Ongoing student research projects aim to investigate the effects of canopy cover, habitat isolation, and nutrient additions on community structure. Data have been shared and analyzed collaboratively among the school systems. Biodiversity and water quality have varied greatly seasonally and spatially among the sampling locations, which range from inner-city Richmond to Charles City County, Virginia. This project was made possible by the Howard Hughes Medical Institute (HHMI).

Environmental Science

MODELING FISH SPECIES RICHNESS AND DIVERSITY IN LOWER PIEDMONT STREAMS. E. G. Maurakis[1,2], D. V. Grimes[3], A. Schutt[4], and S. Short.[1] [1]Science Museum of Virginia, [2]University of Richmond, [3]Virginia Department of Environmental Quality, [4]VCU. Objectives were to model fish species richness and diversity using biotic and abiotic environmental factors in Quantico Creek (a forested watershed) and Cameron Run (an urban watershed), Virginia. A total of 17 physical, chemical, and biological factors were used to construct mathematical models to predict fish species richness and diversity in each watershed. Fish species richness in Quantico Creek can be predicted using season, stream order, elevation, river km, stream width and depth, watershed size and percent undeveloped land cover. Fish species richness in Cameron Run can be predicted with stream gradient, stream flow, water temperature, and percent undeveloped land cover. Funded by U.S. Department of Energy Grant DE-FG02-08ER64625.

PRELIMINARY ANALYSIS OF BAY FILTER UNIT SUCCESS IN FREDERICKSBURG, VA. MICHAEL L. BASS, UNIVERSITY OF MARY WASHINGTON, FREDERICKSBURG, VA. Virginia Department of Conservation and Recreation (DCR) evaluates and approves manufactured treatment devices (MTD's) deemed reasonable methods of prevention, control and/or treatment of storm water runoff. Virginia's stormwater management programs are implemented under: Virginia Stormwater Management Law and Virginia Stormwater Management Regulations. DCR maintains the authority to regulate BMP methods used in Virginia to control stormwater runoff under the Virginia Technology Assessment Protocol (VTAP). The assessment protocol deals with the MTD's that are designed for, reducing stormwater runoff volume, reducing peak runoff rate and/or and reducing total phosphorous (TP). The goal of the VTAP regarding runoff quality control is to determine how much a specific MTD can remove total phosphorous (TP). MTD's seeking certification for runoff quality control in Virginia will only be approved for TP removal at this time, requiring 50% TP removal for influent with TP concentrations ranging from 0.15 mg/L to 0.5 mg/L. Additional requirements are 80% removal of TSS for influent with TSS concentrations ranging from 100 mg/L to 200 mg/L and > 80% removal of TSS for influent with concentrations greater than 200 mg/L. Baysaver Technologies, Inc has applied for interim approvals to use the Bay Filter System to meet Virginia requirements for treating stormwater runoff. Flow through the filter system in gravity-driven and self-regulating. The monitoring program is intended to demonstrate through field testing that Bay Filter is capable of

removing contaminants from stormwater runoff. The field test will demonstrate the removal efficiencies attained by the system for TSS, TP, Cu, Zn and other pollutants. This will then be used to confirm that the system meets stormwater regulations which require the removal of a minimum 80% of the total suspended sediment load and treatment of nutrients to the maximum extent feasible. The field testing program will collect discrete samples from the influent and effluent of the BayFilter. These samples will be analyzed using standard EPA protocols for total suspended solids (TSS), particle size distribution (PSD), nutrients as well as metal concentrations. Removal efficiencies will be calculated based on this data using standard scientific methods. Precipitation and flow records will be aquired during these events as well. The testing program is anticipated to take 12-18 months to complete and will include at least 15 qualifying storm events. BayFilter systems to be monitored will treat the stormwater runoff from Trinity Episcopal Church property in Fredericksburg, VA. Stormwater runoff from the paved area transports dissolved, colloidal, suspended and settleable solids in a heterogeneous mixture, which includes metals, organic compounds and nutrients. These constituents result from atmospheric deposition, traffic activities, vehicular wear, pavement degradation and deicing, landscape maintenance and littering. The nutrient load from the site is expected to vary seasonally.

ASSESSING WATER QUALITY OF CEDAR CREEK USING BENTHIC MACROINVERTERBRATES. John V. Stevens, Briana L. Barron, James E. Bisset, Linden E. Lewis, Daniel A. Milhon, Cory M. Miller, Benjamin S. Sawyer, Amy L. Smith & Woodward S. Bousquet. Environmental Studies Department, Shenandoah University, Winchester Virginia 22601. In the spring and fall of 2010, Shenandoah University researchers assessed the water quality of Cedar Creek in Frederick and Shenandoah Counties, Virginia. They used the Environmental Protection Agency's Rapid Bioassessment Protocols (RBPs) to select sampling sites and collect specimens. In addition to choosing three representative sites on the creek's main stem, the researchers selected two locations on ecologically distinct tributaries: Paddy Run (a cold-water montane stream), and Meadow Brook (a warm-water valley stream). Analysis was performed with the Virginia Stream Condition Index (VSCI), a multimetric measure based on the diversity, pollution tolerance and feeding categories of the invertebrates collected. A majority of the sites had a VSCI water quality score of >73, placing them in the excellent category. Only Meadow Brook was rated as severely impaired (avg. VSCI score = 32.2), most likely due to surrounding agricultural and residential development. These findings affirm previous studies that rated Cedar Creek's overall water quality as among the best in the Shenandoah Valley region, using chemical, physical and fish community data. Best management practices should be implemented to protect this beautiful, high-quality watershed.

Medical Science

THE ROLE OF α5 NICOTINIC ACETYLCHOLINE RECEPTORS IN ACUTE AND CHRONIC ALCOHOL BEHAVIORS IN MICE. Anton J. Dawson & M. Imad