



St. Croix Watershed Research Station

Highlights of 2010 -2011



Lake St. Croix: How Healthy is It?

A new collaborative study will examine nutrient inputs into Lake St. Croix and assess the relationship between water quality and the ecological health of the lower section of the St. Croix River. This effort, funded by the St. Croix River Association, will aid ongoing nutrient-reduction efforts by the inter-agency St. Croix Basin Water Resources Planning Team. Coordinated by Assistant Scientist Sue Magdalene of the Research Station and involving partners from the U.S. Geological Survey (USGS) and Metropolitan Council Environmental Services, the project has two overall goals. First, a new USGS stream flow gage will be installed on the St. Croix River at Stillwater to improve existing phosphorus budgets for the lake. Second, phytoplankton, zooplankton, and lakebed sediments from Lake St. Croix will be sampled to further understanding of how the lake will respond to phosphorus reduction efforts. In particular, the study will try to understand why phosphorus levels have been slowly declining in the lake over the last few decades while at the same time algal blooms appear to be increasing. The new information from these efforts will provide a basis for estimating the future success of Total Maximum Daily Load (TMDL) limits in Lake St. Croix. Funds for this project were allocated to the Minnesota Pollution Control Agency by the Minnesota State Legislature.



NPS ecologist Brenda Moraska Lafrancois takes water-quality samples on Lake St. Croix (NPS photo)



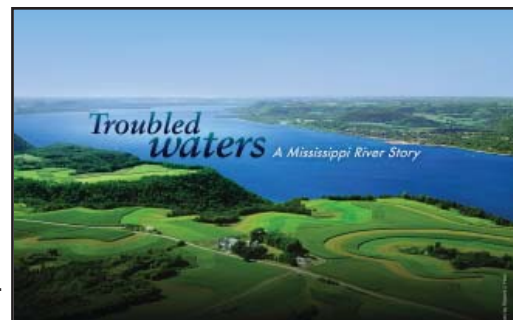
STARS: Science Training and Research Skills

Last spring and summer the Research Station introduced a program to teach science and research skills to high school and college students. The "STARS" project—Science Training and Research Skills—is a partnership with the St. Croix National Scenic Riverway and the Mississippi National River and Recreation Area. Developed by station scientists Jill Coleman Wasik, Joy Ramstack, and Toben Lafrancois, the mission of the STARS program is to engage students in scientific research, including both field and laboratory settings. Programming for high school students included classroom visits and summer programs at the Research Station which introduced current research on the St. Croix and potential careers in environmental science. In these 3-day summer classes, students designed and completed their own water-

quality studies. At the college level, four undergraduate interns were paired with mentors and developed independent research projects in one of the partner parks. The students participated in weekly seminars which offered in-depth discussions on the process of performing and communicating science, as well as career-building topics. The students presented their research results at a late-summer symposium. Reviews by student participants were enthusiastic, and the project leaders are seeking additional funding for an expanded STARS program in summer, 2011.

Mississippi Film Features Station Research

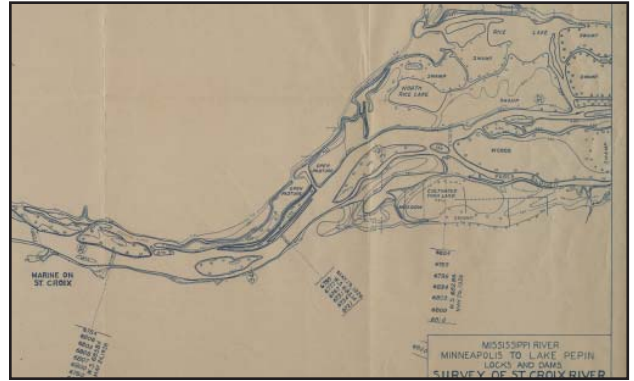
A new film produced by the University of Minnesota's Bell Museum of Natural History prominently featured research and commentary by Station Director Dan Engstrom and Senior Scientist Shawn Schottler. "Troubled Waters: A Mississippi River Story" traces the development of America's agricultural heartland and its effects on the legendary river. The film itself became news when its premiere was abruptly cancelled by the University in early October. An intense controversy erupted, the decision was reversed, and the film opened as planned and aired on Twin Cities Public Television to wide acclaim. The hour-long documentary by Peabody Award-winning filmmaker Larkin McPhee tells the story of changes on the land and the initiatives people are



taking to ensure a more sustainable food production system that protects water quality. The film shows the unintended consequences of our agricultural abundance in the Gulf of Mexico, where excess nutrients from farm runoff have fueled the formation of an extensive "dead zone." Closer to home, the accelerated infilling of Lake Pepin, first documented by Research Station scientists, is a featured story. Here the film showcases ongoing work by Schottler, Engstrom, and colleagues aimed at quantifying the sources of the sediment that imperils Lake Pepin and degrades the river.

Historic Maps Included in Digital Library

Thirty-four historic maps from the J.W.G. Dunn Research Library are now available online through the Minnesota Digital Library. This collaborative resource, developed by professionals from libraries, archives, historical societies and museums, is creating a digital collection of the state's unique resources and special collections. The initial digitization effort of the MDL, *Minnesota Reflections*, includes nearly 45,000 images and documents shared by more than 98 cultural organizations across the state. Research Station Librarian, Suzanne Yoch, worked with MDL specialists to select from the Dunn Library a unique set of historic St. Croix River maps. Digitization of the maps was completed in a special scanning laboratory at the University of Minnesota. Suzanne provided information for the online database, and these rare maps can now be accessed by the general public. Our collection on Minnesota Reflections includes maps and river charts from the 1930s, many with handwritten notations. A sketch map of the river from Taylors Fall to Stillwater notes Otisville, Sweezy's Lodge, and a lime kiln below Osceola. Additional resources from the J.W.G. Dunn Research Library will be considered for inclusion on *Minnesota Reflections* in 2011. See the maps—and the entire project—at <http://www.mndigital.org/reflections/>.



Return to Lake Michigan: Studying Botulism Outbreaks near Sleeping Bear Dunes

A new cooperative project will partner the Research Station with National Park Service, US Geological Survey, and University of Massachusetts scientists to disentangle how outbreaks of botulism are again occurring along Great Lakes coastlines. These outbreaks were common along Lake Michigan in the 1960s, resulting in beach closures and fish, waterfowl, and wildlife deaths. The 1970s brought stringent pollution controls and improved water quality, and botulism outbreaks were thought to be a thing of the past. In the 2000s, botulism again showed up around the lower Great Lakes with particularly severe outbreaks near Michigan's Sleeping Bear Dunes. Loons, lake sturgeon, and even the federally endangered piping plover succumbed in large numbers. Causes of the new outbreaks are unclear. In an effort to understand those causes, station researchers Mark Edlund and Alaina Fedie boarded the USEPA's research vessel Lake Guardian in September for a 3-day, 600-mile research cruise on Lake Michigan to collect sediment cores. These cores will be analyzed for biological, geochemical, and paleo-DNA evidence to reconstruct the history of four factors implicated in botulism outbreaks – algae growth, anoxia, impacts of zebra mussels, and historical levels of *Clostridium botulinum* – to understand the conditions likely to generate future botulism outbreaks and die-offs. NPS aquatic ecologist Brenda Moraska Lafrancois and staff scientist Mark Edlund are lead investigators on the project.



Mark Edlund retrieves a gravity core from Lake Michigan

Clean Hands, Dirty Water

For the past 20 years soap manufacturers have added the bactericide, triclosan, to liquid hand soaps and other personal care products. However, recent scientific findings raise questions about unintended consequences of widespread triclosan use. It appears that a portion of the triclosan that goes down our drains is discharged to surface waters, where it is transformed by sunlight into dioxins, an infamous class of toxic pollutants. Now two new studies, one funded by the National Science Foundation (NSF) and the other by the Legislative and Citizens Commission on Minnesota Resources (LCCMR), will explore the extent of triclosan-dioxin pollution in Minnesota and beyond. These studies are a collaborative effort between scientists at the University of Minnesota, ETH-Zurich (Switzerland), and the Research Station. Much of the focus will be on sediment-core records of historical dioxin pollution from lakes and estuaries receiving wastewater discharge. In Minnesota, that includes Lake St. Croix, Lake Pepin, the Duluth-Superior Harbor, Lake Superior, and a number of smaller lakes. The overall aim of the studies is to quantify the relative importance of triclosan and related compounds such as PDBEs (flame retardants) to the total dioxin contamination of our surface waters.

