the adjacent riparian zone and flood-prone area, to a natural stable condition based on reference conditions. Restoration will typically include rebuilding the appropriate channel pattern, profile, dimensions, and riparian zone to the extent that watershed conditions will allow.



Bank Stabilization Sediment is the single largest pollutant of Photo courtesy of CEC

Tennessee streams. Excessive sedimentation can result in the elimination of critical habitat for invertebrates and spawning fish. Sediment is introduced into streams from many different sources.



Photo courtesy of TSMP

Runoff from agricultural fields, commercial and residential land development, and unsound forestry practices transports tremendous quantities of sediment into our streams. Stream bank erosion is another major source of sediment. It can be caused by natural channel evolution, but more commonly is a symptom of the loss of riparian vegetation. **Bank stabilization** is the process of permanently stabilizing actively eroding stream banks. This can be accomplished by re-sloping vertical banks

and using bio-engineering techniques that incorporate living materials, rock, and structures that reduce the erosive near-bank velocities and provide in-stream habitat.

Riparian Restoration A healthy riparian zone is a critical component of a healthy stream. A well-forested riparian zone provides canopy, buffers polluted runoff, and provides important wildlife corridors. Streams with little or no riparian vegetation commonly have vertical, eroding banks and degraded in-