River & Streams Technical Committee
State of Indiana Report – 2017
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
Compiled by Kayla Werbianskyj

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 a 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). In 2017, sampling for the program focused on waterbodies in the Kankakee River Basin. For the purpose of this program, the Kankakee River Basin is geographically defined as within the borders of Indiana and is contained by the 8-digit Hydrologic Unit Codes 07120001, 07120002, and 07120003. Biological communities and habitat information were sampled at 38 sites with landowner approval. Water chemistry and *E. coli* were sampled at the same 38 sites and an additional 7 sites (in the event of a rejection of the original 38).

Starhead Topminnow (Fundulus dispar) – Kankakee River Basin

Performance Measures Monitoring Efforts

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.

In 2017, Watershed Assessment and Planning Branch (WAPB) staff revisited five subwatersheds to determine if there have been improvements in the waterbodies' ability to support aquatic life. Headwaters Curtis Creek (071200020401) – Newton County; Elliot Ditch (051201080104) – Tippecanoe County; Kilmore Creek (051201070306) – Clinton County; Jenkins Ditch-South Fork Wildcat Creek (051201070308) – Clinton County, and Ell Creek (051202090405) – Dubois County each had one site that was sampled for fish and/or macroinvertebrate communities.

Banded Darter (Etheostoma zonale) – Kankakee River Basin

Nutrient/Diel Dissolved Oxygen Pilot

U.S. EPA has mandated that states either adopt U.S. EPA numeric nutrient criteria or develop their own criteria for incorporation into State water quality standards. IDEM's Office of Water Quality (OWQ) has collaborated with the U.S. Geological Survey (USGS) on several projects that have provided the technical background for developing numeric nutrient criteria for lakes, rivers and streams in Indiana. Numerous field studies have demonstrated the links between nutrients and algae, aquatic macroinvertebrates and fish such that a reasonable picture exists of how biological conditions change across a nutrient gradient. A dose-response relationship is thought to occur, but it is an indirect path influenced by numerous environmental variables (i.e., land use, light, temperature, flow gradients, in-stream and riparian habitats, and substrate types) that can affect whether a given amount of nutrient enrichment is limiting, sustaining, or detrimental to the aquatic communities. The impact of eutrophication on higher trophic levels is difficult to quantify because fish and aquatic macroinvertebrate communities are strongly influenced by physical habitat. However, the dose-response relationship can be exploited because there is a reasonably predictable and consistent response between increasing nutrient concentrations and periphyton, and between periphyton and dissolved oxygen concentrations.

In order to further the development of a weighted approach to nutrient criteria development utilizing multiple response variables, in 2017 the WAPB implemented a pilot study. The goal was to trace steps from nutrient utilization to periphyton biomass as chlorophyll-a; from periphyton to dissolved oxygen; and from dissolved oxygen to diatom, macroinvertebrate, and/or fish communities responses, with the goal of identifying benchmarks or change points at each step that would help define where a given water body is positioned along a continuum of enrichment or nutrient utilization. Partially funded by a U.S. EPA supplemental Section 106 grant, 28 sites were targeted for sampling based on a number of qualifying criteria. In addition to water chemistry, aquatic macroinvertebrate, fish and periphyton communities were sampled using IDEM's standard sampling protocols. Continuous data collection for dissolved oxygen also occurred at these sites through the deployment of dissolved oxygen data loggers to gain an understanding of dissolved oxygen diel swings and extremes.

The objectives are twofold. The first is to measure whether concentrations of primary nutrients (phosphorus and nitrogen) are positively associated with periphytic chlorophyll-a, and, in turn, increasing daily variation in dissolved oxygen concentrations. If those relationships hold, then determine if the increasing expression of nutrient enrichment given by either of these secondary response indicators corresponds to decreasing condition of diatom, macroinvertebrate, and/or fish community indicators. Where clear associations between stressor and response variables are found, the second objective becomes identifying concentrations or levels in the stressors over which the respective response variables change appreciably through further, more expanded sampling and modelling in a subsequent study. The change points then form the basis for defensible water quality standards for nutrients in small rivers and streams. Quite simply, OWQ is testing the utility of dissolved oxygen swing as a linking covariate to biological community response.

OWQ completed the data collection phase in 2017 and is currently verifying and managing the data. Staff will complete a report in 2019.

<u>Assessment of Downstream Fish and/or Aquatic Macroinvertebrate Community Response and Recovery from Permitted Thermal Discharges</u>

In accordance with Title 327, Article 5, Rule 7 of the Indiana Administrative Code (IAC) and Section 316(a) of the federal Clean Water Act, National Pollutant Discharge Elimination System (NPDES) dischargers may request alternative thermal effluent limitations (ATEL) for a discharge based on a demonstration that the proposed effluent limitations for temperature are more stringent than necessary for the protection and propagation of the receiving waterbody's balanced, indigenous community (BIC) or balanced indigenous population (BIP) of shellfish, fish, and wildlife in and on the

body of water. 327 IAC 5-7 is based on federal regulations (40 CFR Part 125.70 through 125.73) designed to implement Section 316(a) of the Clean Water Act. With that, the regulated dischargers are required to demonstrate no harm to the BIC. The State must establish a demonstrably safe limit on allowable thermal discharges with a confidence interval/margin of error that will reliably protect stream habitats and fish populations from either longer term and/or acute adverse impacts to those habitats and shellfish, fish, and wildlife in a manner consistent with maintaining aquatic life use of State waters.

In support of this, in 2017 the WAPB implemented several studies downstream of thermal dischargers to further understand biological community response and recovery from thermal loads to riverine systems. The objectives were to test and refine sampling methods; collect data on biological community response and recovery moving downstream from the discharge point of the thermal loads; and provide additional information for the determination of "No Harm" to the BIC.

The stream conditions downstream of three electrical generating stations were targeted for sampling; the Cayuga Electrical Generating Station (EGS) on the Wabash River, the Petersburg EGS on the lower White River, and the R.M. Schahfer EGS on the Kankakee River. A travelling zone approach was applied for assessing fish community response. This involved sampling in 10 transects set equally spaced based on the wetted width of the river and a standard unit of effort beginning at the discharge point. Fish community sampling occurred along each transect for the right descending bank, left descending bank, and middle of the river channel, recording fish accounts separately for each of the 10 transects (total of 30 reaches). Travelling zone assessment methodology will be applied. In all cases an upstream location was also selected and sampled by standard protocols of the WAPB for a full fish community assessment. Subsurface temperature measures were also collected at right, middle and left channel along each transect boundary to gain an understanding of thermal plume movement and dissipation downstream.

Staff is currently working on data management and will be assessing the results of these studies through the winter months.

Preliminary Fish Community Monitoring Results from 2017

A total of 158 fish community samples were collected from 77 sites resulting in the capture of 18,317 individuals representing 112 different species.

Fish Tissue Contaminants Monitoring Program

Fish tissue contaminant samples from IDEM's 2017 sampling efforts (East Fork White River, Great Miami River, and Great Lakes basins) were sent to the analytical laboratory in October. Staff sampled 38 sites on 23 waterbodies and collected a total of 764 individual fish. Data results are anticipated to be received by the end of April 2018, at which time results will be incorporated into the Indiana Integrated Water Monitoring and Assessment Report, the 303(d) List of Impaired Waters, and the Indiana State Department of Health's Indiana Fish Consumption Advisory.

Nongame Fishes Update
Brant Fisher, Nongame Aquatic Biologist, IDNR

An abundant population of Gilt Darter (*Percina evides*), a state endangered fish, was discovered in the Tippecanoe River below Norway Dam. This same location has been sampled around the same time of year, with the same gear, since 2014, while collecting Logperch (*Percina caprodes*) for a Snuffbox augmentation project. Gilt Darter was not collected during the first two years of sampling. In 2016, a single individual was seined and was the first ever recorded from this section of the Tippecanoe River, even with quite a bit of sampling in the past. This newly discovered population is interesting in that there is only a relatively small stretch below Norway Dam on the Tippecanoe River that is riverine before it converts into Lake Freeman. Reasons for how/why this new population appeared is unknown, but could be tied to the major flood of June 2015 that turned Lake Shafer into more of a river than a reservoir. Adults/larvae could have navigated their way from upstream of Lake Shafer to over Norway Dam during the high water event. The Gilt Darter is still not known in the lowest section of the Tippecanoe River downstream of Lake Freeman.

An Alligator Gar (*Atractosteus spatula*), the first verified from the state in well over a century, was shot by a bowfisherman in an oxbow along the lower White River in Gibson County. The fish was 63 inches long and weighed 55 pounds. A similar sized fish was also shot in Lusk Creek in southern Illinois about two weeks prior. Upon inspection, both fish had been tagged, indicating that they had been stocked by Kentucky as part of their restoration work with the species. Based on the size of the fish, they were likely around 10 years old and from 2009 or 2010 stockings. Since 2009, Kentucky has stocked Alligator Gar in the counties along its western border that flow into the lower Ohio River (along the length of the Illinois/Kentucky border) and Mississippi River. These two roaming gar were likely males that had reached sexual maturity and were looking for spawning companions. Alligator Gar is currently on the state's list of extirpated fish species, but will be reinstated to the current state list.

Pugnose Shiner (*Notropis anogenus*), a state species of special concern, was collected from Big Chapman Lake, Kosciusko County. This is the first record for this species in recent times in Indiana. They were collected from deeper (too deep to wade), weedy areas of the lake using boat electrofishing techniques. Some targeted sampling for Pugnose Shiner will be attempted in Big Chapman Lake next year during warmer months to get a sense of its exact habitat preference. This should help in determining how best to sample for it in other lakes of the region.

Annual Lake Sturgeon (*Acipenser fulvescens*) netting was completed in the East Fork White River, Martin County. Eight Lake Sturgeon were collected from the six locations sampled throughout the prime Lake Sturgeon stretch. Fish ranged in weight from 11-30 kg (25-66 lbs) and in length from 1180-1684 mm (46.5-66.3 inches). Two of the eight fish had not previously been collected. Of the six recaptures, three were originally collected/tagged in 1999. Radio transmitters were attached to four of the larger, collected Lake Sturgeon for future tracking.

The following (Table 1) is information from recaptured Lake Sturgeon 036-284-042, which has been collected five different times over the last 18 years, every time in the same location on the river. The variation in weight, points to this fish being a female and could represent years just prior to or just after spawning (where it has a full complement of eggs or is coming off a spring where it just released eggs).

Table 1. Lake Sturgeon (036-284-042) collection information.

Date collected	Weight (kg/lbs)	Fork Length (mm/inches)	Total Length (mm/inches)
11/10/1999	20/44	1336/52.6	1472/58.0
10/14/2005	28/61	1426/56.1	1567/61.7
11/13/2007	28/61	1450/57.1	1602/63.1
10/12/2010	33/73	1501/59.1	1650/65.0
10/4/2017	30/66	1536/60.5	1684/66.3

Freshwater Mussel Augmentation and Reintroduction
Brant Fisher, Nongame Aquatic Biologist, IDNR

Snuffbox Augmentation in the Tippecanoe River

Once present in multiple watersheds of Indiana, the state and federal endangered Snuffbox (*Epioblasma triquetra*) has only been found live within three in recent times: Salamonie River (Huntington County), Tippecanoe River (White County), and Sugar Creek (Shelby County). It is likely only secure in about a ten mile stretch of the Salamonie River where multiple individuals and juveniles have been found. The other two populations seem precarious at best, and if still present may no longer be reproducing. Augmenting one of these populations would provide a better chance of the continued persistence of Snuffbox in Indiana. Federal funding was procured in 2012 to initiate a Snuffbox augmentation project in the Tippecanoe River using female Snuffbox from the Salamonie River population.

A fourth year of Snuffbox propagation was successfully completed April 17-19, 2017. Procedures were similar to past years and completed over a three day period. On April 17th, five cage bases were filled with substrate and placed in Lake Shafer. On April 18th, four female Snuffbox were collected from the Salamonie River. These were kept in a mesh bag (tied to a tree) in the Salamonie River so they could be retrieved the following day.

On April 19th, 107 Logperch were collected (with seines) from the Tippecanoe River downstream of Norway Dam. They were then transported to the Salamonie River, and the previously collected female Snuffbox were secured. A streamside laboratory was set-up and glochidia were extracted from the four female Snuffbox and used to infect the Lopgerch. This was accomplished by gently prying open the shell of each female just far enough that a small cork could be placed between the valves to provide access to the gills and to keep the valves open. Each gill was then pricked a couple times along its length using a small needle attached to a syringe. After each prick, glochidia were flushed from the gill into a small container with a steady stream of water from the syringe.

The 107 Logperch were separated into ten, one gallon containers of water (around 10 Logperch per container). Collected glochidia from each of the four female Snuffbox were used to infect 2-3 one gallon containers of Logperch. Each container had its own air stone which was used to keep the glochidia in suspension. The gills of a few Logperch were checked periodically under a microscope throughout the process to check for infestation rates. There seemed to be good coverage of the gills after about 15-30 minutes, at which time all the Logperch were removed from their containers and transferred to a cooler

of clean water. Once the culture procedures were completed, the four female Snuffbox were returned to the Salamonie River, and the Logperch were taken to Lake Shafer and placed in the previously prepared cages.

In early May, a cage top was pulled to check the condition of the Logperch. All but one Logperch were still alive and gills still had good coverage of glochidia. Logperch were checked again at the end of May, and still seemed to be in good health, with lots of glochidia still attached. Snuffbox cages were again visited on July 5th. The gills of a couple Logperch were checked and were clean of glochidia. At this point, all the Logperch were released from the cages, and cage tops were secured back onto the cage bases. These cages will remain in place until summer/fall 2018 at which time they will be pulled and checked for juvenile Snuffbox.

Near the end of August 2017, Snuffbox cages placed in April 2016 were pulled and checked for juveniles. Eighty-one sixteen month old snuffbox were recovered ranging from 15-23mm in length. This was the most successful propagation year to date. Because of their still relatively small size, all were placed back into two cages and secured in Lake Shafer for another year of growth. In the summer of 2018, they will be pulled from the cages, PIT tags will be attached, and they will be placed at augmentation sites further upstream from Lake Shafer on the Tippecanoe River.

Northern Riffleshell Augmentation in the Tippecanoe River and Clubshell Reintroduction in the Eel River

Northern Riffleshell (*Epioblasma torulosa rangiana*) and Clubshell (*Pleurobema clava*) were once both widely distributed within the Ohio River and Lake Erie drainages of Indiana. Northern Riffleshell has not been seen live for many years in Indiana but is still considered extant in the Tippecanoe River. Clubshell is still reproducing in the upper section of the Tippecanoe River and is still found live in Fish Creek, although reproduction, if occurring there, is at very low levels. Augmenting and strengthening the Northern Riffleshell population in the Tippecanoe River and re-establishing a Clubshell population in another Indiana drainage (Eel River in the upper Wabash River drainage) would provide a better opportunity for the continued persistence of both species in Indiana.

The salvage of adult Northern Riffleshell and Clubshell (among other species) from the Hunter Station (US 62) bridge replacement project on the Allegheny River in Pennsylvania provided an unprecedented opportunity to augment and reintroduce populations of both species within their historical ranges. The states of Pennsylvania, Illinois, West Virginia, Kentucky, and Ohio have already initiated augmentation/reintroduction projects. In 2015, Indiana received approval from the Pennsylvania Fish & Boat Commission to now, along with Manchester University and the U.S. Fish and Wildlife Service (Carterville Fish and Wildlife Conservation Office and Indiana Field Office), also partner in this project.

Prior to receiving adult mussels from Pennsylvania, a lot of effort was spent finalizing locations for augmentation/reintroduction in the Tippecanoe and Eel rivers. Three sites in each river were chosen, permanent grid markers were installed, and quantitative mussel sampling was completed. At least 30 - ¼m^2 quadrats were dug at each site to determine mussel densities prior to release of Northern Riffleshell and Clubshell.

One hundred fifty Northern Riffleshell and 150 Clubshell arrived in Indiana via overnight FedEx (packed in a cooler with moist burlap and some ice) in September 2015. All mussels came with a pit tag already epoxied to one valve and a small numbered plastic tag attached to the other valve. These 'pilot study' mussels were placed at the three sites in each receiving river (50 per site) and monitored for survival in October 2015 and June 2016.

In October 2015, all 300 released mussels were relocated, and none had moved outside their original area of placement. Five individuals at each site were dug up and checked – all were still alive and closed

tightly upon handling. Many were seen actively filtering at each site and many (especially the Clubshell) were buried deeply into the substrate.

The 300 pilot study mussels were monitored again in June 2016. For Northern Riffleshell in the Tippecanoe River, all 50 pit tagged mussels were found at two of the three sites; 46 of 50 were found at the third. At each site, five random mussels were dug up to see if they were still alive. Four out of five were live at two of the sites and three out of five were found live at the third. Overall, 11 out of 15 were found live (73%); this is actually good survival for Northern Riffleshell when compared to other states that have moved Northern Riffleshell from the Hunter Station bridge location. All fifty mussels were re-found at two of the three Eel River sites where Clubshell were reintroduced; 49 of 50 were found at the third site. All 15 mussels dug up to check for survival were live (100%). With these promising results, Indiana was granted more adults of each species for continued augmentation/reintroduction by the Pennsylvania Fish and Boat Commission.

Near the end of July 2016, 3,000 adult Clubshell arrived in Indiana. Similarly to 2015, mussels arrived via overnight FedEx, packed in coolers on ice. Of the 3,000 Clubshell only one died in transit. An additional two Clubshell arrived as mudders (had been dead for a while but were thought to have been alive when pulled from the Allegheny). Ten percent of the Clubshell arrived with a pit tag attached to one of their valves. The rest were marked with green glitter super glued to their shell to distinguish that they were placed in 2016.

Near the beginning of August 2016, 3,000 adult Northern Riffleshell arrived in Indiana from the Hunter Station bridge project on the Allegheny River in Pennsylvania. Of the 3,000 Northern Riffleshell around 2% were dead on arrival; interestingly almost all were males. Similarly to the Clubshell, ten percent of the Northern Riffleshell arrived with a pit tag attached to one of their valves, and the rest were marked with green glitter super glued to their shell.

The 2,997 Clubshell and 2,934 Northern Riffleshell were placed in the Eel River and Tippecanoe River respectively, at the three sites where pilot studies were initiated in 2015. At each location, they were placed at a density of $8/m^2$ within the previously designated 8 x 20 meter grid. This was a monumental effort made much easier by the assistance of Manchester University students/faculty, USFWS, The Nature Conservancy, and Division of Fish and Wildlife Fisheries Section staff.

Northern Riffleshell and Clubshell have been monitored for survival since placement (Tables 2 and 3). In general, a large number of the previously placed PIT-tagged animals were found during searches, with only a few 'missing' at each site. While survival of Northern Riffleshell has not been as good as Clubshell, it is similar to what has been seen in other states receiving mussels. Only two clubshell are confirmed dead to date. The survival of these animals has been nothing short of incredible. These two populations will continue to be monitored for survival. Some effort in the next year or two will also be spent looking for juvenile individuals of each species, in order to determine if any successful reproduction is occurring. No additional adult mussels were received in 2017, but hopefully there will be other opportunities in the future.

Table 2. Northern Riffleshell monitoring data for 2016 and 2017.

	Total originally placed	Known dead through Oct 2016	Unaccounted for through Oct 2016	Known dead through Sept 2017	Unaccounted for through Sept 2017
Pit-tagged	442	48 (11%)	10 (2%)	93 (21%)	37 (8%)
Glitter	2642	103 (4%)	---	201 (8%)	---

Table 3. Clubshell monitoring data for 2016 and 2017.

	Total originally placed	Known dead through Oct 2016	Unaccounted for through Oct 2016	Known dead through Sept 2017	Unaccounted for through Sept 2017
Pit-tagged	449	1 (<1%)	4 (0.9%)	2 (<1%)	29 (6%)
Glitter	2698	0 (0%)	---	0 (0%)	---

Black Bass Survey of the Flatrock River - Shelby, Bartholomew and Rush Counties
Dave Kittaka, Fisheries Biologist, IDNR – District 5

In 2017, Dave Kittaka and Debra King, IDNR District 5 Fish Management and Corey Deboom from District 4 Fish Management conducted a gamefish survey of the Flatrock River in Shelby, Rush and Bartholomew Counties. In 2012, Indiana changed the black bass harvest regulation to a protected slot-size-limit (12 to 15 inches) total bag 5 fish/day with only 2 fish above 15 inches. The survey covered 44 river miles of stream with stations roughly 8 miles apart. Results are not finalized but there were 106 Smallmouth Bass collected at a length range of 2.9 to 17.8 inches. The catch rate was 19 fish per hour. PSD Q was 73, PSD P was 23 and PSD M was 4. There were 141 Rock Bass collected at a length range of 2.9 to 9.4 inches. The PSD Q was 44 and PSD P was 2. Other game fish included, Spotted Bass, Largemouth Bass, Flathead Catfish and Channel Catfish.

Pictures: Corey Deboom with Rock Bass (left) and Dave Kittaka with Smallmouth Bass (right) both from Flatrock River

Big Rivers Update
Craig Jansen, Big Rivers Fisheries Biologist, IDNR

In 2017, the IDNR big rivers unit conducted annual Shovelnose Sturgeon monitoring on the Wabash River and annual Paddlefish monitoring on the Ohio River. Catfish were sampled via hoop nets and electrofishing on the White River as part of the Inland catfish monitoring dataset, and catfish were also sampled via trotlines on the Ohio River during a collaborative effort with Kentucky DFWR. The big rivers unit assisted KDFWR and USFWS on multiple Asian carp projects on the Ohio River, in addition to collecting, filleting, and serving Asian carp to the public at two events. General fisheries surveys were completed at Hovey Lake and Oil Creek (embayments/backwaters of the Ohio River). Sauger were sampled and tagged at Newburgh Dam tailwaters on the Ohio River as part of a collaborative ORFMT project.

Smallmouth bass abundance and size in Rock Creek, Huntington County – Management Update 2017
Jed Pearson, Fisheries Biologist, IDNR

Background

Rock Creek, a 16-mile tributary of the Wabash River, has been a focal point for smallmouth bass management for many years. In the 1970s pools/riffles were created using streambed blasting and rip-rap deflectors in upstream channelized areas to improve fish habitat. Three double-wing log deflectors, eight hardwood tree-top shelters, and 100 boulders were placed in the lower reach in 1992-93. Surveys in 1976, 1990-93, and 1995 indicated larger fish and more smallmouth bass were present in pools below deflectors but variations in recruitment due to weather and watershed changes compromised the benefits. Although the deflectors and boulders remained in place, the tree tops were quickly displaced by high water.

Following requests by local anglers in 2008, a DFW property rule was imposed to prohibit harvest of smallmouth bass in Rock Creek within the Roush Fish and Wildlife Area. Prior to the rule (1995-08) smallmouth bass abundance and size increased dramatically but no post-rule sampling was done. Although a 12- to 15-inch protected slot limit was adopted on black bass in Indiana rivers and streams in 2013, the "catch-and-release" rule stayed in effect at Rock Creek.

To update smallmouth bass data at Rock Creek, 71 minutes of daytime barge shocking was done in an upstream direction at Site 1 (N 40.8163, W -85.3622) on September 12 and in a downstream direction at Site 2 (N 40.8090, W -85.3586) and Site 4 (N 40.8012, W -85.3574) on September 14 . Sample sites were similar to previous locations and were 1,150, 1,706, and 886 feet long, respectively. Water temperatures were 63-65F and oxygen concentrations varied from 7-10 ppm. Each smallmouth bass was measured and weighed. Scales were taken for age analysis. Catches were then compared only to the first pass in prior surveys when a depletion sampling method was used to estimate bass numbers. Largemouth bass and rock bass were also collected during sampling.

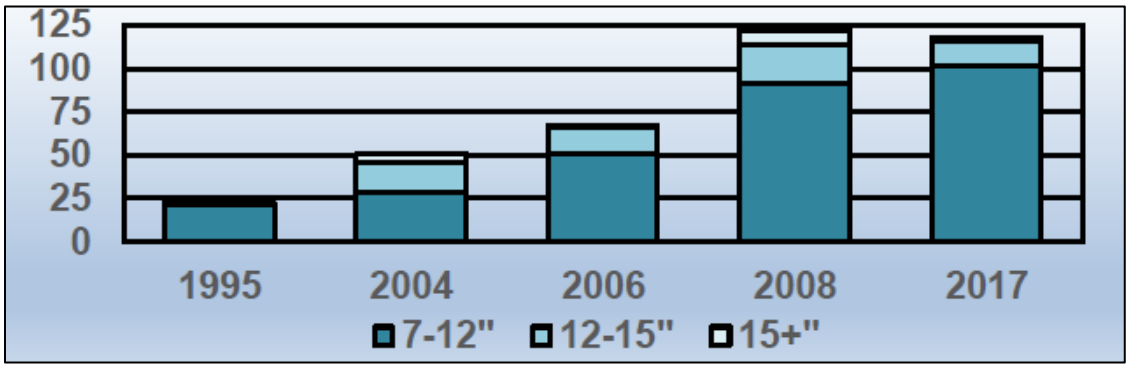
Results

A total of 182 smallmouth bass were captured (154/hr), including 140 that were ≥7 inches. Of those, 86% were 7-12 inches, 12% were 12-15 inches, but only 2% were ≥15 inches. Age-1 fish comprised 77% of the catch and averaged 7.6 inches. Mean lengths at ages 2-5 were 11.3, 12.0, 14.4, and 16.8 inches, respectively. Only three were age-0. Twenty-six rock bass (6-9 in) and 23 largemouth bass (9-13 in) were also caught.

Analysis and recommendation

Rock Creek continues to support an abundant population of smallmouth bass dominated by 7-12 inch fish. The catch rate was similar to 2008 and more than double the earlier average, due most likely to good habitat conditions and no-harvest rule, although how much fishing activity the creek gets is unknown. At least one angler was present on both sampling days. No additional management is needed except for the establishment of a parking area for anglers where the creek crosses CR 200S.

Figure: Number of Smallmouth Bass of three size groups captured per hour of sampling at Rock Creek, 1995-2017



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Relative abundance of fish at two sites in the Fort Wayne Rivers, St. Joseph River and St. Marys River in Allen County – Management Update 2017
Jed Pearson, Fisheries Biologist, IDNR

Background

Each fall the Division of Fish and Wildlife provides assistance to an advanced biology class at Purdue University Fort Wayne by capturing and identifying various fish species found within Fort Wayne's rivers. The class exposes students to the diversity of fish in the rivers and to standard sampling techniques using boat-mounted electrofishing equipment. Sampling has been done traditionally in the St. Joseph River at Johnny Appleseed Park up to and downstream from the dam along Coliseum Boulevard. Given the increasing public interest in the city's rivers related to riverfront development, additional sampling was done in the St. Marys River at Guldin Park in 2017 at the request of PUFW staff. The main purpose was to broaden the list of fish species documented in the rivers. On September 28 daytime electrofishing was conducted for 37 minutes at the St. Joseph site and 33 minutes at the St. Marys site. Other than species richness, little quantitative data were recorded at either site. Due to the inexperience of students as dippers of stunned fish, the results should not be interpreted as catch rates.

Results

The catch included 136 fish representing 23 species. Nine species were found at both sites. Eight additional ones were found at the St. Joseph site and six others were found at the St. Marys site. Bluegills, common carp, gizzard shad, and silver redhorse were the dominant species. As expected, more riverine species were collected at the St. Joseph site. Few popular sport fish (drum, smallmouth bass, saugeye/walleye, rock bass and catfish) were present at either site.

Analysis and Recommendation

Although not abundant or high-quality, fishing opportunities are available in Fort Wayne's rivers. Given habitat conditions it's not likely that the species composition will change over time. However, additional sampling for educational purposes and long-term monitoring may be useful

Figure: Number of fish of various species captured in two rivers in Fort Wayne on September 28, 2017

Species	St. Joseph	St. Marys	Total	Percent
Bluegill	18	4	22	16.2
Common carp	2	19	21	15.4
Gizzard shad	12	8	20	14.7
Silver redhorse	10	10	20	14.7
Logperch	8	1	9	6.6
Bigmouth buffalo	1	6	7	5.1
Freshwater drum	3	1	4	2.9
Largemouth bass	1	3	4	2.9
Channel catfish	2	1	3	2.2
Orangespotted sunfish	3		3	2.2
Smallmouth bass	3		3	2.2
Spotted sucker		3	3	2.2
Black crappie		2	2	1.5
Green sunfish	2		2	1.5
Northern pike	2		2	1.5
Quillback carpsucker		2	2	1.5
Saugeye	2		2	1.5
Smallmouth buffalo		2	2	1.5
Bluntnose minnow	1		1	0.7
Flathead catfish		1	1	0.7
Northern hogsucker	1		1	0.7
Rock bass	1		1	0.7
White crappie		1	1	0.7
TOTAL	72	64	136	
Species Number	17	15	23	

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Coho Stocking in the St. Joseph River
Ben Dickinson, Assistant Lake Michigan Fisheries Biologist, IDNR

Starting with the 2015 year-class of Coho Salmon, a new stocking strategy was implemented for the St. Joseph River. Instead of stocking fall fingerlings in November, fish are now being held a few months longer – to yearling stage – and then stocking them in March/April of the following year. This was done to boost return of mature fish to the St. Joe in the fall. Prior to this stocking change in 2015, Indiana had been stocking Cohos at fall fingerling stage from 2010-2014, with relatively poor results (returns of between 0.39% and 1.91% annually, with total return over the period averaging in the ballpark of 1%). Stocking numbers by Indiana have varied between years, so it is hard to know the proportion of 2 year old jacks versus 3 year old mature spawners (and therefore the contribution to a given run by a given year-class), or the exact percentage of fish that ascended the river into Indiana from Michigan stockings downstream. Given all these uncertainties, the new stocking strategy was accompanied by an adipose fin clip to positively identify the yearling Cohos currently being stocked. The return of these fish are being analyzed by using the viewing window and camera in the South Bend Fish Ladder.

The initial stocking in spring 2016 (of the 2015 year-class) resulted in a 2% return of those fish as jacks in the fall of 2016. A full 65% of the entire Coho run in 2016 were jacks from the 2015 year-class. This year (2017) there was an additional 3.7% return of the 2015 year-class, now as mature 3 year old fish. That return was far better than any previously seen from fall fingerling stockings. A 1.3% return of the 2016 year-class as jacks in the fall of 2017 was also accounted for. However, in 2017 there was a huge increase in the total Coho run, and most of those fish (59%) were actually Michigan-stocked fish that swam up into Indiana; this was very unusual, and that type of run has not been documented for 20 years. Although this is only 2 years' worth of data, we've learned that the camera and fin clip combo is a very effective way to assess returns to the St. Joe River; that the proportion of jacks, Michigan fish, and Indiana fish may vary widely from year to year; and perhaps most importantly, switching to stocking spring yearlings over fall fingerlings has, so far, resulted in a substantial improvement over the previous stocking strategy.

Muncie Sanitary District Bureau of Water Quality
Drew Holloway, Aquatic Biologist

In 2017, the Muncie Sanitary District Bureau Water Quality (BWQ) sampled 56 sites from the West Fork White River (WFWR) and its surrounding tributaries in Delaware County, IN to evaluate the health and integrity of their fish communities. These sampling events yielded 11,029 fish representing 53 species. Looking at the White River specifically, 48 species were harvested bringing in 7,226 fish.

In addition to yearly sampling events, a Smallmouth Bass population estimate was conducted for all sites on the WFWR. The results of this population estimate will be presented as a poster by two 2017 summer fish crew interns, Cole Baird (Ball State University) and Matt Byrnes (Purdue University), at the spring Indiana American Fisheries Society meeting. The third fish crew intern, Ryan Seymour (Ball State University), will be presenting a poster as well looking at length frequency distributions of all darters sampled throughout the summer.

Out of curiosity, a decision was made to age all Common Carp sampled during boat electrofishing events. A total of 39 carp graciously donated their dorsal spines for aging. This study is also looking at changes in total biomass of Common Carp for all boat electrofishing events (1983-2017). The results of this study will be presented at the spring IAFS meeting as well.

This year also marked the 3rd time an American Eel has been sampled by the BWQ since the organization started in 1972. The first came in 1986 and the second in 2013. The eel sampled this year was at the same location as the one caught in 2013, below a lowhead dam in Muncie, IN.

In the summer of 2018 the BWQ will continue to monitor the WFWR as it has for the last 40+ years.

Picture: Drone photograph featuring Drew Holloway, Ryan Seymour, Cole Baird, and Matt Byrnes electrofishing on the West Fork White River, Delaware County

The City of Elkhart
Daragh Deegan, Aquatic Biologist

The City of Elkhart completed its 20th year for fish community sampling in the St. Joseph River watershed (Lake Michigan Drainage) in 2017. While, IBI scores remain relatively good for the St. Joseph River and some of its larger tributaries, there have been some changes in the fish communities in this watershed in the past 20 years. One specific example is a gradual reduction in the abundance of catostomids, and a gradual increase in the abundance of centrarchids. In addition to monitoring fish communities, we also continue to monitor macroinvertebrates and collect fish tissue samples every year. This year, with collaborators from Purdue, the results of 5 years of monitoring intersex in smallmouth bass from the St. Joseph River were published: https://www.ncbi.nlm.nih.gov/pubmed/28783897.

At select sites, some initial aquatic plant surveys were conducted on the St. Joseph River in collaboration with Indiana University South Bend. The hope is to take this further in the coming years by sampling fish, macroinvertebrates and plants at the same sites. Lamprey samples were also collected in 2017 for genetic testing over the 2017/2018 winter to confirm identifications and establish more accurate distributions in the watershed. Within the St. Joseph River watershed (Lake Michigan Drainage) there are three species in the genera *Ichthyomyzon*; Silver Lamprey (*I. unicuspis*), Chestnut Lamprey (*I. castaneus*), and Northern Brook Lamprey (*I. fossor*), which have overlapping characteristics, particularly in the ammocoete life stage. There is a plan to do the same thing with Longear Sunfish (*Lepomis megalotis*) and Northern Sunfish (*Lepomis peltastes*) in 2018. It appears that there is definitely *L. megalotis* present, with the possibility of also having *L. peltastes*.

Manchester University
Jerry Sweeten, Ph.D – Professor of Biology

Manchester University continues to move forward with conservation initiatives to improve stream habitat, water quality and fish passage in the Eel River of north central Indiana. The Eel River is a 100 mile long 5th order stream with a watershed area of 529,968 acres (827.07 square miles). There are 52 species of fish and 23 species of freshwater mussels (including two Federally Endangered species).

The mission of the Eel River Initiative is to design and implement a holistic strategy to restore the ecological integrity of the Eel River basin within the context of human endeavors and to provide ecological research opportunities for Manchester University Environmental Studies students. The Initiative began in 2009 as a result of Manchester University's commitment to its students and the environment. Thanks to the Environmental Studies Program at Manchester University, the Initiative is able to work toward the goals outlined in the Watershed Management Plan, which include: improving water quality, enhancing recreational opportunities, and promoting conservation of natural resources within the Eel River Watershed.

Most recent projects

1. Paired watershed study in two 12-HUCs to examine soil and water conservation practices and the export of nitrogen, phosphorus and sediment. This study examines the spatial variability of stream habitat and fish community structure.
2. Construction of 1,500 feet of a natural channel design stream. This experiment examines the response of the stream ecosystem to removal of trees from a traditional trapezoidal farm ditch to conversion to a natural designed stream. The response of upland wildlife and stream fishes are being monitored.

3. Reintroduction of Clubshell (*Pleurobema clava*) mussels to the Eel River – 3,000 mussels have been reintroduced in 2016 with over 95% survival.
4. Removal of a third dam from the Eel River at RM 30 (near the town of Mexico) (2016). Research continues on the stream response.
5. There are plans to remove the most upstream dam at RM 60 next year. Two people were killed at this dam during the summer of 2017. Once removed over 1,100 miles of the Eel basin will be reconnected.
6. Construction of a prototype fish ladder around the mill dam at the small village of Stockdale (RM40). With removal of the dam at Mexico and the opening of the fish ladder over 700 miles of the stream system has been reconnected. (this includes removal of two other dams in 2012). The fish ladder effectiveness is being monitored with three Biomark antennas and eventually 2,000 tagged fish. Early results suggest the ladder will pass fish as small as 30 mm. Over 12 species have used the ladder. This ladder design holds great promise to improve fish passage across the Midwest.
7. A study was just completed that examined year class strength of Smallmouth Bass (SMB) in relation to total suspended solids (TSS). The results suggest TSS was the significant pollutant causing poor spawning success.
8. A telemetry study of SMB through the entire basin is in the process of being completed. This study examines the seasonal movement of SMB in the Eel basin and the effect of fish passage.

Picture: Prototype fish ladder around the Stockdale Dam on the Eel River (RM 40), Wabash County

<u>Project Partners:</u>

Manchester University, Environmental Studies	Private Donations	Indiana Soybean Alliance
Wabash County SWCD	IDNR	NRCS
Kosciusko County SWCD	USFWS	Indiana Corn Marketing Council