MESSAGE FROM THE DIRECTOR

April 2007

Breck Bowden
Water Center Director

Jurij Homziak
Lake Champlain Sea Grant

RESEARCH UPDATE:

The Vermont Water Center entered into an exciting new collaboration during 2006-2007 with the River Management Program in the Department of Environmental Conservation (Vermont Agency of Natural Resources). In recognition of substantial state matching support provided by the River Management Program, the Vermont Water Center RFP for 2006 was designed to specifically address several broad aspects of river management that are of direct interest to the Department of Environmental Conservation. While proposals on any topic relevant to the mission of the Water Center were considered, proposals that addressed some aspect of the research needs expressed by the River Management Program were given priority for funding.

The general objectives of the Joint ANR/Water Center RFP included: to advance scientific understanding that helps describe and quantify the contribution of sediment and nutrients derived from fluvial processes in Vermont’s rivers; to establish the socio-economic justifications, costs, and benefits associated with or represented by river corridor protection in Vermont; and to contribute to Vermont's river corridor management, restoration, and protection infrastructure.
Several areas of particular interest were identified. We sought proposals that would strengthen and help validate Vermont’s draft fluvial geomorphic-based model for describing sediment regime departures from reference or equilibrium conditions, which may influence the magnitude of sediment and nutrient production, transport, and attenuation or storage on a watershed scale. Three new projects were recommended for 2-year funding.


Mandar Dewoolkar (UVM – Civil and Environmental Engineering) and Paul Bierman (UVM – Geology). Evaluating Quantitative Models of Riverbank Stability.

**Student Research:**

*Evan P. Fitzgerald*

Measuring erosion from a stormwater outfall in Centennial Brook watershed.

The Vermont Agency of Natural Resources (ANR) has developed a state-of-the-art methodology for Stream Geomorphic Assessments (SGA), and has been collecting data on the physical condition of streams and rivers throughout the state since 2001. The protocols have been used widely in different watersheds throughout Vermont, but prior to 2005 their use in highly urbanized areas (e.g., Chittenden County) had been limited. As part of an effort to develop Total Maximum Daily Load (TMDL) analyses in stormwater impaired watersheds in the state, ANR sought baseline geomorphic assessment data for these watersheds and partnered with UVM in 2005 to obtain this information.
My thesis research project developed out of the collaborative effort between ANR and UVM’s Rubenstein School to complete the SGA Phase I (GIS-based analysis) and Phase II (field-based rapid stream assessment) level surveys for the stormwater impaired streams in Chittenden County, as well as a select group of nearby attainment streams. Data collection was completed in summer 2005 in 9 impaired watersheds and 5 attainment watersheds, including a total of 145 reaches. The reach-level assessment data includes multiple metrics of geomorphic stability, channel evolution and morphology, and physical habitat condition, and are summarized in two composite metrics: RGA (Rapid Geomorphic Assessment); and RHA (Rapid Habitat Assessment) scores. The geomorphic assessment data, when combined with other land use and aquatic biota data collected by ANR, provided the basis for the following research topics: 1) the effect of urban land use on stream geomorphic stability and physical habitat conditions; 2) the comparison of hydraulic geometry between urban and rural watersheds; 3) linkages between geomorphic stability and aquatic biota in the urban environment.

Results of our research suggest that the physical and biotic conditions of streams in the cold climate of Vermont are perhaps more sensitive to urbanization than streams found in other regions. While much data from across the country has shown that stream health typically declines when watershed imperviousness exceeds 10%, our data indicate that significant decline is observed at ~5% watershed imperviousness. In addition, small headwaters reaches in urban watersheds of Chittenden County appear to be much more sensitive to channel adjustments (e.g., widening) than larger, downstream reaches. Results also indicate that some recovery of biotic communities may be possible following natural channel restabilization. UVM and ANR are working together to incorporate these findings into the long-term management of stormwater impaired watersheds in the state.

The State of Vermont, Agency of Natural Resources Flow Monitoring Project

Meredith Curling

Introduction:
This report presents the results of streamflow gauging and precipitation measurement from June 2006 through January 2007 in sixteen impaired and ten attainment watersheds in the state of Vermont. The State of Vermont has listed the sixteen impaired watersheds as Impaired due to the effects of stormwater runoff. The state has also listed the other 10 streams with the classification of attainment, indicating that these streams are currently meeting state biological monitoring protocol, and are not currently stormwater impaired. The purpose of the streamflow gauging and precipitation measurement was to develop a substantial precipitation and stream flow record for stormwater-impaired and attainment watersheds in, and around Chittenden County. This record may be used in current and future management, permitting, and research efforts throughout the state. Previous efforts have been made to gauge streamflow in impaired watersheds only. These efforts were a great start, but highlighted the need for multi-season gauged precipitation and streamflow data for both the impaired, and attainment watersheds, in order to produce the appropriate validation for hydrologic models that will aid in future adaptive management efforts. Data collected previously by the private consulting firm Heindel and Noyes (H&N) may serve as a baseline for the sixteen impaired watersheds included in this study. Their data may be used to illuminate possible changes in the hydrology and for the purpose of comparison with future monitoring efforts. Similarly, the attainment data presented in this report represents baseline conditions in the attainment watersheds, and may be used to aid future monitoring efforts. Collectively, these data will establish a basis for historical data records for each of the focus watersheds.

Work Performed
UVM established streamflow gauging stations at twenty-five of the twenty-six watersheds included in this study. Streamflow gauging at the Englesby Brook watershed was performed separately by the United States Geological Survey (USGS). Precipitation measurements for all of the twenty-six watersheds included in this report were performed by the University of Vermont using HOBO® recording tipping bucket precipitation.
gauges and were recorded in number of tips per five minute interval. Stage data was collected in five minute intervals using Trutrack® capacitance stage sensors and dataloggers. Discharge profiling was also completed at each site in order to develop discharge rating curves to accompany the recorded stage data. This section of the report describes general data collection and analysis procedures.

WASHINGTON, D.C. - VERMONT HOUSE AND SENATE:
Senator Bernard Sanders: http://www.congress.org/congressorg/bio/?id=594
Senator Patrick Leahy: http://leahy.senate.gov/
Representative Peter Welch: http://www.congressmerge.com/onlinedb/cgi-bin/newmemberbio.cgi?member=VT00&site=congressmerge

WEBSITES

Visit the Vermont Water Resources and Lake Studies Center website at: www.uvm.edu/envnr/vtwater for information about the Water Center, The Rubenstein School of Environment and Natural Resources and the Lake Champlain Sea Grant Program at The University of Vermont.

MEETINGS/CONFERENCES/SEMINARS/WORKSHOPS
April 29-May 3, 2007: The 2007 Groundwater Summer. The summit is designed to facilitate the exchange and dissemination of technical information and new science developments. Albuquerque, New Mexico. Information: http://www.ngwa.org/e/conf/0704295095.cfm


AQUACULTURE CORNER


The Aquaculture Network Information Center [aquanic.org](http://aquanic.org) is a gateway to the world's electronic aquaculture resources. The goals of AquaNIC are to:

1. Provide access to all electronic aquaculture information at the national and international level.
2. Increase the quantity and quality of electronic information available to the aquaculture industry.
3. Provide self-paced aquaculture instruction to the aquaculture industry.
4. Obtain user input in directing AquaNIC services.

The mission of the Regional Aquaculture Centers is to support aquaculture research, development, demonstration, and extension education to enhance viable and profitable U.S. aquaculture that will benefit consumers, producers, service industries, and the American economy. Two centers are important to those interested in aquaculture in Vermont and northern New York. The Northeastern Regional Aquaculture Center (NRAC) [www.umassd.edu/specialprograms/nrac](http://www.umassd.edu/specialprograms/nrac) is a principal public forum for the advancement and dissemination of science and technology needed by Northeastern aquacultural producers and support industries. The North Central Regional Aquaculture Center [ag.ansec.purdue.edu/aquanic/ncrac/index.htm](http://ag.ansec.purdue.edu/aquanic/ncrac/index.htm) supports more than 1,000 producers of food fish, baitfish, and fish for stocking into recreational water bodies.

These websites support a highly diverse range of producers, ranging from well established producers who have made a significant capital investment and are interested in ways of reducing production costs while increasing output to those who could be classified as newcomers, who need training, capital, and an awareness of the potentially high risk, high investment, and low returns that most producers encounter.

**FAO GLOSSARY OF AQUACULTURE.** The Food and Agriculture Organization of the United Nations (FAO) Fisheries Department has published a multilingual Glossary of Aquaculture containing, at the time of publication, 2,958 terms with definitions, synonyms, related terms, information sources and images, when available. The primary objectives of the glossary are to: (i) serve as a reference to fish farmers, consultants, administrators, policy makers, developers, engineers, agriculturists, economists, environmentalists and all those interested in aquaculture, and (ii) facilitate communication among experts and scientists involved in aquaculture research and development. Website: [http://www.fao.org/fi/glossary/aquaculture/](http://www.fao.org/fi/glossary/aquaculture/)

**MEETINGS/CONFERENCES**


May 28-31, 2007: Global Trade Conference on Aquaculture. Qingdao, China. Contact: INFOFISH and GLOBEFISH 603-26914466 infish@po.jaring.my or globefish@fao.org.


November 27-30, 2007: Iran’s 5th International Fisheries, Aquaculture & Seafood Exhibition. Goal of the Exhibition is to create a dynamic environment for presenting, transferring, exchanging, expanding and developing the know-how and marketing of fisheries and aquaculture industry through active participation of Iranian and foreign companies. Contact: The Secretariate 91 484 2394798.

This newsletter is prepared by Dr. Breck Bowden, Director, Vermont Water Resources and Lake Studies Center, The Rubenstein School of Environment and Natural Resources, The University of Vermont, George D. Aiken Center, Burlington, Vermont 05405-0088, (802) 656-4057; and Dr. Jurij Homziak, Lake Champlain Sea Grant Program, The Rubenstein School of Environment and Natural Resources, George D. Aiken Center, The University of Vermont, Burlington, VT 05405-0088, (802) 656-0682. This newsletter is published with funds provided in part by the U.S. Geological Survey, Department of the Interior, as authorized by the Water Resources Research Act of 1984 and by the University of Vermont Extension System and U.S. Department of Agriculture.