

Opposite and above – Washington State DOT is working to remove fish passage barriers, allowing fish such as this chinook salmon to pass safely beneath the state's roadways. Re-built culverts, pictured above, allow fish unrestricted access to freshwater habitat for spawning and juvenile rearing.

Transportation: Wetlands and Water Quality Successes

Did you know?

Transportation is achieving a net gain in wetlands acreage, adding over 20,000 acres of wetlands since 1996.

Few Americans realize that the transportation sector has achieved a 160 percent net gain in wetlands acreage since 1996. Data collected by the federal government over the past seven years show an amazing accomplishment—the highway program averaged 2.6 acres of wetlands gained for every acre lost.³⁹

Transportation agencies are boosting efforts to preserve and enhance the natural environment by financing wetlands and habitat mitigation and restoration projects—effectively using the funding flexibility provided in the Intermodal Surface Transportation Efficiency Act of 1991, and subsequently in the Transportation Equity Act for the 21st Century (TEA-21).

The transportation sector's increasing use of wetland banking—setting aside or creating new wetlands to compensate for unavoidable impacts—has shown impressive results:

- ▶ Irreplaceable wetlands that might have been lost to development are being preserved.
- ▶ Wetlands that were altered or degraded are being restored, providing improved water quality and better wildlife habitat.
- ▶ Buffer areas in wetland watersheds are being protected, enhancing existing wetland functions and values for society, including natural areas for recreation.

In addition to wetlands improvements, environmental experts at transportation agencies across the country are devising creative solutions that target taxpayer dollars to preserving and enhancing water quality through storm water management, restoration of streams, and erosion and sediment control. In many cases, transportation dollars and staff are partnering with other agencies and organizations to preserve entire ecosystems and watersheds.

In fact, water quality improvements over the past 25 year—during a time of major economic growth in the United States—represent an achievement that rarely receives much attention. A review of data on the water



Above and opposite left – The South Carolina Department of Transportation, along with the Federal Highway Administration, the Nature Conservancy, and other private- and public-sector organizations, came up with a plan to purchase Sandy Island as a wetlands mitigation bank, preserving it from potential commercial development.

The Sandy Island Mitigation Bank also saved taxpayers over \$50 million—money that would have been required for mitigation of impacts from construction of a major coastal highway and other projects in the area.

quality constituents associated with surface transportation—including nutrients, dissolved oxygen, suspended sediments, dissolved solids, and pesticides—found transportation-related water quality has shown significant improvement.

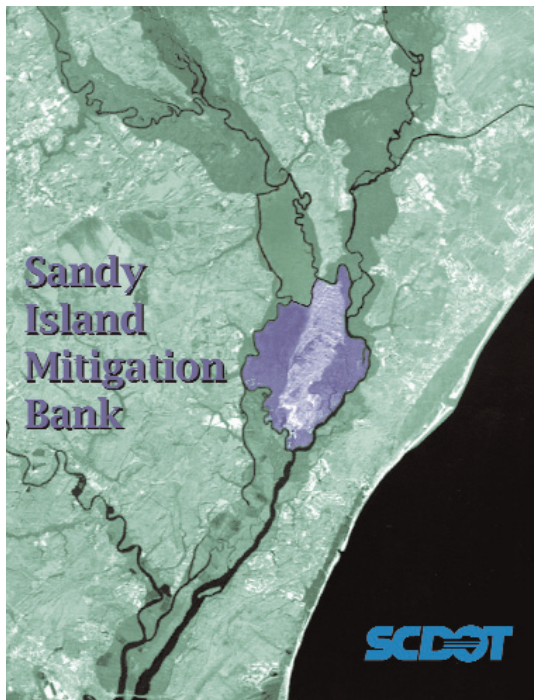
And this improvement came despite a 29 percent population growth, a 61 percent increase in employment, growth of 102 percent for inflation-adjusted gross domestic product, a 61 percent growth in vehicles, and a growth in vehicle miles traveled of 125 percent from 1970–1996.⁴⁰

Wetland Mitigation Banking: A Success Story in South Carolina

The award-winning Sandy Island mitigation project in South Carolina illustrates the benefits of the wetland banking approach in a unique effort in which over 16,000 acres—an entire island of pristine wetland habitat south of Myrtle Beach—was purchased by the state transportation agency as a wetlands mitigation bank. The project was successful in protecting a valuable ecosystem, while at the same time preserving irreplaceable social and archaeological resources.

Wetland mitigation banking operates like a bank account: a designated amount of the restored or created wetlands area can be “withdrawn,” leaving a balance that can be used to offset impacts from future projects.

Working with a unique partnership, the South Carolina Department of Transportation came up with a plan to purchase Sandy Island as a wetlands mitigation bank, preserving it from potential commercial development. The partnership also included the Federal Highway Administration, the Nature Conservancy, and other private- and public-sector organizations.



Right – The Washington State Department of Transportation protects water quality in the state by focusing on entire watersheds.

This unique agreement resulted in preservation of unique wetlands habitat, the remnants of rice plantations, a large colony of endangered red-cockaded woodpeckers, and archaeological sites—providing opportunities for visitors to experience the untouched natural environment and view relics of the past. Preservation of the island also preserved the culture of the island residents, a community descended from African-American plantation labor force, which has been in existence since 1865.

Meanwhile, the Sandy Island Mitigation Bank also saved taxpayers over \$50 million—money that would have been required for mitigation of impacts from construction of a major coastal highway and other projects in the area. Using credits from the mitigation bank, these transportation improvements will proceed, providing important economic benefits to the entire region.

Washington State’s Watershed Solution

The Washington State Department of Transportation (WSDOT) has taken a comprehensive approach to protecting water quality in the state—focusing not only on individual wetlands or bodies of water, but on entire watersheds.

The primary objective of the agency’s watershed approach is to direct transportation mitigation dollars toward areas that maximize environmental benefit and reduce mitigation cost rather than just meeting minimum mitigation standards. Since 1996, the agency has been developing and refining a watershed approach to meet this objective, while encouraging cooperation among various agencies and promoting long-term solutions that benefit both people and the fish and wildlife resources of Washington State.



Photos courtesy of the Washington State Department of Fish and Wildlife

The potential benefit of investing significant transportation dollars and expertise in watershed restoration is enormous to both taxpayers and the environment.

The agency is developing tools to systematically examine ecosystem function and to identify core problems leading to the degradation of water quality, increased peak flows, declining base flows, and the loss of fish and wildlife habitat. These tools provide new opportunities to mitigate transportation impacts and contribute to local natural resource recovery goals. The result: a more predictable permitting process with measurable transportation and environmental benefits.

Along with developing assessment tools that will help mitigate transportation impacts, a variety of the department's environmental initiatives, such as the Wetlands Strategic Plan, Fish Passage Barrier Removal Program, Advanced Environmental Mitigation Revolving Account (AEMRA), Flood Management Strategy, and Capital Budget Coordination are being managed within watershed scales to help choose the best mitigation options.

Above and inset – Before and after photos of a fish passage project on Washington State's Rasmussen Creek, a tributary to the Strait of Juan de Fuca. A single, precast concrete round culvert, located on SR 112, was replaced with a bridge in 1996, allowing coho salmon, steelhead trout, searun cutthroat trout, and resident trout to pass beneath the roadway.

Using Natural Systems

In the Puget Sound region of Washington State, the department is now developing and testing a new innovative watershed characterization method that continues to build on the watershed approach started in 1996. An interdisciplinary technical team was formed in 2002 to develop methods that view environmental mitigation in a fundamentally different way than conventional approaches.

For example: when a transportation project increases storm water runoff, engineered solutions—such as detention ponds or large concrete vaults under highways—are typically designed and constructed to retain surface water runoff. These options—while considered best management practices—are expensive to construct and will require long-term maintenance and eventual replacement. In contrast, watershed characterization seeks to understand how the project watershed stores water naturally (e.g., wetlands, riparian areas, floodplains), and then identifies where land use has resulted in the loss of natural storage capacity.

By targeting natural systems like wetlands or riparian areas for mitigation, it is possible to mitigate project storm water impacts while simultaneously restoring a self-maintaining natural system that provides many other valuable watershed functions. These include groundwater recharge, water quality treatment, and fish and wildlife habitat, along with aesthetic, recreational, and educational values to residents. Initial method development has been completed on State Route 522 in Snohomish County, Washington, with testing planned in 2003 for the Interstate 405 corridor.

Helping Washington's Threatened Salmon

The watershed approach is helping to address an ongoing challenge in the state—preservation and recovery of threatened species of salmon.

One of the major challenges is assuring that salmon and other fish have unrestricted access to freshwater habitat for spawning and juvenile rearing. Transportation officials are working to help fish navigate the streams beneath the state's roadways by helping to remove culverts that may be barriers due to high water velocity, inadequate water depth, inadequately sized, and/or a large outfall drop.

Washington State DOT has extensive work underway to correct culvert barriers in the course of highway projects, during routine maintenance, and through a special retrofit program as stand-alone projects funded expressly by the legislature.

Many of these salmonid species found in the State of Washington are in danger of becoming extinct and have been listed under the Endangered Species Act.

The fish-passage barrier retrofit program is inventorying highways to locate impassable culverts, rating the potential habitat to be gained from fixing them, and prioritizing the fixes. WSDOT and the state Department of Fish and Wildlife jointly manage a statewide database for this inventory with over 600 identified culvert barriers.

Since 1991, 45 barriers have been corrected in the course of highway projects, and another 54 barriers have been corrected through the stand-alone retrofit program. WSDOT has spent more than \$13.8 million to inventory, conduct habitat studies, prioritize, and correct fish-passage barriers to Washington streams as of April 2003. Under this program, fish access to more than 1,593,467 square meters of salmonid habitat, or, over 357 linear kilometers (222 miles) has been improved.

Once these problem culverts are corrected, the benefits to fish habitat are real and immediate—in many cases fish have been observed upstream of improved culverts within weeks of restoring access.

WSDOT also has developed and funded a research strategy to improve understanding of how road crossings can become barriers to fish and the best approaches to correcting barriers. This research will focus on hydraulic conditions in culverts as well as ecological questions relating to the behavior of juvenile salmonids.

Maryland State Highway Administration: Managing Storm Water, Controlling Erosion, and Restoring Streams

Like other transportation agencies across the country, Maryland's State Highway Administration is going to great lengths to protect and restore aquatic resources through development and implementation of new technologies—and these efforts are making positive contributions that reach beyond the transportation sector.

For example, Maryland has one of the first and most comprehensive storm water management programs in the United States. The goals of the program are to control flooding from highway construction and to clean highway runoff. The ponds and wetlands systems designed to treat storm water have evolved into multi-functional habitat areas for a variety of plant and animal species.

Advanced technologies for sediment control and stream restoration are also being developed and implemented. Sophisticated sediment control technologies initially aimed at protecting the Chesapeake Bay are used on all of the highway agency's projects—and contractors and inspectors must be certified in these sediment control practices.

Efforts to reconstruct streams are helping to advance the state-of-the-art science termed fluvial geomorphology. This process allows engineers and designers to correct past impacts by recreating intricate patterns and details found in nature to re-establish aquatic vegetation, fish, and other species.



Above – A detention pond in Maryland’s District 7 provides habitat for a variety of plant species. Sophisticated sediment control technologies initially aimed at protecting the Chesapeake Bay are used on all of the the state highway agency’s projects. Contractors and inspectors must be certified in these sediment control practices.

Right – The Maryland State Highway Administration is going to great lengths to protect and restore aquatic resources, as shown by the stormwater management facility on US 301 in Kent County, Maryland.

