Abstracts

Tuesday, April 29

Session C6: Best Management Practices for Protecting Water Quality

8:00 – 9:30 am | Room 232

Monitoring Forest Service's BMPs – Assessing the First Year of National Program Implementation

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Abstract
In 2012, the USDA Forest Service initiated a formalized National Best Management Practices (BMP) Program. The program provides a critical tool in the Agency's efforts to maintain and improve water quality. BMP Monitoring Protocols were developed as part of the overall National BMP Program, to provide a consistent approach for monitoring BMP implementation and effectiveness on all national forests and grasslands. These protocols support the adaptive management process that is integral to improving the application and refinement of BMPs. Monitoring data will be aggregated over time to provide national, regional and forest-scale evaluations of BMP performance. Monitoring using the National BMP protocols began in 2013 and all forests and grasslands were required to monitor at least two activities. Monitoring goals were assigned regionally to ensure that a diversity of land management and land disturbing activities were evaluated, including those associated with roads and trails, stream restoration, vegetation management, facilities management, and recreation. Altogether, over 280 projects or sites were monitored covering 39 activities. Results from the first year of BMP monitoring will be shared, including programmatic corrective actions needed, the type and location of projects monitored, summaries of metadata feedback, and initial monitoring costs.

Stormwater Monitoring in the Cherry Creek Basin, Colorado

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Abstract
Stormwater monitoring can have many different purposes from evaluating metals contamination to bacterial levels. For the Cherry Creek Watershed in Colorado, stormwater monitoring is in place to quantify the non-point source phosphorus and nitrogen loads that eventually flow into Cherry Creek Reservoir. Baseflow and stormflow monitoring has been conducted for 21 years on 3 tributary inputs to the reservoir to better understand the effects of the nutrient inputs from Colorado's variable rainfall events. This study quantifies the nutrient stormflow loads and compares these values to the baseflow load conditions in the watershed. The increase in nutrient and stormflow concentrations due solely to storm events is high. During the 2012 water year (October 2011 through September 2012), the total phosphorus concentration in stormflows ranged from 49% to 84% higher than baseflow conditions. Best management practices such as constructed wetlands and stream reclamation have become a key focus in the watershed to reduce the amount of nutrient loading into the reservoir. For the 2012 water year, a series of 2 constructed wetlands along 1 of the tributaries to Cherry Creek resulted in a total reduction of 65% total phosphorus and 68% total suspended solids concentrations during storm events. The effectiveness of these management practices at reducing nutrient loading is presented. The presentation will also evaluate impacts from major storm events such as the storm in June 2012 that resulted in estimated 10-year flood levels in the Cherry Creek basin and the disastrous storm event in September 2013 with estimates ranging from 10 to 25-year flood levels in the basin.

The Potential Importance of Conservation, Restoration and Altered Management Practices for Water Quality in the Wabash River Watershed

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Abstract
Nonpoint source (NPS) pollution is one of the leading causes of water quality impairment within the United States. Conservation, restoration and altered management (CRAM) practices may effectively reduce NPS pollutants discharge into receiving water bodies and enhance local and regional ecosystem services. Barriers for the implementation of CRAM include uncertainties related to the extent to which nutrients are removed at various spatial and temporal scales, longevity, optimal placement within the landscape, and implementation / operation / maintenance costs. We conduct a study to explore extent, geographical distribution, and spatial scale, determining load reduction in a relatively small watershed to a level below which an 'accepted' nutrient standard becomes insignificant relative to the overall nutrient load routed downstream through a far larger watershed. The study results are expected to provide information on local, regional, and national significance of CRAM implementation for water quality standard attainment. For this study, we use a recently developed screening-level modeling approach, WQM-TMDL-N, running in the ArcGIS environment, to estimate annual total nitrogen(TN) loading and average TN concentration; and expanded this with a new option to explore CRAM effects on TN and concentration, and multi-objective algorithm optimizing load and cost. We apply this modeling approach to the Wabash River (WR, HUC 4) watershed, IN, where land use is predominated by agriculture and CRAM implementation is being planned and implemented. CRAM practices explored include buffer strips, nutrient management practices, and wetland restoration. Because the WR accounts for over 40% of the nutrient loads of the Ohio River, which in turn significantly contributes to the anoxic zone in the Gulf of Mexico, reduction in TN loading of the WR is expected to directly benefit downstream ecosystem services. Results of initial model applications indicate that the implementation of buffer strips and nutrient management practices may significantly contribute to local and regional water quality standard attainment, and wetland restoration may even exceed these effects - with the latter offering potential solutions for water quality issues. Decisions on CRAM implementation for water quality improvement take cost into consideration, and, therefore, our pollutant load-cost optimization algorithm is expected to facilitate the decision-making process.

How Paired Is Paired? Comparing Nitrate Concentrations in Three Iowa Drainage Districts

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Abstract

Quantifying the effectiveness of perceived best management practices (BMPs) at the field and landscape-scale is difficult, so paired watershed studies are used to detect water quality improvements. We evaluated concentrations of NO3–N discharged from three tiled Iowa watersheds during a 5-yr period to assess their suitability for a paired watershed approach. Our objectives were to evaluate similarities in physical characteristics, concentration patterns, and correlation among the three paired sites and perform a minimum detectable change (MDC) analysis on paired site configurations. We also explore the effect of extreme hydrologic events (flood, drought) on concentration variability and its relevance to the paired watershed and MDC approach. The study results demonstrate that concentration variability within and between sample sites affected correlation among the paired basins, even though the physical characteristics of the basins are quite similar. High correlation between sites during normal and wet periods at the beginning of the calibration period was reduced with the onset of drought conditions. The lack of a suitable correlation may impair the ability to detect changes expected to result from BMP implementation. The MDC for NO3–N concentration change detection varied from 6.9 to 12.9% and averaged 8% for the best control-treatment pair. To ensure that conservation resources are being used effectively, implemented BMPs should focus on practices capable of achieving at least this magnitude of change.