American Water Resources Association
2009 SUMMER SPECIALTY CONFERENCE
Adaptive Management of Water Resources II
June 29 – July 1, 2009
Snowbird, UT

Wednesday, July 1
10:30 AM – 12:00 Noon
SESSION 33: Chesapeake Bay Adaptive Management Activities

1. Development of an Adaptive Management Decision Support Tool for Increasing Effectiveness of Best Management Practice Implementation in the Chesapeake Bay Watershed - Olivia Devereux, University of Maryland, Annapolis, MD

The Chesapeake Bay Program is facilitating increased nutrient and sediment control strategies by creating a framework and toolkit for adaptive management. The Chesapeake Bay Program, a partnership among the US Environmental Protection Agency, other federal agencies, the six watershed states and Washington, D.C., and citizen advisory groups, recognizes that integrating regional water quality needs into local land use decisions is key to restoring the Bay. The Chesapeake Bay Program has worked for 25 years to track progress toward abating nitrogen, phosphorus, and sediment pollution in the Bay. With the onset of a basin-wide TMDL and amidst criticism of overestimating progress in achieving decreased nutrient and sediment loads, the Chesapeake Bay Program is developing a free and on-line tool to assist planners in meeting cap-loads associated with the TMDL. Since the Bay Program staff will also use this tool, the methods used for tracking progress will become more transparent. The University of Maryland under a grant from the Chesapeake Bay Program is developing an online decision-support tool known as the Nutrient and Sediment Scenario Builder. The tool is designed for rapid scenario development so users may understand the impacts of management practices, land use change, and develop more effective nitrogen and phosphorus management strategies. In essence, it allows local governments and watershed organizations to translate land use decisions such as zoning, permit approvals and BMP implementation into changes in pounds of nitrogen, phosphorus and sediment originating from a particular county or watershed. The underlying model to the Nutrient and Sediment Scenario Builder is process-based. The sources of nutrients include farm animals, chemical fertilizer, biosolids, septic and sewer systems. Users can estimate the impact of land use changes on nutrient and sediment loads by comparing scenarios. The implication of where and which best management practices are applied may also be determined. This information can help users target limited resources to the locations where they will have the most impact. Creating these “what-if” scenarios, coupled with monitoring and explanatory information, provides a powerful adaptive management tool to decrease nutrient and sediment loads to the Chesapeake Bay.

2. Enhancing Management, Coordination and Accountability of BMP Definitions and Effectiveness Estimates Utilizing an Adaptive Management Approach – Sarah Weammert, Maryland Department of Natural Resources, Annapolis, MD

Severe eutrophication in the Chesapeake Bay has led to degraded water quality and anoxic conditions. Bay watershed states have developed strategies based on BMP effectiveness estimates to reduce nutrient loads by more than 50%. Chesapeake Bay Program (CBP) partners have begun utilizing adaptive management as a routine part of programmatic decision-making; one example is a project that revised and developed BMP definitions and recommended effectiveness estimates reflective of average conditions. This project developed a protocol for BMP review in which scientists with expertise on specific BMPs reviewed literature and other data, identified factors influencing operational effectiveness and recommended BMP definitions and nutrient and sediment reduction effectiveness estimate. Developing efficiencies that reflect operational, real-world conditions requires a holistic view point and an adaptive management approach. This allows forward progress in implementation, management and policy, while acknowledging uncertainty and limits in knowledge. The adaptive management approach to BMP development incorporates the best applicable science along with best current professional judgment into definition and effectiveness estimate recommendations. With adaptive management it is necessary to include a schedule that allows for revisions as advances knowledge and experience becomes

available. Effectiveness estimates were adjusted to account for differences between research- and field-scale effectiveness due to factors such as spatial, temporal, climatic and management variability. The draft efficiencies were reviewed by expert panels and CBP technical workgroups where it became evident that both research and programmatic interests favored maintenance of optimistic efficiencies which necessitated debate and negotiation. Research on BMP effectiveness remains limited but data and experience indicate lower effectiveness at operational than research scales. Revised definitions and efficiency estimates are closer to actual, but likely remain optimistic. This talk will cover the process employed to develop BMP definitions and effectiveness estimates reflective of operational conditions, lessons learned, and challenges to implementing an adaptive management approach.

3. Adaptively Integrating Science into Policy in the Chesapeake Bay Watershed: Lessons Learned - Thomas Simpson, Water Stewardship, Inc, Annapolis, MD

The state-federal Chesapeake Bay Program (CBP) has worked for 25 years to reduce nutrient related hypoxia and clarity problems. The Program is science-based and recognized for leadership in estuarine and water quality science. The CBP has used Tributary Strategies since 1992 as plans to achieve needed nutrient reductions. Annual “progress” was based on efficiency estimates for Best Management Practices (BMPs) and state reported implementation levels used as input into a watershed model. Output was presented as annual progress by policy makers. By 1997, scientists began questioning the efficiency estimates and reported implementation. Efforts to address these concerns initially resulted in little change and met policy resistance as they would reduce perceived progress. More substantive changes made to a few BMPs in 2003 raised awareness of the issue and a The Scientific and Technical Advisory Committee report better defined the concerns with efficiency estimates and state reported implementation. A Washington Post investigative report in 2004 and several subsequent federal reviews concluded progress had likely been inadvertently overestimated. A detailed study, discussed in another paper in this symposium, was undertaken in 2006 to address problems with efficiency estimates. A recent Post article in late 2008 suggested that policy makers may have been aware of the overly optimistic progress estimates. The Bay Program has 15 years experience using BMP efficiencies and implementation estimates to project restoration progress. It has provided leadership to the science and methodology to do this but has also encountered difficulty adapting to new knowledge due to concerns over political and public backlash. Estimation of BMP impacts and verification of practice implementation remain difficult and challenging. Political pressures to show progress are not limited to the Chesapeake and make a scientifically conservative approach difficult to implement. However, as efficiencies and reported implementation begin to be used for regulatory and ecosystem-market purposes, better, more realistic estimates of impacts are essential. This requires improved estimates of BMP effectiveness and implementation verification. Experiences from the Chesapeake can help other restoration efforts, regulatory programs and developing markets avoid problems we faced while applying the many positive lessons learned.

4. Web-based Tools for Improved Management and Restoration of the Chesapeake by Watershed – Cassandra Mullinix, U.S. Geological Survey, Reston, VA (co-authors: S. Phillips, P. Hearn, J. Wolf, K. Shenk, M. Dubin)

COAST: Web-based Tools for Improved Management and Restoration of the Chesapeake Bay Watershed Hearn, P.1, Phillips, S.2,Mullinix, C.1,Wolf, J.3, Shenk, K.3, and Dubin, M.4 1U.S. Geological Survey, Eastern Geographic Science Center, Reston, VA, USA 2U.S. Geological Survey, Northeast Area, Baltimore, MD, USA 3U.S. Environmental Protection Agency, Chesapeake Bay Program, Annapolis, MD, USA, 4Chesapeake Bay Program Office & USDA-CSREES Mid-Atlantic Water Program, University of Maryland , Annapolis, MD, USA The Chesapeake Bay is listed as an impaired water body under the Clean Water Act (CWA), largely due to low dissolved oxygen levels, poor water-clarity, and high nutrient and sediment loads. To be removed from the CWA list, water-quality in the Chesapeake Bay and its tidal tributaries must be substantially improved. To date, Chesapeake Bay Program (CBP) partners (Federal, State, and local government agencies, academia, and non-governmental organizations) have only achieved about 50 percent of the nutrient load reductions needed to meet the CWA goals. Consequently, CBP partners need to increase the impact of their limited resources when a regulatory clean-up plan is implemented in 2010. The Chesapeake Online Adaptive Support Toolkit (COAST) is a collection of Web-based analytical tools and information, organized by their roles in an adaptive-management (AM) framework. It is designed to help CBP partners maximize the use of resources by more easily identifying

priority problem areas, choosing the most effective management actions, and using monitoring data to evaluate results. The initial version of COAST will be used primarily by CBP partners who implement management actions and provide grants to meet the CBP water-quality goal. COAST's AM cycle consists of 6 steps: 1. Assess objectives and strategies 2. Select areas to enhance implementation of water-quality actions. 3. Identify partner activities and resources. 4. Choose and implement actions to improve water quality. 5. Monitor change and assess progress 6. Evaluate change to adjust actions. The initial version of COAST will be used principally as a regional planning tool. However, as more information becomes available at local scales, it should become more useful for local governments and watershed groups. Future versions will also support other CBP goals, such as improving the health of habitats, watersheds, and fisheries.