

River & Streams Technical Committee
State of Indiana Report – 2013
North Central Division American Fisheries Society
Chair: Stephen J Jacquemin



The following accounts have been solicited from the Indiana American Fisheries Society membership and summarize the major lotic ecological research, restoration projects, management strategies, monitoring appointments, and conservation efforts ongoing across the state of Indiana.

Indiana Department of Environmental Management

In June, IDEM with help from the Indiana Department of Natural Resources (IDNR) had three crews collecting 35 fish community samples in the Deep River – Portage Burns Watershed as part of a baseline monitoring and Total Maximum Daily Loads project. The study provides data which characterizes the current condition of the watershed, identifies impairments, and designates critical areas for watershed improvement plans. Data collected includes water chemistry, bacteriological sampling (E.coli), macroinvertebrate and fish communities once in the summer, habitat assessments, and flow at a subset of the sites.

Also since June, IDEM has collected 42 fish community samples at 38 sites on waterbodies in the East Fork White River basin for the 2013 Probabilistic Monitoring Program. The goal of this program is to characterize the overall integrity of the river basin for aquatic life use support using data collected from random sites including water chemistry, E.coli, nutrient data, macroinvertebrate and fish communities, as well as habitat evaluations.

Fish and macroinvertebrate communities were sampled at targeted sites in the Blue River watershed and the Upper Tippecanoe watershed as part of performance measures' monitoring to determine if there are improvements. The 2013 sites included Blue River in Harrison and Crawford counties (four sites), South Fork Blue River in Washington County, Grassy Creek in Kosciusko County, and tributary of Gaff Ditch in Whitley County. The objective is to document water quality improvements following implementation of a watershed management plan.

Fish community results from all of the projects listed above will be summarized in the IAFS December newsletter.

Fish tissue monitoring also took place in 2013 to generate data for use as ecological indicators in support of the Clean Water Act Sections 305(b) quality of Indiana's waters and Section 303(d) listing of impaired waters. The data will also be used by the Indiana State Department of Health for the issuance, modification or removal of fish consumption advisories. In 2013, 35 sites in the Upper Wabash River Basin will be the primary focus of IDEM including five lakes (J. Edward Roush Lake, Lake Freeman, Lake Shafer, Mississinewa Reservoir, and Salamonie Reservoir). In addition, the IDNR Division of Fish and Wildlife will collect fish tissue samples from Center Lake in Steuben County and the Indiana waters of Lake Michigan. Sampling began in July and will continue through October. The total number of composite fish tissue samples collected is expected to be about 148 prepared from approximately 700 individual captured fish. Analytical tests for metals, organochlorine chemicals, PCBs, etc. will be performed by Pace Analytical, Inc. of Green Bay, Wisconsin.

A unique project took place this summer on the Grand Calumet River/Indiana Harbor Ship Canal in Lake County (northwestern Indiana). The purpose of the study was to conduct fish tissue, fish and macroinvertebrate community and sediment contaminant and toxicity sampling on the river in order to provide information regarding whether areas can be delisted for Beneficial Use Impairments, removed from the Indiana 303(d) list for Fish Consumption Use and Impaired Biotic Communities, and provide preliminary assessments on the effectiveness of sediment remediation projects on the quality of waters in the Grand Calumet River and Indiana Harbor Ship Canal. The project required 23 staff from four different IDEM offices as well as assistance from the National Park Service, the Indiana Department of Natural Resources, and the U.S. Fish and Wildlife Service. Through a great deal of planning, cooperation, logistical support and scientific expertise, several teams of staff were mobilized to different sections of the river for collecting samples during three days in August and September. In August, 126 artificial substrates were set out at 21 sites for macroinvertebrate colonization, fish tissue samples were collected at 18 sites, and fish community was collected at six sites. In September, 24 macroinvertebrate samples and 112 of the 126 artificial substrate samples were retrieved from all 21 sites along with sediment samples for contaminants and toxicity testing. The data has yet to be produced by the laboratories and analyzed by IDEM staff and stakeholders, but the importance of this project is far reaching from the status of the Grand Calumet River in Indiana's Impaired Waterbodies list to the Lake Michigan Lakewide Management Plan for Beneficial Uses, and as an EPA Area of Concern.

Bureau of Water Quality (Muncie, IN)

The Bureau of Water Quality recently completed its yearly sampling on the West Fork of White River in Muncie, Indiana. During this time period 54 sites were sampled in order to evaluate the biological integrity of the fish community. In addition, 4 sites were sampled as part of a smallmouth bass and rock bass population estimate study. The above mentioned sampling events yielded 15,004 fish representing 63 species.

This summer we were lucky enough to find some of the species that we don't see on a yearly basis, Fantail darters and Pirate perch. These species were sadly trumped when we came across a 30 inch American eel during an electrofishing event on August 8th. This was only the second eel ever sampled by the Bureau of Water Quality. The First was caught in 1986. After countless pictures and videos the eel was released back below the dam where it was sampled.

A greater emphasis has also been put on public outreach at the Bureau of Water Quality. This year the BWQ has spoken to a high school environmental science class, Indiana Smallmouth Alliance, Normal City Fly Fishers and have scheduled presentations for two other local High schools. Let's hope this trend continues and the BWQ will have plenty of other outreach opportunities in the future.

City of Elkhart Aquatic Biology (Elkhart, IN)

The City of Elkhart continues to monitor fish communities on the rivers and streams of Elkhart and St. Joseph Counties. Interestingly, we collected several juvenile greater redhorse which typically elude capture until adulthood. We also continue to monitor macroinvertebrates and chemical concentrations concurrently. Additional aspects of our program include fish tissue analysis in support of the fish consumption advisory, game fish studies, and research related to endocrine disruption. In the summer of 2013, we were awarded a grant from the U.S. Fish and Wildlife service to study and design fish passage alternatives on 5 barriers along Christiana Creek in Elkhart. In addition, we have developed sampling protocols for monitoring native lamprey populations in the Little Elkhart River. We plan on monitoring lamprey populations for the next several years on the Little Elkhart Rive to support the interests of the local chapter of Trout Unlimited.

Duke Energy

Duke Energy has been monitoring aquatic communities at its two generating facilities (Wabash River Station and Cayuga Station) on the Wabash River since 1982. These efforts were driven in large part from requirements in the National Pollutant Discharge Elimination System (NPDES) permits at each station. Specifically, Duke Energy has studied the potential effects of thermal effluent on the aquatic communities present in the Wabash River in order to demonstrate that a Balanced and Indigenous Population of fish and aquatic macroinvertebrates exist in the vicinity of these two stations. Specific objectives of these studies include: document the current species composition and relative abundance of the fish and macroinvertebrate community of the Wabash River in the vicinity of Wabash River Station (WRS) and Cayuga Generating Station (CGS), document the changes in the spatial and temporal distribution of the fish and macroinvertebrate community of the Wabash River in the vicinity of WRS and CGS, compare the results of fisheries and macroinvertebrate data with previous years, and evaluate the potential impact of the

WRS and CGS discharge on the diversity and density of the downstream fish and macroinvertebrate assemblages.

The fisheries sampling techniques implemented to complete the work described above are boat electrofishing, seining, quantitative macroinvertebrate sampling through the use of Hester Dendys, and qualitative macroinvertebrate sampling. Typically, this work is performed between the months of June and October but can vary based on river discharge rates and heights. At each station, fish and macroinvertebrate samples are collected at three locations upstream of the station's heated discharge and three locations downstream of the station's heated discharge. Currently, each electrofishing sampling location is 500 meters in length and seining and macroinvertebrate samples are collected within the electrofishing location or in the vicinity of it. At the end of the sampling season, the resultant data is compiled, verified for quality assurance, analyzed, and expressed in an annual report for each station.

Manchester University

Manchester University is currently involved in a variety of monitoring and restoration projects in and around the Eel River.

Projects in Jerry Sweeten's lab include:

Two low-head dams were removed from the Eel River one year ago and this past summer we continued monitoring habitat, bathymetry, and biological community.

Smallmouth bass research continues at permanent sampling stations where we continue to examine year class strength in relationship to habitat preference, stream discharge and suspended sediment.

Our 319 nonpoint source pollution grant for the Middle Eel River Initiative was reauthorized for an additional 3-y.

We have just started a paired-watershed study on the upper portions of Beargrass Creek and Pawpaw Creek. This study will examine the efficacy of fall cover crops and other BMPS. We will examine nutrient and sediment export along with temporal and spatial variability of fish and invertebrate communities.

Wright State University - Lake Campus

Wright State University – Lake Campus is currently involved with several ecomorphological, evolutionary, and macroecology projects in the Wabash River Basin.

Projects in Stephen Jacquemin's lab include:

Macroecology of lotic fishes - Can species attributes such as body mass and geographic range be used to predict fluctuations in riverine fish populations? This project was designed as another way to characterize what predicts why certain taxa increase or decrease in abundance over long term monitoring. We used the long term White River dataset from the Delaware Co, IN to test these ideas. Our hypothesis was that small bodied fishes would tend to exhibit greater population stochasticity and exhibit smaller geographic ranges as a function of more limited dispersal potential. However, neither variable was found to be a good indicator of population variation.

Describing potential sources of morphological variation in aquatic taxa. Morphological variation has been identified in fish and macro invertebrate taxa as a result of developmental history, environmental plasticity (biotic and abiotic), and genetic influences. However, relatively few studies have incorporated all of these potential influences in the same predictive framework to parse out the order and magnitude that these sources contribute. Beginning this spring a series of streams in the upper Wabash River basin will be sampled for fishes and macroinvertebrates, water quality, and habitat. Morphology of each will be measured and compared to each predictive layer to address this issue. The project will involve several undergraduate research theses and serve as a starting point for long term morphological monitoring in the region.

Ball State University

Ball State University is currently involved in a variety of monitoring, management, and restoration projects across the Ohio River Basin.

Projects in Mark Pyron's lab include:

Historical food webs of the Wabash River. We found a large change in fish abundance –body size trends that occurred around 1995. Our guess is the change was a result of nutrient input, hydrologic alterations, and introduction of Asian carp. This project is a test of changes in isotope ratios for recent fish collections compared to historic fish collections. Our preliminary results are spotfin shiner are feeding at lower trophic levels than historically , there is high variation in diets of recent gizzard shad compared to historic collections, and we found no change in diets of spotted bass. In addition we found that fishes in upstream locations tended to feed at lower trophic levels (algae) compared to fishes in downstream reaches (prey such as insects).

Crayfish morphology of Illinois streams. We are examining shape variation of crayfish in streams of Illinois and testing for covariation with altered hydrology and landuse patterns.

Aquatic snail morphology variation across eastern North America. We sampled snails from Pennsylvania to Oklahoma and are currently quantifying their shape variation. We will test if snail shape varies with local predator regime, environmental variables, or snail diets.

Projects in Tom Lauer's lab include:

Estimating capture probabilities of common stream fish in the Eastern Corn Belt Plain. Imperfect detection of fish can lead to biased estimates of abundance and assemblage level descriptors such as the Index of Biotic Integrity. Accentuating this bias are two items. First the schooling behavior of fish confounds the efficacy of traditional models in estimating abundance and capture probability. Second, we know habitat influences fish distribution and catchability. Although multi-pass depletion sampling of fish can be used to estimate some of the bias, assuming fish behave independently, quantifying both schooling and habitat bias effects is required to fully understand fish abundance. Thus, our objective in this study is to determine how imperfect detection of common stream fishes is influenced by schooling behavior and a suite (15) of physicochemical variables. To meet this objective, we conducted multi-pass depletion surveys at 16 randomly selected sites in the Eastern Corn Belt Plain ecoregion in Indiana. We will use these data and extend an existing model to estimate abundance and capture probability of schooling and non-schooling species. These estimated capture probabilities can then be applied to standard electrofishing surveys to improve the accuracy of abundance estimates and can be applied to biological monitoring tools to create multimetric indices that are more sensitive to perturbation.

Technical Report Contributors

The River & Streams Technical Committee thanks Drew Holloway (BWQ), Daragh Deegan (City of Elkhart), Mark Pyron (BSU), Tom Lauer (BSU), Stephen Jacquemin (WSU), Jerry Sweeten (MU), Jason Doll (BSU), Daniel Arndt (Duke Energy), and Stacey Sobat (IDEM) for their contributions to this report.