River & Streams Technical Committee
State of Indiana Report – 2021
North Central Division American Fisheries Society

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The following accounts have been solicited from the Indiana American Fisheries Society membership and summarize some of 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 (IDEM) / Office of Water Quality / Watershed Assessment and Planning Branch – Kayla Werbianskyj

Fish Community monitoring and results from 2021

Collections for the year 2021 focused on the Patoka River as well as other targeted watersheds throughout the state. A total of 148 fish community samples were collected resulting in the capture of 28,774 individuals representing 111 different species.

Probabilistic Monitoring Efforts

The main objective of IDEM's Probabilistic Monitoring Program is to provide a comprehensive, unbiased assessment of the ability of rivers and streams in a river basin to support aquatic life and recreational uses. Sites are randomly generated each year for the selected basin from the U.S. EPA laboratory in Corvallis, Oregon. This project is on a watershed rotation schedule to cover the whole state in 9 years (West Fork White River, Patoka River, East Fork White River, Great Miami, Upper Wabash, Lower Wabash, Kankakee River, Great Lakes, Ohio River).

The Watershed Assessment and Planning Branch (WAPB) collected 42 samples at 38 sites on waterbodies in the Patoka River Basin. A total of 75 different species were captured and 6,213 individual fish were identified. Macroinvertebrate community, water chemistry, algae and *E. coli* were also collected at the same 38 sites.

Index of Biotic Integrity (IBI) scores had a range of 16-48. The lowest IBI score of 16 occurred at one site: Patoka River in Pike County. The highest IBI score of 48 occurred at three sites: Patoka River at Cuzco Road in Dubois County and two sites on the Patoka River at CR 50 West in Orange County. Results are currently under review to determine whether the stream segments these sites fall on are considered "supporting" for aquatic life use.

Watershed Characterization

The Clean Water Act (CWA) and U.S. Environmental Protection Agency (U.S. EPA) regulations require that states develop Total Maximum Daily Loads (TMDLs) for waters on the Section 303(d) List of Impaired Waters. A TMDL is the total amount of a pollutant that can be assimilated by the receiving water while still achieving water quality standards. TMDLs are composed of the sum of individual wasteload allocations (WLAs) for regulated sources and load allocations (LAs) for sources that are not directly regulated. TMDLs are developed at a 10-digit watershed scale. After a watershed is selected for TMDL development, a watershed characterization monitoring project is implemented to determine the extent and magnitude of impairments throughout the watershed. Selecting a spatial monitoring design, with sufficient sampling density to accurately characterize water quality conditions, is a critical step in the process of developing an adequate watershed study. The next task is to reassess each waterbody using new sampling data and identify current impairments for TMDL development. The reassessment data also help IDEM identify critical areas of concern with the largest number of impairments. A TMDL report is then developed that includes information regarding point and nonpoint sources of pollutants, allocations of allowable pollutant loads, and recommended implementation activities. The final TMDL report is provided to the local watershed group so they can include the TMDL information into a local watershed management plan and use the data to make improvements throughout the watershed.

Twenty-four samples were collected at 21 sites on waterbodies in the Vernon Fork Muscatatuck watershed. A total of 49 species were captured and 5,578 individual fish were identified in this 10-digit HUC. IBI scores had a range of 20-54. Five sites scored 50 or above on the IBI. The lowest IBI score of 20 occurred at Tributary to Richart Lake at CR 900 West in Jennings County. The highest IBI score of 54

occurred at Vernon Fork Muscatatuck River at CR 60 South in Jennings County. Harlequin Darter and Eastern Sand Darter were collected during this survey. Bluntnose Darter was collected for the first time in this area. Results are currently under review to determine whether the stream segments these sites fall on are considered "supporting" for aquatic life use.

Reference Site Project

In 2015, IDEM started a 10-year project to sample 250 sites across Indiana with the intention of finding sites with the best water quality in the state. In 2021, the WAPB collected 21 samples at 18 sites on waterbodies in the various 8-digit HUC watersheds. The IBI scores had a range of 36-52. The lowest IBI score of 36 occurred at Leatherwood Creek in Ripley County. The highest score of 52 occurred at Big Raccoon Creek in Montgomery County. There were seven sites that scored 50 or above on the IBI. Results are currently under review to determine whether the stream segments these sites fall on are considered "supporting" for aquatic life use.

Performance Monitoring

Performance monitoring is initiated to show improvements in water quality when waterbodies cited in Categories 4A and/or 5A of Indiana's 303(D) List of Impaired Waters have received documented nonpoint source (NPS) control or watershed planning and restoration efforts. This type of monitoring provides chemical, physical, biological, and/or bacteriological data, depending on the parameter(s) for which the watershed is impaired, that can be reported to U.S. Environmental Protection Agency (U.S. EPA) Region 5's NPS Program showing improvements in watersheds previously listed as impaired.

The WAPB collected fish and macroinvertebrate communities at nine sites across six sub-watersheds (Big Pine Creek Ditch-Big Pine Creek; Prairie Creek; Lafferty Ditch-Eel River; Thunderbird Pond-Turman Creek; Town of Dodds Bridge-Turman Creek; and Vestal Branch-Indian Kentuck) as part of performance measures' monitoring to determine if there are improvements in the biological integrity. Two of the eight sites were only sampled for fish (21W001 and 21W002) Site locations and Index of Biotic Integrity scores are summarized below in Table 5. A score of lower than 36 (out of 60) on the IBI or macroinvertebrate IBI indicates impairment for both communities.

Table 2. Performance Measures Monitoring waterbodies, HUCs, counties, fish IBI scores

Project Site Number	Waterbody	HUC	County	fIBI[1]	mIBI[2]
21W001	Big Pine Creek	051201080402	Benton	38	NA
21W002	Prairie Creek	051201070305	Clinton	50	NA
21W003	Eel River	051202030805	Clay	36	42
21W004	Turman Creek	051201111201	Sullivan	40	36
21W005	Turman Creek	051201111203	Sullivan	36	38
21W006	Turman Creek	051201111203	Sullivan	42	40
21W007	Indian Kentuck Creek	051401010201	Ripley	36	36
21W007.5*	Indian Kentuck Creek	051401010201	Ripley	38	NA
21W008	Vestal Branch	051401010201	Ripley	42	38

[1] Index of Biotic Integrity Score for fish community

[2] Index of Biotic Integrity Score for macroinvertebrate community

*Fish only revisit of site 21W007 at a different date of the same year

Performance Measures Monitoring results are currently under review to determine whether the stream segments these sites fall on are considered "supporting" for aquatic life use and if any segment improvements can be reported as Success Stories.

Coolwater IBI Project

IDEM, working with U.S. EPA and Tetra Tech, is modifying new biological indices for coolwater streams in Indiana. Identify coolwater streams, mean stream summer temperature less than 22 ºC, using the temperature tipping points for coolwater taxa and stream temperature data modeling. Determine temperature tipping points for coolwater taxa, using plots of cold or cool taxa,and warm taxa versus maximum water temperature between 15 ºC and 30 ºC. Validate stream temperature models and tools, used to identify coolwater streams, by deploying temperature loggers and collecting biological assemblages at reference and stressed coolwater sites around the state. Determine the disturbance of a site, reference or stressed, using land use evaluations and identification of other anthropogenic impacts such as road crossings, point source impacts, and population density. Following data collection, modify new biotic indices to accurately evaluate biological assemblage expectations for coolwater streams. Collected data fulfill several goals such as development of a Coolwater IBI for macroinvertebrate and fish communities, and ALUS assessments at probabilistic, reference, and watershed characterization sites. Forty-five of 90 sites were sampled in 2021 for fish community (the remaining 45 will be sampled in 2022).

Fish Tissue Contaminants Monitoring Program – 2021

In 2021, contaminant monitoring in fish tissue was conducted in the West Fork White River Basin and the Patoka River Basin, in addition to the Indiana waters of Lake Michigan. Samples will start being sent to the lab for analyses in February 2022. Data will be used to support Indiana's Integrated Report, the 303(d) List of Impaired Waters, and the Indiana Department of Health's Indiana Fish Consumption Guidelines. The Indiana Fish Consumption Guidelines can be used by anglers to help them maximize the health benefits from eating fish, while minimizing the risks (IDOH Fish Consumption Guidelines). Per- and polyfluoroalkyl substances (PFAS) will continue to be analyzed for select species at 52 of the sites collected for 2021. Samples were collected at four urban lakes in the West Fork White River Basin, these lakes have been stocked by DNR and have not typically been targeted by the contaminant monitoring program. For more information on IDEM's contaminants monitoring program or to inquire about fish tissue contaminants data, contact IDEM Watershed Assessment and Planning Branch staff member Tim Fields, at tfields@idem.IN.gov or (317)308-3184.

IDEM staff Tim Fields (left) and Ross Carlson (right) with a Flathead Catfish

ISDH staff holding a Walleye

Elkhart – South Bend Aquatic Community Monitoring Program – Daragh Deegan, Aquatic Biologist

The Elkhart-South Bend Aquatic Community Monitoring Program continued to monitor fish and macroinvertebrate communities in the Indiana section of the St. Joseph River (Lake Michigan Drainage) and tributaries in 2021. In 2021, we completed 72 fish community surveys resulting in 69 species and 32,450 individuals in Elkhart and St. Joseph Counties.

While our program primarily focuses on fish community monitoring, we also do macroinvertebrate sampling at 22 sites on an annual basis. In addition, we collect 10 fish tissue samples annually and provide data to the state for inclusion in the fish consumption advisory.

In 2021, for the first time in 20 years of sampling, our program collected flathead catfish (Pylodictis olivaris). A total of 4 juvenile flatheads, approximately 10 inches long, were collected from different sections of the St. Joseph River during the summer of 2021. These records in addition to angler reports suggest that this species has been introduced and has a strong potential to establish.

A juvenile Flathead Catfish collected from the St. Joseph River in 2021

In 2021, we continued to also collect turtles during electrofishing surveys in an effort to determine local species distributions. Species collected in order of highest abundance include map turtle (Graptemys geographica), snapping turtle (Chelydra serpentina), painted turtle (Chrysemys picta), red-eared slider

(Trachemys scripta elegans), eastern musk turtle (Sternotherus odoratus), spiny softshell (Apalone spinifera), river cooter (Pseudemys concinna), and blandings turtle (Emydoidea blandingii).

In 2021, we started collecting crayfish during electrofishing surveys in an effort to determine local species distributions. Rusty crayfish (Orconectes rusticus), a well-established invasive, was often the only species collected from the St. Joseph River and tributaries. Several other species were collected in low abundance in streams that have migration barriers, such as small dams or perched culverts, that are potentially isolating their populations from invasion of the rusty crayfish. Other species collected include calico crayfish (Orconectes immunis), northern clearwater crayfish (Orconectes propinuquus), virile crayfish (Orconectes virilis), and white river crayfish (Procambarus acutus).

In 2021, our program continued to monitor species migration relative to the removal of the Elkhart River dam that occurred in January of 2020. We collected another new species upstream of the former dam bringing the total to 9 species that have recolonized the Elkhart River. Furthermore, we encountered schools of spawning River Redhorse (Moxostoma carinatum) about 10 miles upstream of the former dam as a result of the dam removal.

A male River Redhorse collected 10 miles upstream of the former Elkhart River dam

IN DNR – Invasive Carp Unit – Craig Jansen

The Indiana DNR established a dedicated Invasive Carp work unit in August of 2021. This was made possible by an increase in federal funding for the Ohio River basin states to address the invasive carp problem. Craig Jansen transferred into the biologist position (formerly the big rivers biologist) and Jessica Westhoff and Miranda Belanger were hired as assistant biologists. The new unit will work closely with state and federal partners in the Ohio River basin to accomplish region-wide goals and objectives. This Ohio River partnership annually discusses needs and develops multiple project plans to outline necessary work. Currently these project plans include work on early life stages, control and containment, early detection and evaluation of management actions, and using telemetry to quantify lock and dam passage, habitat use, and survival rates of invasive carp – each of these project plans is multi-faceted and requires a tremendous amount of collaborative work.

Prior to the Invasive Carp Unit's establishment, the Big Rivers Unit completed targeted invasive carp sampling in April, and larval and YOY sampling in late-spring/early-summer. Since August, the new crew has been extremely busy trying to catch up on work as outlined in the above Ohio River basin

partnership project plans. In addition to procuring boats and other necessary equipment, the crew's field work accomplishments included: 1) collecting otoliths on 870 invasive carp for aging and microchemistry analysis, 2) tagging 456 carp with acoustic tags to determine habitat usage and movement rates, 3) constructing stands and deploying 30 Vemco receivers in the Ohio River and it's tributaries, 4) processing and aging over 400 otoliths, 5) capturing 504 invasive carp totaling 3,450 pounds on one outing in the West Fork White River 6) assisting with 3 weeks of fish community sampling to inform hydroacoustic biomass assessments. Additionally, the Invasive Carp Unit will be managing three subcontracted research projects looking at recruitment sources via microchemistry, Hovey Lake recruitment contributions, and invasive carp response to a dam removal in the Eel River.

IN DNR – Big Rivers Unit – Sarah Molinaro

The Big Rivers unit did a variety of work on the Wabash, White, and Ohio rivers in 2021. We completed drift net surveys targeting Shovelnose Sturgeon sampling on the Wabash River in spring near Lafayette, IN and in fall near Crawleyville, IN. We caught 817 Shovelnose in the spring, including 752 unique individuals, and 27 individuals tagged in previous years. The oldest recaptured fish had been at large for 13 years and had grown 15 mm since that time. Around 50 Shovelnose Sturgeon were captured in the fall, including 3 individuals tagged previously. One of these recaptured fish had been tagged during in spring 2021 near Lafayette – over 231 river miles away from where it was recaptured in the fall.

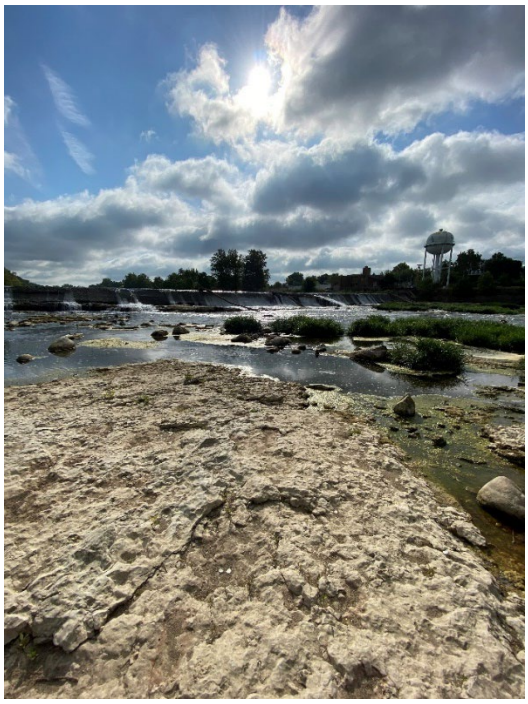
We sampled for catfish in the White River system: one sample site is on the West Fork White River (Maysville, IN), one sample site is on the East Fork White River (Glendale Fish and Wildlife Area), and two sample sites are on the Mainstem White River (Petersburg and Hazelton, IN). In June, 20 hoop nets were set for two nights at each sample site. We also electrofished for two hours at each site, with pedal time split between general community settings (high-pulse) and catfish specific setting (low-pulse). Electrofishing normally occurs in July, however high water prevented sampling until August this year. While we specifically target catfish, we record information on all species. Hoop nets caught 20 species: River Carpsucker were the most abundant followed by Smallmouth Buffalo, Flathead Catfish, Freshwater Drum, and Common Carp. Electrofishing caught 28 species: Flathead Catfish were the most abundant followed by Smallmouth Buffalo, Silver Carp, Longnose Gar, and Shortnose Gar. Overall, 33 species were caught.

We completed trotline surveys targeting catfish in J.T. Myers pool of the Ohio River in July and August as part of a cooperative project with Kentucky DFWR. A total of 174 Channel Catfish, 78 Blue Catfish, and 1 Flathead Catfish were collected. Mean catch rate of Channel Catfish was 5.4 fish/trotline and was higher than the previous two years. Mean catch rate of Blue Catfish was 2.5 fish/trotline and continued to decline for the third consecutive year. Bycatch included 2 Hybrid Striped Bass, 2 Paddlefish, 1 Longnose Gar, and 1 Silver Carp. The Paddlefish and Silver Carp were most likely foul-hooked.

Ecosystems Connections – Dr. Jerry Sweeten

Two dams were removed from the lower Eel River at Logansport in November 2021. Since 2012, six low-head dams have been removed and installation of the Boyd Kynard fish passageway around the Stockdale Mill Dam (RM 35) has completely reconnected the Eel River basin. Nearly 1,200 stream miles. There is ongoing research to document changes in fish communities across the basin now that the Logansport Dams are gone. There were 61 fish species documented above the dams in Logansport before removal and there are 48 fish species below the dams not found above. There have been extraordinary partnerships guided by Ecosystems Connections Institute (Jerry Sweeten and Herb

Manifold) including the National Fish Passage Program, US Fish and Wildlife Service, Indiana Department of Natural Resources, Indiana Department of Environmental Management, private donors, Logansport Municipal Utilities.



Pictured above: Logansport dam prior to removal

Pictured above: Post removal of Logansport Dam