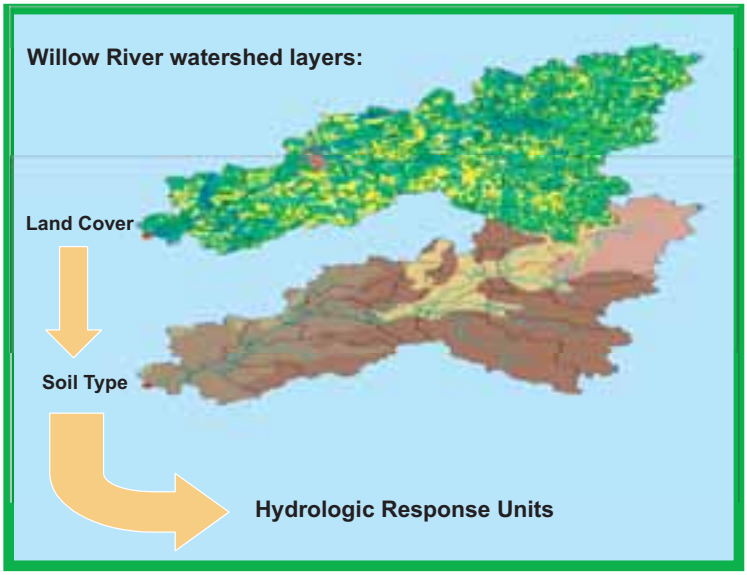
St. Croix Watershed Research Station

Highlights of 2005

TAPwaters Targets the Willow River

The Technical Assistance Program for Watersheds (TAPwaters) project uses computer programs to model hydrologic processes within watersheds and adds a vitally important skill to the station's "research toolbox." While we can use sediment cores to look at *past* conditions, and monitoring data to characterize *present* conditions, TAPwaters allows us to predict *future* conditions of watersheds in response to varied scenarios. Currently the TAPwaters team of Jim Almendinger and Marylee Murphy is modeling the Willow River watershed in western Wisconsin, a tributary to the St. Croix that delivers high loads of sediment and phosphorus. Eventually, the model will provide information to watershed managers about the best ways to clean up the watershed.



TAPwaters plans to model tributary watersheds of the St. Croix, one by one, until an integrated model of the entire river basin has been constructed. This project takes our science "out of the laboratory" and "into the real world" where decision makers implement the actions required to keep the St. Croix River healthy.

Cross-Continental Mercury Research

Atmospheric mercury is a global pollutant that knows no boundaries, and Dan Engstrom and colleagues are tracing its impacts on aquatic environments to the far corners of the globe. Most recently this group of mercury sleuths (including Dr. Bill Fitzgerald of the University of Connecticut and Dr. Carl Lamborg at Woods Hole Oceanographic Institute) has been collecting sediment cores and precipitation samples from remote sites on opposite coasts of North America--southeastern Alaska on the Pacific and western Newfoundland on the Atlantic. The idea is to compare trends in atmospheric mercury deposition for contrasting regions of the continent to determine how much of the mercury is from global emission sources and how much is contributed by regional and local sources. The study also includes monitoring sites in Minnesota, Washington, Maine, and Florida. The work is funded by the Environmental Protection Agency's STAR program (Science to Achieve Results) and will ultimately help guide policy efforts to limit mercury emissions.

Heritage Garden

Paul Red Elk, a Lakota from Rosebud Reservation in South Dakota, planted heritage seeds in a special test garden on the grounds of the research station. Red Elk has successfully germinated historic seeds that have been passed down through Native American families or gathered by seed collectors, some dating to c. 1850. Red Elk is interested in ancient vegetable species, their nutritional values, and cultural connections. The research station plot provides a protected garden for these valuable plants and complements the public gardens Red Elk has planted in the museum's "Big Back Yard."

Wooded area with heavy understory of buckthorn

Buckthorn Control Methods

In an effort to control the invasive shrub buckthorn, scientists Shawn Schottler and Matt Peters evaluated an herbicide application technique called dormant basal bark spraying. This method provides an easier, more efficient alternative to laborious means of control such as hand pulling. Its use may encourage more widespread efforts to control buckthorn, which dominates many forest habitats to the detriment of native plants.

Further studies are planned to examine the risk of spraying to non-target plants, as well as the development of a low concentration treatment for the seedlings that "carpet" the forest floor.

Graduate Students Receive Scientific Training

Seven graduate students are currently conducting research at the station, working in close collaboration with our scientists.

Staff scientists Mark Edlund and Joy Ramstack (center) with graduate students in the scope lab.

Doctoral students include Laura Triplett, continuing her investigations into nutrient cycles, contaminant inputs, and sediment flux to the lower St. Croix River; Avery Cook Shinneman, investigating climate and landscape change in Mongolia; Claire Serieyssol, studying lake-level changes in Voyageurs National Park; and Mark Green, using watershed models to understand how hydrology impacts nitrogen and phosphorus dynamics in streams.

Master's students are Kristina Brady, examining change in water chemistry and climate through sediment core records at Lake Itasca; Marylee Murphy, studying human impacts to aquatic systems through modeling the Willow River Basin in Wisconsin; and Jill Coleman Wasik, looking at how acid rain and seasonal drought impact mercury cycling in wetlands. Triplett, Shinneman, Brady, and Murphy are in the University of Minnesota Dept. of Geology and Geophysics, while Green, Serieyssol, and Wasik are in the Water Resources Science program.

Team Returns to Mongolia

Jim Almendinger and Mark Edlund returned to Mongolia in August for the second field season on a National Science Foundation-funded research project. Their team of 18 traveled over 1,000 miles by jeep across the gravel plains and sand dunes of western Mongolia, from the western edge of the Khangai Mountains to the semi-desert basin called the Valley of the Great Lakes. They sampled 32 lakes and 37 spring or stream sites for selected groups of algae, insects, and crustaceans. The team endured snow, sleet, and rain in the mountains, followed by high winds in the hot, semi-desert. Cooperating organizations are the University of Minnesota, St. Olaf College, Royal Belgian Institute of Natural Science, National University of Mongolia, and the Mongolian Academy of Science.

(l) Mark Edlund
(l) the crew
(r) Avery Shinneman, experiencing weather extremes