CHESAPEAKE & ATLANTIC COASTAL BAYS TRUST FUND

The Chesapeake and Atlantic Coastal Bays Trust Fund was created in 2007 in an effort to reduce nutrient and sediment pollution to these bays. The Trust Fund has focused its financial resources on the implementation of effective non-point (i.e., diffuse) source pollution control projects in high priority watersheds. Examples of projects supported by the Trust Fund include stream channel restorations, stormwater retrofits, and cover crops.

The Maryland Trust Fund helps support Chesapeake Bay restoration efforts

The Chesapeake and Atlantic Coastal Bays Trust Fund was created by Maryland lawmakers in 2007 to:

- finance and accelerate Chesapeake Bay restoration,
- encourage and test new and innovative non-point source pollution control approaches,
- leverage existing funds to the greatest extent possible,
- target the most cost effective locations and practices, and
- engage the community.

Though implementation plans associated with the new Chesapeake Bay Total Maximum Daily Load (TMDL) provide state leaders with plans for Bay restoration and protection, overcoming cost-associated barriers will require cooperation among local, state, and federal partners. The Trust Fund has been designed to encourage such cooperation by focusing limited financial resources on implementation of effective non-point source pollution control projects (i.e., Best Management Practices, or BMPs) in targeted, priority areas.

Priority areas were chosen by ranking tributaries from worst to best based on water quality, then using a watershed model to estimate where the highest levels of nitrogen inputs to waterways occur, given watershed characteristics. The resulting map (Figure 1) shows where Trust Fund grants should be targeted to maximize pollution reduction benefits. The cumulative effect of numerous projects in targeted areas should lead to a measurable, positive effect on the ecological health of Chesapeake Bay.

Now in its fourth year, the Trust Fund has allocated over $38 million to over 100 targeted projects, resulting in an estimated reduction of 1.5 million pounds of nitrogen, 117,000 pounds of phosphorus, and 222,000 pounds of sediment from the Bay's waters. However, to meet the requirements of the new Bay TMDL, Maryland will be required to increase on-the-ground implementation of BMPs to further reduce nutrient and sediment loading to the Bay's waters.

The Trust Fund provides a foundation for financing such implementation activities, as well as for assessing their efficiency. For example, a monitoring strategy document has been prepared by the Trust Fund Evaluation Workgroup to guide assessment of BMP effectiveness.

In addition to funding implementation and assessment of BMPs, the Trust Fund also promotes the development of new technologies that could accelerate Bay restoration efforts. An Innovative Technology Fund has begun supporting projects such as floating wetlands (Figure 2), new flooring systems for poultry houses that reduce the industry's environmental impacts, and development of biofuels.

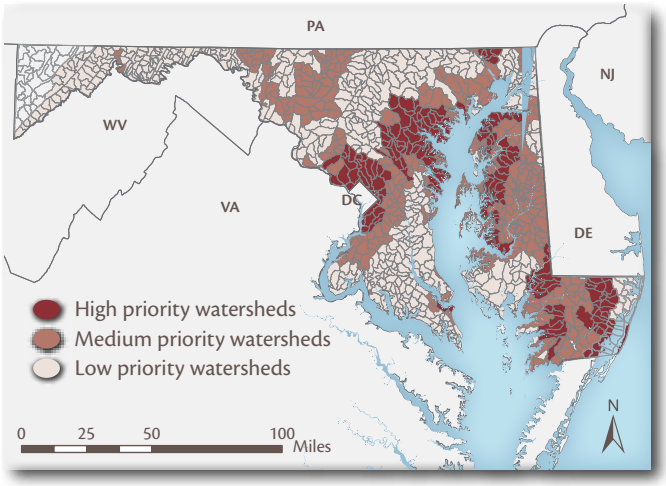
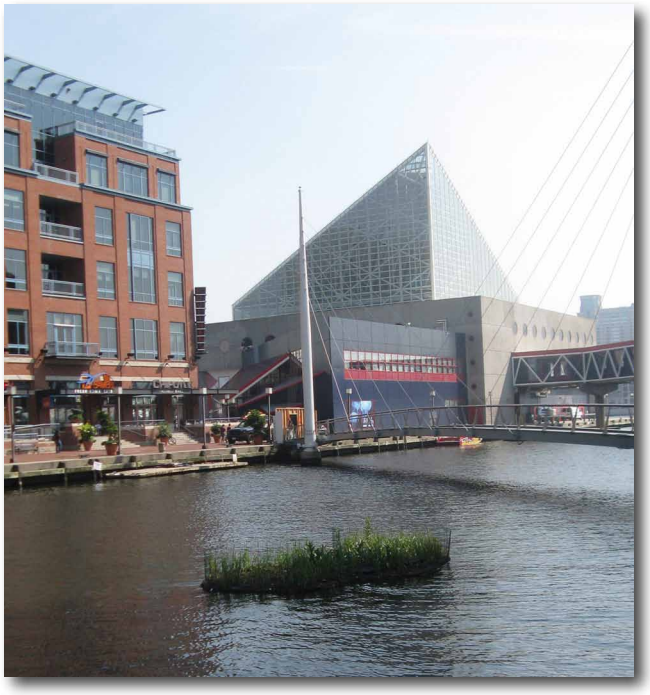


Figure 1. Watersheds in Maryland were grouped into priority areas based on water quality and nutrient loads. High priority watersheds are where Trust Fund projects will be targeted first, with many high priority watersheds located in Howard and Kent counties, and Baltimore City.



S.Powell

Figure 2. Floating wetlands, such as the one seen here outside of the National Aquarium in Baltimore Harbor, are an example of a type of project funded by the Trust Fund's Innovative Technology Fund. This fund supports projects that promote development of innovative technologies that could accelerate water quality restoration efforts.

BMPs REDUCE SEDIMENT & NUTRIENT POLLUTION

Numerous types of BMPs are currently funded

Best Management Practices (BMPs) are practical structural or nonstructural methods designed to prevent or reduce the movement of pollutants from land to surface and/or ground waters. For example, planting grasses or other native plants on eroding, exposed streambanks helps reduce sediment and nutrient pollution by reducing runoff velocities, stabilizing the stream bank, and promoting nutrient uptake.

The Trust Fund supports many types of BMPs—current projects include installation of agricultural BMPs, stream restoration projects, septic drainfield repairs, and stormwater retrofits. Current projects are distributed throughout Maryland's high priority watersheds, with many located in Howard and Kent counties and Baltimore City.

The majority of funded BMPs fall into the bioretention/stormwater retrofit category, followed by outreach and education, agricultural, and stream restoration (Figure 3).

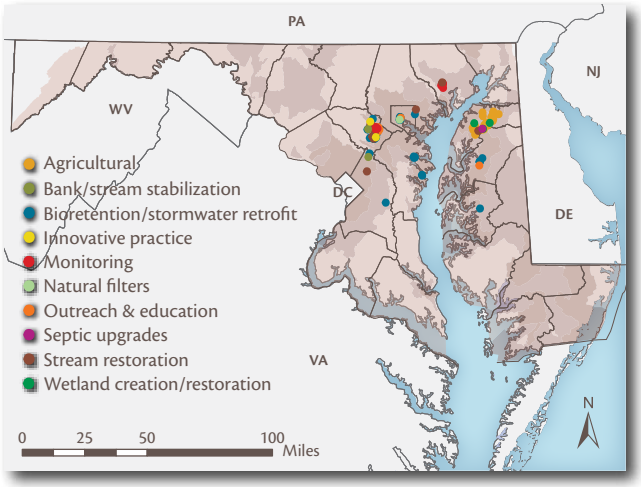


Figure 3. Current Trust Fund projects are distributed through high priority watersheds on both sides of the Bay.

Case Study—Wheel Creek Watershed Restoration

Wheel Creek is a small, urban watershed located south of Bel Air in Harford County. The Wheel Creek watershed was identified by the Harford County Department of Public Works as being in need of restoration, particularly stormwater management retrofits and physical stream channel stabilization projects. The Trust Fund began providing financial support in 2010 for implementation of BMPs throughout the watershed to address these issues.

Before BMP installation, water quality monitoring data was collected by the Maryland Biological Stream Survey (MBSS) to provide an understanding of baseline conditions in Wheel Creek, and also in an adjacent control watershed. The control watershed was selected because of its similar size and land use characteristics compared to Wheel Creek.

Eight sites were sampled for temperature, fish and benthic macroinvertebrate populations, physical stream habitat condition, and general water chemistry indicators. Land use and impervious surface coverage was also calculated using data from the 2001 National Land Cover Database.

Table 1. Benthic Index of Biotic Integrity (BIBI) scores for sites in the Wheel Creek and control watersheds. Data were collected during 2009 by the MBSS.

Location	BIBI Score	Rating
Wheel Creek Site 1	2.00	Poor
Wheel Creek Site 2	1.67	Very Poor
Wheel Creek Site 3	1.67	Very Poor
Wheel Creek Site 4	2.67	Poor
Wheel Creek Site 5	2.00	Poor
Wheel Creek Site 6	1.67	Very Poor
Wheel Creek Site 7	2.33	Poor
Control watershed Site 1	2.67	Poor

Both watersheds are predominantly urban. This contributes large amounts of impervious surface to each watershed—21% of Wheel Creek and 16% of the control watershed is impervious. It is widely understood that once imperviousness reaches 10% of a watershed's area, this can negatively impact the health of the waterbody. This is reflected in the poor and very poor scores of the Benthic Index of Biotic Integrity (Table 1) and physical stream sampling results (Figure 4).

These baseline monitoring results will be used to assess the effectiveness of the Trust Fund restoration projects. Because each monitoring site in the Wheel Creek Watershed is located downstream of the proposed restoration projects, it may be possible to assess the benefits of each individual project, as well as the efficiency of the various restoration project techniques. This information may then help guide the selection of restoration projects in other watersheds in the future.

K. Mack

Figure 4. Some of the BMPs implemented in the Wheel Creek watershed will focus on stabilizing eroding streambanks.

MEASURING THE IMPACT OF TRUST FUND PROJECTS

Monitoring before & after implementation is critical for evaluating BMP effectiveness

Evaluating BMP effectiveness is necessary for demonstrating whether projects actually reduce pollutant yields. The Trust Fund's current monitoring strategy indicates that BMPs implemented in Trust Fund projects must demonstrate a water quality response (e.g., improvement in water quality) within three years of completion. Monitoring water quality both before and after BMP implementation is a preferred and effective method that can be used to evaluate the pollutant reduction capabilities of newly implemented BMPs.

Given the number of projects currently funded (Figure 3), several projects have been selected for intensive BMP performance evaluations. One of these projects is located in a sub-catchment of the Patuxent River watershed called Red Hill Branch. To determine baseline conditions in Red Hill Branch, (i.e., before the implementation of BMPs), nutrient and sediment export from the watershed is estimated by frequent water quality monitoring combined with the calculation of discharge using weirs or flumes (Figure 5). These data are then used to calculate the pounds of nitrogen, phosphorus, and sediment that are exported from the watershed. These values will be compared to similar measurements after the BMPs are implemented. Effective BMP implementation will show a reduction in the pounds of nitrogen, phosphorus, and sediment exported from the watershed.

P. Kazyak

Figure 5. Compound weir at Meadowbrook Park.

Online mapping tool allows tracking of project and spending progress

In addition to the annual project implementation and expenditure plans associated with the Trust Fund, an interactive online mapping tool is also being developed. This mapping tool will help to promote community engagement, and will allow stakeholders to track project progress in numerous ways. For example, users can search for projects by inputting an address to locate projects close to them, by searching for all the projects in each Maryland county, and also by each watershed in the state (Figure 6).

Users can also view the funds allocated to each project or county, and see the total amount of money that has been spent.

Figure 6. The online mapping tool will provide a way for stakeholders to monitor the progress of Trust Fund projects.

INTEGRATION OF MBSS DATA INTO TRUST FUND PROJECTS

MBSS DATA OFFER A COMPREHENSIVE SNAPSHOT OF WATER QUALITY IN MARYLAND STREAMS

The Maryland Biological Stream Survey (MBSS) is a yearly, statewide randomized survey of freshwater streams conducted by the Maryland Department of Natural Resources (MD DNR). The MBSS uses information about the types and numbers of stream-dwelling animals (e.g., insects, fish, salamanders, mussels, crayfish), along with physical and chemical data (e.g., turbidity, dissolved oxygen, pH), to measure the overall health of Maryland's streams.

Nearly 4,000 sites across Maryland have been sampled and rated by the MBSS since 1995 (Figures 7 & 8). MBSS stream health ratings have been used by the Maryland Department of the Environment (MDE) to set regulations regarding the protection and restoration of non-tidal streams, and MBSS data are also used by MD DNR's Natural Heritage Program to identify and track many rare, threatened, and endangered freshwater species.

Most recently, MBSS data are beginning to be used for monitoring the success of management practices. Changes seen in the biological, chemical, and physical aspects of monitored streams near Trust Fund projects will be reflected in the MBSS data, and can help provide information about the success of the projects in reducing pollutant loads and improving water quality.

MBSS

Figure 8. MBSS Scientists count fish and other organisms below Bloede Dam on the Patapsco River. MBSS data is used to measure the overall health of Maryland's streams.

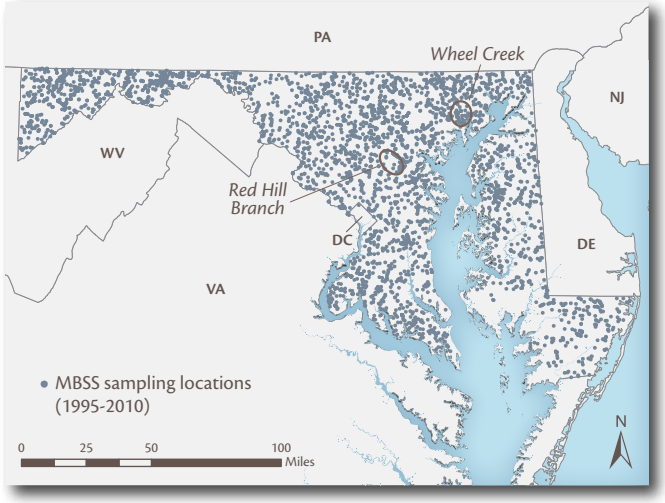


Figure 7. This map shows the sites sampled by the MBSS from 1995-2010. Sampling in the Red Hill Branch and Wheel Creek watersheds is being conducted to assess the effectiveness of extensive restoration efforts taking place as a part of Trust Fund projects.

In addition to sites that are sampled in close proximity to Trust Fund projects, MBSS will begin sampling minimally impaired sites to compare these sites around Trust Fund projects to those where a BMP has already been installed or restoration work has already been completed. This is an additional way to examine the overall effectiveness of the Trust Fund projects.

A database has been set up by MD DNR to manage monitoring data collected by MBSS and other partners around Trust Fund project locations. This database will allow for easy access to detailed monitoring data for all Trust Fund sites, simplifying analysis and distribution processes.

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FURTHER INFORMATION

MBSS: http://www.dnr.state.md.us/streams/MBSS.asp
Trust Fund: http://www.dnr.state.md.us/ccp/funding/trust_fund.asp
Web mapping tool: http://www.dnr.maryland.gov/ccp/funding/trust_fund/mapper/