Upper Midwest Environmental Sciences Center
December 2011 Activity Report

72nd Midwest Fish and Wildlife Conference

- UMESC scientists participated in the 72nd Midwest Fish and Wildlife Conference, December 4-7 in Des Moines, IA. Activities included:

Oral Presentations *(General Meeting)*

- Effects of Electricity on the Early Life History Stages of Three Model Fishes to Investigate the Use of Electricity to Control Invasive Fish, by Sam Nutile, Reuben Goforth, Marisol Sepulveda *(Purdue University),* and Jon Amberg *(UMESC).*
- Influences of Hydrologic Mixing on Larval Fish Populations in Rivermouth Ecosystems of the Laurentian Great Lakes, by Nathan Gainer *(University of Michigan),* Jeff Schaeffer, Martha Carlson-Mazur *(GLSC),* James Larson, William Richardson, Robert Gaugush *(UMESC),* Faith Fitzpatrick *(OH WSC),* and Paul Seelbach *(GLSC).*
- Non-target Laboratory Trials Determining Animal Effects of *Pseudomonas fluorescens* on Native Species of the Great Lakes and Upper Mississippi River, by Kerry Weber, James Luoma, Mark Gaikowski *(UMESC),* and Denise Mayer *(New York State Museum).*

Oral Presentations *(USGS Asian Carp Symposium)*

- Development of Methods to Assess Ingestion of Micro-Particles by Filter-Feeding Asian carp, by Nathan Jensen, Jon Amberg, James Luoma *(UMESC),* Liza Walleser *(University of Wisconsin-La Crosse),* and Mark P. Gaikowski *(UMESC).*
- Development of Species-Specific Biocides and Delivery Technology for the Control of Aquatic Invasive Species, by Mark Gaikowski, Jon Amberg, Terrance Hubert, and James Luoma.
- Gut Physiology of Asian Carps and Native Planktivores: Moving Toward the Development of Species-Specific Controls, by Jon Amberg, Nathan Jensen, Blake Sauey, and Mark Gaikowski.
- Ingestion of Micro-Particles Designed as an Oral Delivery Formulation of Biocides for Species Specific Control of Filter Feeding Asian Carps, by James Luoma, Jon Amberg, Nathan Jensen, Todd Severson, and Mark Gaikowski.
- Using Molecular Technologies to Better Understand Xenobiotic Metabolism: Silver Carp, Bighead Carp and Bigmouth Buffalo Responses to Rotenone, by Jon Amberg, Theresa Schreier, and Adam Ladwig.

Oral Presentations *(Midwest Mussels Symposium)*

- Comparison of Clearance Rates and Particle Size Selection of Native Unionid and Zebra Mussels: Information for Selective Biocide Development, by James Luoma, Todd Severson, and Mark Gaikowski.
- Water Level Management and Native Mussels: Short Term Effects on Mortality, Movement, and Behaviour, by Teresa Newton, Steve Zigler, Robert Kennedy *(UMESC),* A. Hunt *(FWS),* M. Davis *(MN DNR),* and P. Ries *(University of Wisconsin-La Crosse).*

Posters (*Fisheries*)

- Preliminary Characterization of Digestive Enzymes in Native and Invasive Mussels, by Blake Sauey, Jon Amberg *(UMESC),* Scott Cooper, Sandra Grunwald *(University of Wisconsin-La Crosse),* Teresa Newton, and Mark Gaikowski *(UMESC).*

Posters (*Wildlife*)

- Advances in Vegetation Mapping using 3D Desktop Technology and Field Computers, by Jennifer Dieck and Andrew Strassman *(UMESC).*

Other

- Michael Jawson *(UMESC)* helped facilitate the USGS Asian Carp Symposium, December 7.

- Wayne Thogmartin *(UMESC)* participated in the Technical Committee meeting of the Upper Mississippi River and Great Lakes All-bird Joint Venture, December 7-8.

Aquatic Ecosystem Health

FDA Approvals of Research Methods

- UMESC received notification the Spectrophotometric (Spec) and High Performance Liquid Chromatographic (HPLC) analytical methods developed by Jeff Meinertz for eugenol *(an immediate release sedative for fish),* was accepted by U.S. Food and Drug Administration (FDA). Acceptance of the method is critical as studies to assess the safety *(animal, human food, environmental)* and efficacy cannot proceed without an acceptable analytical method. The FDA concluded the Spec method was adequate for animal safety and efficacy studies under certain conditions. The HPLC method was considered acceptable for all other uses.

- UMESC also submitted a revised HPLC method Standard Operating Procedure (SOP) to quantify para-toluenesulfonamide (pTSA), the marker residue of chloramine-T administration, to the FDA. The submission of the method SOP is expected to complete data and information generation by UMESC for a chloramine-T approval - the SOP was the last piece of information required by FDA for the human food safety technical section.

Aquatic Invasive Species – Asian Carp

Asian Carp and Minnesota

- Mike Jawson represented the USGS at Governor Mark Dayton's *(Minnesota)* Asian Carp Summit, December 20 in St. Paul, MN. The December meeting was a continuation of two meeting held this fall, to discuss the implementation of an Asian Carp Action Plan to prevent the further spread of Asian carp into Minnesota waters.

Outreach – Midwest Outdoors

- Terrance Hubert was interviewed, November 24, by freelance outdoor writer Mike Yurk, regarding the spread of Asian carp in the Mississippi River basin, the threat of invasion into the Great Lakes, and the efforts to develop methods to control the spread of the carp. The article is expected to appear in an upcoming issue of Midwest Outdoors.

Aquatic Invasive Species – Sea Lamprey

Meetings – Lampricide Control Task Force

- Terrance Hubert and Mike Boogaard attended the Great Lakes Fishery Commission Lampricide Control Task Force Standard Operating Procedure subgroup meeting in Escanaba, MI, December 4-9. The meeting reviewed the procedures used in implementing the sea lamprey chemical control program in the Great Lakes, and made modifications as necessary, to ensure the safe and effective use of the lampricides TFM and niclosamide.

Aquatic Nutrients

Outreach – Winona State University

- William Richardson gave an invited presentation for a Winona State University ecology class titled, "Nitrogen in the environment: The good, bad, and the ugly," Winona, MN, November 30.

Geospatial Science & Technology

Analyzing Landscape Data – New Computer Application

- Douglas Olsen developed two new software applications for analyzing rasterized landscape data sets. These applications have been developed for use with the software program ArcGIS version 10, and are available to download from UMESC's Web site as the Basic Raster Landscape Metrics Tools *(*RasterStats.tbx*)*. The Basic Raster Metrics by Patch tool generates

an output raster attribute table, organized by patch *(one row for each landscape patch),* and collect the following metrics on each patch feature.

- Area
- Perimeter
- Thickness *(radius of largest circle which can fit in patch)*
- X_Centroid
- Y_Centroid
- Majoraxis *(major (long) axis of ellipse fitting patch)*
- Minoraxis" *(minor (short) axis of ellipse fitting patch)*
- Orientation *(angle of ellipse fitting patch)*

The Basic Raster Metrics by Class tool generates an output raster attribute table, organized by feature class, and collects the following metrics on each feature Class.

- Area
- Perimeter
- Pct_Ls *(percent of landscape)*
- Num_Patch *(number of patches)*
- Ave_P_Area *(mean patch area)*
- Min_P_Area *(minimum patch area)*
- Max_P_Area *(maximum patch area)*
- Std_Dev
- SDI *(Simpson's Modified Diversity Index)*
- SHDI *(Shannon's Diversity Index)*

Great Lakes Restoration Initiative (GLRI)

Project #73, Avian Botulism in Distressed Great Lakes Environments

- Kevin Kenow gave an invited presentation at the Minnesota Ornithologists' Union paper session on common loon migration, December 3 at the Bell Museum, University of Minnesota - Minneapolis. Fifteen breeding common loons were recently marked with satellite transmitters and archival geolocator tags in Minnesota, to determine migratory movements and foraging patterns. The presentation summarized findings to date and explored implications for exposure to botulism toxin in the Great Lakes and contaminants while on wintering grounds. This research has been funded through the Great Lakes Restoration Initiative and under an agreement with the Minnesota Department of Natural Resources.

Project #82, Characterize Habitat and Foodweb Structures across Great Lakes Rivermouth Estuaries

- James Larson, Jack Waide, and William Richardson met with scientists from the GLSC, MI WSC, and WI WSC to plan upcoming activities with the Great Lakes Restoration Ecological Indicators of Rivermouth Ecosystem Health project, December 4-6 in Ann Arbor, MI. The team *(a)* reported on progress to date on the five work Tasks, *(b)* organized efforts to secure funding from outside sources, *(c)* planed for a Special Session on Great Lakes Rivermouth Ecology and Hydrology at the upcoming meeting of the International Association of Great Lakes Research, and *(d)* initiated detailed research plans for the 2012 field season.

Long Term Resource Monitoring Program

2010 Aerial Photography of the Upper Mississippi River

- Janis Ruhser and John (JC) Nelson completed the 2010 Aerial Photo mosaics of Upper Mississippi River Navigation Pools 1-13 *(Minneapolis, MN to Clinton, IA),* and Illinois River

navigation pools Alton, La Grange, Marseilles, Peoria, and Starved Rock *(the River's confluence with the Mississippi River to Marseilles, IL).* The mosaics will be utilized to help support planning, design, implementation, and evaluation of the U.S. Army Corps of Engineers' Environmental Management Program's (EMP)-Habitat Rehabilitation and Enhancement Projects (HREP), along with research and monitoring efforts conducted by the Long Term Resource Monitoring (LTRM) program, implemented by UMESC.

Outreach – University of Wisconsin Math Department

- Yao Yin gave the presentation, "Applied Mathematics and Statistics in Monitoring the Health of the Upper Mississippi River System," for the University of Wisconsin-La Crosse Math Department, December 2. Yin provided examples of using mathematical and statistical skills to monitor the ecological health of a large river ecosystem.

Wildlife Ecology

Combining Waterfowl Harvesting Models with Habitat Management Models

- Wayne Thogmartin co-authored a manuscript on a modeling framework developed for the integrated harvest and habitat management of North American waterfowl. Currently, management decisions made for the harvest of waterfowl occurs separately from those made for habitat. The team developed and evaluated the performance of a continental metapopulation model enabling managers to examine, for the first time, the consequences of alternative management strategies involving habitat conditions and hunting on both harvest opportunity and carrying capacity for migratory waterfowl. While the model is parameterized for northern pintail, the approach is one that could be employed for all harvestable waterfowl. As part of a Powell Center working group in Animal Migration and Spatial Subsidies, the team used the spatial relationship of the pintail populations described in this article as the foundation for evaluating the migratory flow and connection of ecosystem services.
    - Mattson, B.J., M.C. Runge, J.H. Devries, G.S. Boomer, J.M. Eadie, D.A. Haukos, J.P. Fleskes, D.N. Koons, W.E. Thogmartin, and R G. Clark. 2012. A modeling framework for integrated harvest and habitat management of North American waterfowl: Case-study of northern pintail metapopulation dynamics. Ecological Modelling 225:146–158.

Other

Acronyms

FDA: U.S. Food and Drug Administration
FWS: U.S. Fish and Wildlife Service
GLSC: Great Lakes Science Center
HPLC: High Performance Liquid Chromatographic
MI WSC: Michigan Water Science Center
MN DNR: Minnesota Department of Natural Resources
OH WSC: Ohio Water Science Center
pTSA: para-toluenesulfonamide
SOP: Standard Operating Procedure
Spec: Spectrophotometric
TFM: 3-trifluoromethyl-4-nitrophenol
UMESC: Upper Midwest Environmental Sciences Center
USGS: U.S. Geological Survey
WI WSC: Wisconsin Water Science Center