Upper Midwest Environmental Sciences Center
October 2011 Activity Report

Agriculture

Environmental Effects of Agricultural Practices

- William Richardson and Jon Vallazza traveled to Olivia, MN *(Minnesota River basin)* October 5-7 to sample biologic material in streams and ditches draining agricultural fields, quantify the source of phosphorus entering streams, evaluate the effects of agricultural land management on phosphorus movement to streams, and evaluate the effects of phosphorus on stream biota. Streams to be sampled drain agricultural catchments with a gradient of amount and type of land retirement and riparian buffer zones. The biologic materials *(algae, algal grazing invertebrates, predatory invertebrates, and fish)* will be analyzed for fatty acids and stable carbon and nitrogen isotopes to determine organism health, food chain length, and food source. This particular sampling trip is one of many conducted by scientists from the Upper Midwest Environmental Sciences Center, the Minnesota, Wisconsin, Kentucky, and Indiana Water Science Centers, as well as staff from the Natural Resources Conservation Service, Renville Soil and Water Conservation District, and the Hawk Creek Watershed Project. This sampling effort supports the Midwest Area's Environmental Effects of Agricultural Practices project titled, "Influence of retired agricultural lands on stream water and ecological quality."

Animal Abundance

Estimating Animal Abundance

- Brian Gray coauthored a manuscript on the use of the N-mixture model, proposed by Royle in 2004, to approximate the abundance and detection probability of animal species in a given region. The team studied the robustness of a Bayesian approach to fitting the N-mixture model for pseudo-replicated count data. Their simulation results showed that the Bayesian estimates for abundance and detection probability are slightly biased when the actual detection probability is small and are sensitive to the presence of extra variability within local sites.
    - Toribio, S.G., B.R. Gray, S. Liang. 2011. An evaluation of the Bayesian approach to fitting the N-mixture model for use with pseudo-replicated count data. Journal of Statistical Computation and Simulation. DOI:10.1080/00949655.2011.572881

Aquatic Ecosystem Health

FDA Grants for Aquaculture Drug Research

- The Upper Midwest Environmental Sciences Center received notification from the U.S. Food and Drug Administration's Office of Minor Use Minor Species had accepted five grant proposals from UMESC for funding through its "Minor Use Minor Species Development of Drugs" grant program. Two of the projects are related to the development of eugenol as an immediate-release fish sedative, another two are related to the use of 35%PEROXAID® to treat *Gyrodactylus sp.* infestations in coolwater and warmwater finfish, and the fifth application will support the expansion of the approved label to allow for administration of florfenicol or oxytetracycline in medicated feed to control mortality associated with motile aeromonad septicemia caused by four different aeromonad species. For more information contact Mark Gaikowski (mgaikowski@usgs.gov).

Using Hydrogen Peroxide to Control Saprolegniosis

- The U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine (CVM) completed their review of a study completed by UMESC scientists Maren Tuttle-Lau, Sue Schleis and Mark Gaikowski to describe the effectiveness of 35%PEROXAID® to control mortality caused by saprolegniosis on walleye. The CVM, based on the work on walleye and previous work by Tuttle-Lau and others on rainbow trout and by Jeff Rach and others on

channel catfish, concluded that the effectiveness technical section is complete for the use of hydrogen peroxide to control mortality from saprolegniosis on all freshwater-reared finfish. This decision clears the way for the drug sponsor, Eka Chemicals, to add this label claim to their approved drug label for 35% PEROXAID®. This project was supported through a grant from the FDA Office of Minor Use Minor Species. For more information contact Mark Gaikowski *(mgaikowski@usgs.gov).*

Aquatic Invasive Species – Sea Lamprey

Regulatory Actions

- UMESC scientists submitted the following regulatory actions during the week of October 3-7, in support of the Great Lakes Fishery Commission Integrated Management of Sea Lamprey *(Petromyzon marinus)* Control Program.
    - Rivera, J.E. and T.D. Hubert. 2011. Pesticide Manufacturer and Labeler License Application for the license period ending December 31, 2012. Submitted to the Wisconsin Department of Agriculture, Trade and Consumer Protection, October 4, 2011.
    - Rivera, J.E. and T.D. Hubert. 2011. Report to comply with the Federal Insecticide, Fungicide, and Rodenticide Act 6(a)(2) Regulations. Submitted to the U.S. Environmental Protection Agency, October 5, 2011.

Climate Change

Native Mussels

- Teresa Newton *(UMESC)* and Alissa Ganser *(University of Wisconsin-LaCrosse)* presented their research on the effects of climate change on physiological and reproductive processes in native freshwater mussels in the Mississippi River Basin, at the Electric Power Research Institute's 3rd Thermal Ecology and Regulation Workshop, October 11-12 in Maple Grove, MN.

Fish and Wildlife Service

Big Rivers Biological Network

- UMESC scientists participated in the U.S. Fish and Wildlife Service's (FWS) Big Rivers Biological Network annual meeting, October 4-5 at the Upper Midwest Environmental Science Center in La Crosse, WI. The FWS Big Rivers Biological Network is comprised of biologists and refuge managers from the National Wildlife Refuges associated with the Illinois, Mississippi, and Missouri Rivers. Holding their 2-day annual coordination meeting at UMESC provided them with an opportunity to;
    - Learn first-hand about UMESC science capabilities, programs, and projects that have field applications relevant to river refuges *(e.g., vegetation mapping projects, computer applications, decision support systems used to prioritize habitat rehabilitation projects, using sound recorders to assess wildlife populations)*.
    - Interact with FWS Division of Biological Resources personnel co-located at UMESC.
    - Tour the Mississippi River navigation Pool 8 habitat rehabilitation and enhancement projects located near UMESC.
    - Visit the new refuge headquarters for the La Crosse District of the Upper Mississippi River National Wildlife and Fish Refuge.

Geospatial Science & Technology

Accuracy Improvements (Orthophotography)

- Janis Ruhser and Larry Robinson completed the first step in creating othophotos and orthophoto mosaics that will have positional accuracies measured in inches instead of meters, conducting the boresight computation for a new 60-mm camera lens that will be used with the U.S. Fish and Wildlife Service's FWS Applanix DSS 439 aerial mapping camera. The

improved orthophoto image accuracies are achieved by computing small offsets within the various camera components that can degrade positional information if left unaccounted for. Once calculated, these offsets can be eliminated from photo collection missions, improving the positional accuracy of the final products. This 60-mm natural color lens, which supplements their 40-mm natural color and 40-mm color infrared lenses, will be used primarily to document waterfowl use of Upper Mississippi River. The longer focal length will provide high-resolution images that can be collected at altitudes that will not disturb resting waterfowl.

Aquatic Insect Detection

- Manuel Suarez attended the Upper Mississippi River Conservation Committee's Water Quality Technical Meeting October 25-26 in Muscatine, IA, to gage interest and gather support for the development of a weather radar-based, mayfly emergence detection and reporting system.

Great Lakes Restoration Initiative (GLRI)

Project #73, Avian Botulism in Distressed Great Lakes Environments

- Kevin Kenow, Steve Houdek *(UMESC),* and Brian Lubinski *(FWS)* conducted waterbird surveys on Lake Michigan, October 3-5, in association with Great Lakes Restoration Initiative project Avian Botulism in Distressed Great Lakes Environments.

- Kevin Kenow *(UMESC)* discussed common loon migration during the National Public Radio (NPR) program "Phenology," Tuesday October 11 at 6:00 pm CDT, KAXE radio, 91.7 FM, Grand Rapids, MN. An archive of the program is available at http://kaxe.org/programs/phenology.aspx.

Long Term Resource Monitoring Program

Comparing LTRMP collected data to EMAP

- Brian Ickes co-authored a manuscript which compared the Long Term Resource Monitoring Program (LTRMP) fish sampling data to those collected by the Environmental Monitoring and Assessment Program-Great Rivers Ecosystems (EMAP-GRE) program. EMAP-GRE, which is designed for baseline and compliance monitoring, used a probabilistic, continuous design. LTRMP is designed primarily for baseline and trend monitoring, and used a stratified random design in five discrete study reaches. Analysis of similarity indicated no significant difference between EMAP-GRE and LTRMP Index of Biotic Integrity (IBI) scores. Both datasets distinguished clear differences only between 'Fair' and 'Poor' condition categories, potentially supporting a 'pass–fail' assessment strategy. A decline in IBI scores from upstream to downstream was consistent with Upper Mississippi River fish community studies and a previous, empirically modeled human disturbance gradient. Comparability between EMAP-GRE *(best upstream to downstream coverage)* and LTRMP data *(best coverage over time and across the floodplain)* supports a next step of developing and testing a systemic, multi-metric fish index on the Upper Mississippi River that both approaches could inform.
    - Dukerschein, J. T., Bartels, A. D., Ickes, B. S. and Pearson, M. S. (2011), Are Two Systemic Fish Assemblage Sampling Programmes on the Upper Mississippi River Telling Us The Same Thing?. River Research and Applications. doi: 10.1002/rra.1575

National Park Mapping

Natchez Trace Parkway (NATR)

- Jennifer Dieck, Andrew Strassman, and Larry Robinson coordinated the collection and review of high-resolution digital imagery for the northern half of the National Park Service's (NPS) Natchez-Trace Parkway *(Nashville, TN to Tupelo, MS).* The imagery was collected by Kucera International, Inc. and will be used to develop a vegetation database for the NPS Vegetation

Inventory Program, an effort to classify, describe, and map detailed vegetation communities in more than 270 national park units across the United States.

Wildlife Ecology

Migratory Species

- Wayne Thogmartin participated in the USGS Powell Center for Analysis and Synthesis Working Group titled, "Animal Migration and Spatial Subsidies: Establishing a Framework for Conservation Markets," in Ft. Collins, CO, October 3-6. Over a series of four meetings, during the next two years, the working group seeks to calculate spatial subsidies within the migratory ranges for selected species *(northern pintail, free-tailed bats, monarch butterflies)* and design a market system utilizing this information.

Wildlife Health

White-Nose Syndrome

- Wayne Thogmartin presented research results from, “A Demographic Model for Indiana Bats Subject to White-nose Syndrome,” at the North American Society for Bat Research conference in Toronto, Canada, October 29. Given the great mortality associated with a quickly spreading fungal disease White-nose Syndrome, Thogmartin and his colleagues with the USGS *(Carol Sanders-Reed, Patrick McKann, Mike Runge)* and the U.S. Fish and Wildlife Service *(Lori Pruitt, Jennifer Szymanski, Andy King, Mike Armstrong, Robyn Niver)* project that white-nose syndrome could cause a range-wide collapse of the endangered Indiana bat.

Other

Acronyms

CVM – Center for Veterinary Medicine
EMAP-GRE – Environmental Monitoring and Assessment Program-Great Rivers Ecosystems
FDA – U.S. Food and Drug Administration
FWS – U.S. Fish and Wildlife Service
IBI – Index of Biotic Integrity
LTRMP – Long Term Resource Monitoring Program
NATR – Natchez Trace Parkway
NPS – National Park Service
UMESC – Upper Midwest Environmental Sciences Center
USGS – U.S. Geological Survey