

Research Needs Identified by Chesapeake Bay Program BMP Expert Panel Reports

Note: Panel recommendations are not tied to specific funding sources. Priority research needs, as identified by Panel coordinators, are in **bold**.

Urban sector
Agriculture sector
Wastewater Sector

Research Need	Panel Report Identifying Need	Date of report
Collaborative Monitoring of Retrofit Performance (p.25)	Urban Retrofits	10/9/2012
Map the distribution and ground truth the relative proportion of different land uses/covers within the current pervious land classification used in the CBWM, with a focus on high and low nutrient export risk factors.	Urban Nutrient Management (UNM)	3/11/2013
Conduct additional studies of homeowner fertilizer behavior in urban, suburban and exurban portions of the Bay watershed. These studies should focus on measuring their compliance with the intent of new statewide P fertilizer legislation.	Urban Nutrient Management (UNM)	3/11/2013
Undertake before and after surveys to document changes in homeowner attitudes and behaviors after exposure to UNM planning, and similar surveys to evaluate the impact of UNM training on UNM practice implementation among commercial applicators.	Urban Nutrient Management (UNM)	3/11/2013
Conduct source area monitoring research to confirm the load, concentrations and sources of organic N and P in lawn runoff, and define the specific contribution of lawn and leaf debris to nutrient loads associated with both pervious and impervious cover.	Urban Nutrient Management (UNM)	3/11/2013
Develop improved methods to quantify the actual lawn fertilizer N and P inputs for pervious lands through enhanced reporting and analysis of non-farm fertilizer sales data.	Urban Nutrient Management (UNM)	3/11/2013
Perform field research to measure surface and subsurface nutrient export associated with high and low risk lawns over a broader range of soil, physiographic, terrain and soil conditions.	Urban Nutrient Management (UNM)	3/11/2013
Support sociological research to determine the motivations and impediments for individuals to adopt UNM practices.	Urban Nutrient Management (UNM)	3/11/2013
Subwatershed monitoring studies that could explore how much upland retrofit implementation is needed to optimize functional uplift when stream restoration and stormwater retrofits are installed as part of an integrated restoration plan.	Urban Stream Restoration	5/13/2013
Development of a database of the different stream restoration projects that are submitted for credit under each protocol, and case studies that profile both failure and success stories and on-going maintenance needs that may be required to preserve the credits (see Section 7.1).	Urban Stream Restoration	5/13/2013
Further economic, sociologic, and ecological research to define the value and benefits of local stream restoration projects, beyond nutrient or sediment reduction.	Urban Stream Restoration	5/13/2013
Rapid field assessment methods to assess project performance, identify maintenance problems, develop specific rehabilitation regimes, or down-grade nutrient credits where projects fail.	Urban Stream Restoration	5/13/2013
Proper use and application of engineering hydrology, hydraulic, and sediment transport models to assess channel morphology.	Urban Stream Restoration	5/13/2013
Development of improved design guidelines for individual in-stream restoration structures.	Urban Stream Restoration	5/13/2013
Further refinement in stream restoration design methods that are habitat-based and watershed process-oriented.	Urban Stream Restoration	5/13/2013
Continued research on the performance of palustrine and wetland efficiencies over time to inform Protocol 3.	Urban Stream Restoration	5/13/2013
Conduct additional research on stream restoration in the mid and western coastal plain, the ridge and valley province and the Appalachian plateau as the majority of the available stream research has occurred in the Piedmont portion of the Bay watershed.	Urban Stream Restoration	5/13/2013
More research is needed on denitrification in streams as the denitrification rate in Protocol 2 is based on a single study and may not be representative of all streams in the Bay watershed.	Urban Stream Restoration	5/13/2013
More research is needed to document the response of non-urban streams to stream restoration projects in comparison to the still limited, but more extensive literature on urban streams in the Bay watershed.	Urban Stream Restoration	5/13/2013
Conduct monitoring studies to estimate the contribution of sediment and nutrients from stream bank and channel erosion and determine the causes underlying stream bank erosion.	Urban Stream Restoration	5/13/2013
Provide support for the development of regional stream bank erosion curves for the BANCS method using local stream bank erosion estimates throughout the watershed and a statistical analysis of their predicted results. Use this information to improve the accuracy of the BANCS or similar method	Urban Stream Restoration	5/13/2013
A short-term and intensive monitoring study that focuses on the nutrient concentrations in construction site discharges during the period of high fertilizer wash off risk that occurs during and after site stabilization.	Erosion and Sediment Control (ESC)	4/14/2014
Should the short-term monitoring study indicate that construction site nutrient loads are equal to or greater than the target CBWM nutrient loads, a longer term study should commence. The focus of the long term study should be to determine whether fertilization rate or formulation recommendations, vegetative stabilization methods and/or down-gradient ESC practices could be modified in order to reduce nutrient export, while still maintaining effective vegetative and soil cover during the entire construction process.	Erosion and Sediment Control (ESC)	4/14/2014
The potential benefits of incorporating low doses of PAM to hydro-seeding mixes on erosion-prone soils should be investigated.	Erosion and Sediment Control (ESC)	4/14/2014
The nutrient dynamics within individual ESC practices should be investigated to ascertain whether some practices or design variations promote greater nutrient reduction.	Erosion and Sediment Control (ESC)	4/14/2014
Monitoring studies to evaluate the fate of N and P treated by urban filter strips. Studies need to measure leaching of N and P into groundwater beneath the UFS at different distances along the flow path from the level spreader. Accumulation of N and P over time in the surface soils of the UFS would also be useful.	Urban Filter Strips	6/9/2014
Monitoring studies to evaluate the impact of concentrated flow through forested buffers, and function throughout the buffer.	Urban Filter Strips	6/10/2014
Research to evaluate the function of pollutant removal capabilities of urban forested buffers less than 35ft along the flow path.	Urban Filter Strips	6/11/2014
Investigate effect of hydric soils or groundwater flow close to the soil surface on the nitrate removal capacity.	Urban Filter Strips	6/12/2014
Research into magnitude and extent of illicit discharges, sewage exfiltration and overflows across the Chesapeake Bay	Gray Infrastructure	11/10/2014
Improve knowledge of best detection methods, nutrient concentrations associated with specific nutrient discharge types, the effect of groundwater migration and denitrification, and more precise methods for estimating the flow volume and duration associated with the discharge types	Gray Infrastructure	11/11/2014
Further study to determine whether wet weather SSOs should be granted nutrient credit and what sewer monitoring and modeling tools would be needed to compute and verify them.	Gray Infrastructure	11/12/2014
Establishment of a nutrient discharge fingerprinting database for grey infrastructure. Database would consist of nutrient concentrations, flow rates and flow durations for each of the discharge types in the watershed as they are submitted for credit.	Gray Infrastructure	11/13/2014
More local data are needed on the particle size distribution and nutrient content of street solids and sweeper wastes across the watershed. Given that the verification protocol calls for periodic local sub-sampling of these parameters, it is recommended that a data-sharing mechanism be established across the watershed. In addition, municipalities and other governmental entities will require better guidance on the best methods to collect and analyze samples, and provide adequate quality assurance and quality control.	Street Cleaning	5/19/2016
More research is needed on the fate, transport and processing of leaf litter and other organic detritus in urban streets to determine its significance as a nutrient source. If they are found to be significant, more research could determine whether intensive sweeping or catch basin cleanouts during the fall leaf drop might have a real water quality impact	Street Cleaning	5/20/2016
Tracer studies are needed to assess the mobility of the different particle sizes found in street solids and how this influences their delivery from the street to the gutter and from the storm drain to the urban stream corridor. Tracers should look at both the mineral and organic fractions of street solids, as well as seasonal factors.	Street Cleaning	5/21/2016
Field testing would help define the sediment and nutrient pick-up efficiency of the next generation of street sweeping technology, under real world conditions. One clear need is more research on the sediment pickup efficiency on streets and highway shoulders that lack curb and gutters.	Street Cleaning	5/22/2016
Further testing to determine whether street or storm drain cleaning could be an effective strategy for keeping toxics, chloride, trash or gross solids out of local waterways, and meeting local TMDLs for trash and toxics	Street Cleaning	5/23/2016
More research should be focused on the sediment and trash reduction capabilities of catch basins under various cleaning scenarios, as well as basic investigations of whether the traditional catch basin design could be improved or optimized for greater retention.	Street Cleaning	5/24/2016

Research relating edge-of-stream nutrient loads to leaching or edge-of-field nutrient losses would be valuable to fill a gap the Panel addressed based on its collective BPJ.	Nutrient Application Management Phase 5.3.2	10/15/2013
Documentation of efforts related to verifying all NM plans would be useful to develop verification protocols for all three NM tiers, but especially CGNAM.	Nutrient Application Management Phase 5.3.2	10/15/2013
Data showing the temporal increase in corn grain yields resulting from genetic improvement related to the apparently steady N fertilizer use over the same period are needed. These data could yield a considerable adjustment in recommendations.	Nutrient Application Management Phase 5.3.2	10/15/2013
Additional small watershed scale studies of sediment and especially N and P losses from representative locations within the Bay watershed would provide highly valuable information.	Continuous High Residue, Minimum Soil Disturbance Phase 5.3.2	10/15/2013
Additional studies addressing full, annual N and P balances with manure incorporation and injection practices under natural rainfall are needed.	Manure Incorporation/Injection Phase 6.0	12/19/2016
Crop- and site-specific soil test P concentration data should be collected, aggregated to the appropriate scale, summarized to eliminate disclosure of confidential business information, and used as the foundation for determining P application rate goals.	Conservation Tillage Phase 6.0	12/19/2016
Calibration of remotely-sensed information for residue cover should be continued and expanded through the watershed.	Conservation Tillage Phase 6.0	12/19/2016
Additional research and development of inexpensive and simple alkalinity control methods would help optimize the TN removal	OWTS Phase 1	7/14/2014
Additional collection of data from installed BMPs used to refine TN reduction performance and suggest design and operation enhancements	OWTS Phase 1	7/15/2014
Additional research into soil type as a potential predictor of TN reduction performance.	OWTS Phase 1	7/16/2014
Additional research on ways to reduce energy consumption and costs associated with AFTs, particularly reducing reliance on pumps to produce a continuous flow of water over the raceways	Algal Flow-Way Technology	10/21/2015
Develop additional uses for harvested biomass	Algal Flow-Way Technology	10/21/2015
More data should be collected as larger facilities are established within the Chesapeake Bay Watershed, particularly for sediment removal.	Algal Flow-Way Technology	10/21/2015