PODIUM PRESENTATIONS

^Denotes participation in the Best Student Podium Presentation Award competition

Wednesday, 15 February 2017

3:00–4:40 p.m.
Ball State University Alumni Center
Assembly Hall
First Last, Affiliation—Moderator

3:00 p.m. **MOVEMENT OF LARGE BLUE AND FLATHEAD CATFISH IN THE OHIO RIVER.** Jeremy J. Pritt (jeremy.pritt@dnr.state.oh.us)[1], Richard D. Zweifel[1], Justin T. Walters[2], and Matt A. Hangsleben[3]. 1—Ohio Department of Natural Resources, Hebron, OH. 2—Ohio Department of Natural Resources, Xenia, OH. 3—Ohio Department of Natural Resources, Athens, OH.

Catfish angling has increased in popularity and large river systems offer opportunities for catching trophy-sized Blue and Flathead Catfish. However, large rivers are often multi-jurisdictional and fragmented by dams that may be barriers to fish migration, complicating management of catfish. We used acoustic telemetry and angler reports of Carlin-tagged fish to determine the spatial extent of movement of Blue and Flathead Catfish and quantify among-pool movements (i.e., passage through dams) in the Ohio portion of the Ohio River. From fall 2014 to summer 2016, we implanted 58 Blue Catfish and 62 Flathead Catfish, captured in the Meldahl Pool, with acoustic transmitters and external Carlin tags. We tagged an additional 96 Blue Catfish and 60 Flathead Catfish with Carlin tags only. We used a fixed receiver array and angler reports to monitor fish movement. We observed two Blue Catfish moving downstream past the Meldahl Dam, with one of these individuals returning to make an upstream passage through the Meldahl Dam. In addition, one Flathead Catfish was reported by an angler upstream of the Greenup Dam. Blue and Flathead Catfish regularly made long-distance movements (> 25 km) in relatively short time periods (< 7 d). Both species moved greater distances in the spring and early summer than in late summer, fall, and winter. Blue Catfish frequently used tributaries, with two individuals traveling upstream over 30 km in a major tributary. This ongoing study will help us determine whether Blue and Flathead Catfish in the Ohio River should be managed at large spatial scales or with a pool-by-pool approach.

3:20 p.m. **EXAMINING EXPLOITATION OF WALLEYE IN A MIDWESTERN RESERVOIR USING A TAG RETURN STUDY.** Jason C. Doll[1] (jcdoll@bsu.edu), Andrew Bueltmann[2], and Sandra Clark-Kolaks[2]. 1—Ball State University, Muncie, IN. 2—Indiana Department of Natural Resources, Bloomington, IN.

Walleye *Sander vitreus* are one of the most sought after sport fish in Indiana. To meet this demand, Walleye have been stocked in Monroe Reservoir since 1982 at an average rate of 36 fingerlings/acre. Previous research on yield-per-recruit models has provided insight into effects of various exploitation rates at multiple minimum length limits; however, exploitation for Monroe Reservoir Walleye is unknown. As such, a mark recapture study was conducted from 2015 to 2016. Walleye were tagged in early spring. Tag loss was estimated by double tagging every other Walleye. Non-reporting rate was estimated with an angler creel survey in 2015. Exploitation was estimated using the Ricker method at multiple levels of reporting rates. A total of 157 Walleye were marked with Floy tags in the spring of 2015 and angler reports were accepted through the summer of 2016. Overall, fifteen tags were reported with forty percent of the reported tags being from Walleye caught in the Monroe Reservoir tailwaters. Exploitation rate was estimated at 0.15, 0.22, and 0.44 at a reporting rate of 75%, 50%, and 25%. Maximum yield estimated from the yield-per-recruit models is achieved at an exploitation rate of 0.65 and minimum length limit of 457 mm. The probability of yield reaching 80% of the maximum yield under the current minimum length limit of 356 mm at exploitation rates of 0.15, 0.22, and 0.44 is 0.1%, 74.7%, and 100%. Our results suggest that yield will only increase if exploitation was increased and no change is expected with an increase in the minimum length limit.

3:40 p.m. **A MARK-RECAPTURE AND RESAMPLING APPROACH TO VALIDATE STANDARD FISHERIES ASSESSMENT METHODS.** Stephen M. Tyszko (stephen.tyszko@dnr.state.oh.us)[1], Matt A. Hangsleben[2], Richard D. Zweifel[1], Jeremy J. Pritt[1], and Joseph D. Conroy[1]. 1—Ohio Department of Natural Resources, Hebron, OH. 2—Ohio Department of Natural Resources, Athens, OH.

Standardizing fisheries assessment methods to minimize variation in catchability, maximize catch, and use appropriate sample sizes allows collection of rigorous datasets which in turn facilitate hypothesis testing and statistical inference. Although there is a growing awareness of the importance of standardization, there are few examples where standard methods have been evaluated to confirm that the data they collect meet management needs. We used mark-recapture methods to estimate Largemouth Bass *Micropterus salmoides* electrofishing catchability using Ohio Division of Wildlife standard methods and confirmed that those standard methods minimized catchability variation and maximized catch. Using a resampling analysis, we confirmed that electrofishing CPUE statistically differed between reservoirs that had a real difference in Largemouth Bass density, thereby validating CPUE determined via standard Ohio methods as an index of density. The resampling analysis also estimated statistical power and false positive rate as number of sample sites changed. We are now using this approach to develop and validate a standard hoop net survey designed to sample Channel Catfish *Ictalurus punctatus* in Ohio reservoirs. We fished tandem, baited hoop nets during a mark-recapture experiment from May–July, 2016 to estimate catchability and identify the temporal period with minimal variation and maximum catch. Additional effort in 2017–2018 at reservoirs that likely differ in Channel Catfish density will allow tests for differences in CPUE and assessments of how power and false positive rate changes with sample size. Here we describe a general, logical approach to validating standard methods, provide an example where the approach validated aspects of an existing standard survey design, show how the approach can be used to develop a new standard assessment, and demonstrate application of the approach to fundamentally different gear types.

4:00 p.m. **IMPLEMENTATION OF A 228.6 MM CRAPPIE MINIMUM LENGTH LIMIT AT TWO INDIANA IMPOUNDMENTS.** Andrew

Bueltmann (abueltmann@dnr.in.gov). Indiana Department of Natural Resources, Bloomington, IN.

Dogwood (1,414 acres) and Hardy Lake (741 acres) are two Indiana impoundments which support highly utilized crappie fisheries. In both impoundments Black Crappie are more abundant than White Crappie and are all under a 25 bag limit regulation. From 1997 to 2015 Indiana's Department of Natural resources (IDNR) have surveyed crappie in both lakes on numerous occasions. All surveys used standard trap nets and smaller Lake Michigan trap nets to sample crappie in either the spring or fall. Every fish collected was measured to the nearest millimeter and weighed to the nearest gram. A subsample of Black Crappie were sacrificed each survey for otolith ageing for establishment of a length age key. The Fisheries Analysis and Modeling Simulator was used to model the populations yield (in kilograms) under various length limits ranging from no length limit to a 254 mm length limit using a Beverton-Holt, yield per recruit model. Results suggested under a 228.6 mm minimum length limit number harvested would decrease, but yield harvested (in kilograms) would increase by approximately 37.7%. Therefore, IDNR implemented a 228.6 mm length limit at the beginning of 2016 for both impoundments.

4:20 p.m. **KILLBUCK LAKES CASE STUDY: WHERE ARE WE ONE YEAR AFTER OPENING TO PUBLIC FISHING?** Mike Durkalec (md@clevelandmetroparks.com). Cleveland Metroparks, Fairview Park, OH.

Killbuck Lakes is a Medina County Park District property in Burbank (northern Ohio) that was acquired in 2005. The lakes on the property were formerly privately owned and formed by sand and gravel mining operations. The lakes were closed to fishing up until a collaborative (Cleveland Metroparks and Medina County Park District) fish population survey was conducted in October 2015 via timed shoreline perimeter electrofishing. This data was required in order to help make appropriate management recommendations for public fishing. The survey in the largest lake on the property (47 acres) revealed healthy Largemouth Bass (predator) and Bluegill/Pumpkinseed Sunfish (prey) populations. Proportional stock densities for these species were 83.5% and 74.7%, respectively, which indicated: "Community comprised of large, old specimens. Indicative of an unfished population." Following this survey the lake was opened to public fishing with a 3 bass/day 15 inch minimum length regulation. The lake proved to quickly become popular with the public and reports of heavy harvest were observed. One year later, in October 2016, the fish population was re-assessed. A dramatic change in fish population structure was observed, with bass and sunfish PSDs of 54.7% and 27.4%, respectively. Overall, the lake had more smaller bass and sunfish, although offering "Mutual balance for satisfactory fishing." Human predation appeared to balance the predator and prey dynamic. The overall goal from this point forward is to maintain this balance through park Ranger enforcement of existing regulations. The lake will be re-assessed in October 2017 to determine fish community status. Another 36-acre lake on the property may be opened to the public as a catch and release only trophy fishery and to serve as a control to determine effect of fisheries regulations in the original lake.

Thursday, 16 February 2017

10:20 a.m.–12:00 p.m.

Ball State University Alumni Center Assembly Hall
First Last, Affiliation—Moderator

10:20 a.m. **USING LONG-TERM BIOLOGICAL MONITORING DATA (1983–2016) TO ADDRESS CHANGES IN THE FISH COMMUNITY OF WEST FORK WHITE RIVER MUNCIE, IN.** Drew Holloway[1], Robert Shields[2], and Jason Doll[2]. 1—Muncie Sanitary District, Muncie, IN. 2—Ball State University, Muncie, IN.

The objective of this study was to utilize a 30+ year data set from the Bureau of Water Quality's (BWQ) biological fish monitoring program in an attempt to describe changes in the fish community of West Fork White River throughout Muncie, IN. Fish were sampled using a boat mounted Smith-Root Inc. 5.0 GPP electrofishing unit beginning in 1983 and continued variably through 2016. A total of 53,923 fish (43 species) were collected during this time from 7 sites representing 167 sampling events. Non-metric Multidimensional Scaling (NMS) was used to describe temporal trends over the past 33 years. The final NMS resulted in two axes with 0.16 stress and identified distinct decadal clusters. Axis 1 describes a gradient of decreasing Common Carp abundance and increasing Golden Redhorse, Smallmouth Bass, and Silver Shiner abundance. Most notably was the shift from pollution tolerant species to a fish community made up of more sensitive species. These results indicate that the efforts nationally (Clean Water Act 1972) and locally (BWQ) have directly impacted the fish community of West Fork White River in Muncie, IN.

^ 10:40 a.m. **POPULATION GENETIC STRUCTURE OF AQUATIC GASTROPODS IN THE NORTHERN CHIHUAHUAN DESERT.** Ashley D. Walters[1] (dunithad@miamioh.edu) and David J. Berg[2]. 1—Miami University, Oxford, OH. 2—Miami University, Hamilton, OH.

Organisms with similar geographic distributions often differ in population genetic structure. Such variation of different taxa in the same geographic region often results from differences in biological characteristics. We used microsatellite loci to investigate the population genetic structure and genetic variation of an undescribed species within the pulmonate genus *Physa* and two narrowly endemic species of prosobranch snails of the family *Hydrobiidae*. Both of the latter are federally listed as Endangered. The location of this study, Bitter Lake National Wildlife Refuge, New Mexico, U.S.A., represents the entire range for the prosobranch species, while the *Physa* is limited to a larger portion of southeastern New Mexico. We did not find evidence of significant population genetic structure for *Physa*. The same was not true for the two prosobranch species, which showed differing patterns of population structure throughout the refuge indicating differences in habitat preferences and/or dispersal ability between the species. This information will provide insight into fundamental interactions between species and their landscapes, as well as providing information that is critical for conservation planning and the development of effective management strategies for imperiled species.

11:00 a.m. **TRANSLOCATION OF BLUEBREAST DARTERS INTO AN OHIO RIVER SYSTEM.** Brian J. Zimmerman (zimmerman.205@osu.edu), Daniel Symonds, and S.

Mažeika P. Sullivan. The Ohio State University, Columbus, OH.

Stream ecosystems of Ohio historically supported diverse and abundant fish communities. Loss and fragmentation of high-quality habitat and impairments in water quality have led to significant alterations in the diversity, composition, and productivity of native fish communities. The Bluebreast Darter (*Etheostoma camurum*), for example, was extirpated from many Ohio River systems over a century ago. In late spring 2016, 974 adult Bluebreast Darters were translocated from the greater Muskingum River basin into the upper Licking River. Translocated individuals were marked with visible implant elastomer (VIE) tags; in fall 2016, ~ 12% of translocated individuals were recaptured, as well as four young-of-year. VIE tags revealed that two individuals had moved > 9 river km following translocation. Complementing our translocation activities, additional objectives include evaluating the relative influences of hydrogeomorphology, water-chemistry, and resident fish communities on the ecology and reproduction of reintroduced darters.

11:20 a.m. **COLLABORATIVE 316B STUDY OF SEVEN POWER PLANTS ON THE OHIO RIVER.** Jason Rager[1], Joe Vondruska[1], Greg Seegert[1] (gseegert@eaest.com), and Doug Dixon[2]. 1—EA Engineering, Deerfield, IL. 2—EPRI, Ovid, NY.

In 2015, we began a 2-year study collaborative study of seven power plants on the Ohio River to meet the requirements of EPA's 316b Rule pertaining to an "Entrainment Characterization Study". The same sampling methodology was used at all plants thus facilitating comparisons among plants. This methodology consisted of deploying 0.5-m diameter, 335-micron mesh plankton "bongo" nets at multiple depths within what EPA terms the zone of hydraulic influence in front of each plant's intake. In 2015, we sampled every 2 weeks from March through September. We collected almost no eggs or larvae in March or September. Peak abundance at most plants was from late May through about mid-June, with a secondary peak sometimes occurring in August. In 2015, we estimated that entrainment ranged from about 200 million eggs and larvae to over a billion eggs and larvae, depending on the plant. Although these numbers may seem high, we determined that the vast majority of the eggs and larvae were rough or forage fish (e.g., Emerald Shiner, Freshwater Drum, clupeids, and Ictiobinae). Thus the value associated with entrainment losses at each plant will be fairly low. Because of the lack of larvae at the beginning and end of the sampling period in 2015, sampling in 2016 began in April and ended in August, with weekly sampling during the expected peak from mid-May through June. This will reduce the variance associated with the density estimates, allowing for more accurate and precise entrainment estimates for 2016. The 2016 results are still being tabulated but should be available by the time of the meeting. Preliminary results indicate that the peak period of larval abundance in 2016 was similar to that in 2015 and that species/taxa composition was similar both years, except that clupeids and logperch were more abundant in 2016.

^ 11:40 a.m. **IT TAKES A VILLAGE: AN OVERVIEW OF COLLABORATIVE EFFORTS FOR REINTRODUCING EXTIRPATED LAKE STURGEON (*ACIPENSER FULVESCENS*) TO THE MAUMEE RIVER, OHIO.** Jessica Sherman[1] (jessica.sherman2@rockets.utoledo.edu), Jonathan Bossenbroek[1], Todd Crail[1], Christine Mayer[1], James Boase[2], Justin Chiotti[2], Kent Bekker[3], and Christopher Vandergoot[4]. 1—University of Toledo, Toledo, OH. 2—U.S. Fish & Wildlife Service, Alpena, MI. 3—Toledo Zoo, Toledo, OH. 4—U.S. Geological Survey, Sandusky, OH.

Lake Sturgeon (*Acipenser fulvescens*) were once a very common species throughout the Great Lakes with a historical abundance estimated between 671,000–2.3 million fish. Anthropogenic influences like overfishing and habitat degradation have eliminated Lake Sturgeon from many areas and their populations have been reduced to less than 1% of historic abundance. Rehabilitation and restoration efforts are being implemented throughout their native range to increase population numbers and reintroduce extirpated populations. Lake Sturgeon are a candidate for reintroduction in the Maumee River, Ohio, where they were historically abundant, but are now functionally extirpated. A reintroduction plan has been developed through collaborative efforts to address strategies for rearing and reintroducing Lake Sturgeon to the Maumee River and to outline the objectives and considerations needed for long-term success and the establishment of a self-sustaining population. The reintroduction plan is a multi-faceted approach integrating habitat characteristics, juvenile rearing efforts, population assessments, success rates, public education, enforcement of laws, and incorporation of long-term management strategies to provide a comprehensive strategy for successful reintroduction and species restoration. The reintroduction of Lake Sturgeon into the Maumee River is a multi-agency, international effort that will provide a basis for continued research and strategies to restore Lake Sturgeon populations in Lake Erie and throughout their native range.

Thursday, 16 February 2017

1:00–3:00 p.m.
Ball State University Alumni Center
Assembly Hall A
First Last, Affiliation—Moderator

1:00 p.m. **DEVELOPMENT OF INDIANA'S RESERVOIR ENHANCEMENT PROGRAM THROUGH THE CREATION OF A HABITAT ENHANCEMENT ZONE.** Sandra Clark-Kolaks (sclark-kolaks@dnr.in.gov). Indiana Department of Natural Resources, Bloomington, IN.

In many Midwest states, including Indiana, large reservoirs are highly utilized by anglers. Also, similar to most reservoirs in the Midwest, reservoirs in Indiana are aging and aquatic habitat is deteriorating or nonexistent. Indiana Department of Natural Resources (DNR) is working to create a reservoir aquatic habitat enhancement program similar to other Midwest states using artificial structures: crib structures, rock piles, Georgia cubes, brush piles, and felled shoreline trees. General recommendations of the number of structures to place in a complex (i.e., 20 cribs per acre) are widely available but the question of how much aquatic habitat is needed is still unanswered. Indiana DNR is attempting to use a quantitative measure of habitat enhancement by calculating a Habitat Enhancement Zone (HEZ). The HEZ is the surface area for the portion of the lake with adequate oxygen levels for fish but deep enough not to obstruct boats. The HEZ is calculated using detailed bathometric maps which are created using Lowrance HDS depth finder and BioBase software. All artificial structures will be placed within this HEZ. We created an

impact acreage for structure complexes (i.e., 20 cribs per acre) based on an area slightly greater than the complex surface area due to habitat created along the edges of the structures. Other structures, like brush piles and felled shoreline trees, where documentation of surface area is not available, the best estimate of the area of habitat created was based on an area slightly larger than the structure (length of tree, etc.). Based on these individual structure impact acreages, Indiana DNR hopes to increase available habitat by 5% to 20% in the Habitat Enhancement Zone in project lakes.

1:20 p.m. **MAPPING SUBMERGED AQUATIC VEGETATION IN SHALLOW NORTH MAUMEE BAY: DISTRIBUTION AND ASSOCIATED FISH COMMUNITY.** Jacob W. Miller[1,*], Matt Arkett[2], Patrick M. Kocovsky[3], Matthew D. Cross[1], Daniel D. Wiegmann[1], and Jeffrey G. Miner[1] (jminer@bgsu.edu). 1—Bowling Green State University, Bowling Green, OH. 2—Maritime Way Scientific, Ottawa, ON, Canada. 3—U.S. Geological Survey, Sandusky, OH.

Maumee River and Bay, once with abundant submerged aquatic vegetation (SAV), have experienced declines of SAV due to substantive increases in suspended solids over the last century. Furthermore, potential invasion by herbivorous Grass Carp (*Ctenopharyngodon idella*) may cause declines in SAV abundance/distribution. We used low-cost, side-scan sonar to map large swaths of north Maumee Bay (< 2 m deep, 300 ha), quantifying extent and distribution of patchy SAV. Concomitant sampling for fish community structure in turbid open water and SAV in this bay was conducted to determine the potential for community shifts and improvement of wetland fish community metrics with SAV development. SAV was distributed over 43.7% of the area (131.2 hectares) with 79% overall accuracy and kappa coefficient of 0.58 when compared to other SAV mapping methods. The areas of SAV contained greater fish species richness than the surrounding turbid habitat (8.6 species vs. 5 species per net trawl, respectively). A wetland fish community index also increased demonstrating the potential improvement in fish community characteristics (reduction in Beneficial Use Impairments) if expansion of SAV could occur in these shallow open water habitats.

^ 1:40 p.m. **NEARSHORE FISH COMMUNITY RESPONSES TO SHORELINE TYPES IN LAKE ERIE.** Martin A. Simonson[1] (martin.simonson@rockets.utoledo.edu), Christine M. Mayer[1], Song S. Qian[1], Kristin K. Arend[2], Jonathan M. Bossenbroek[1], and Eric J. Weimer[3]. 1—University of Toledo, Toledo, OH. 2—Ohio Department of Natural Resources, Huron, OH. 3—Ohio Department of Natural Resources, Sandusky, OH.

Approximately 80% of fishes from the Laurentian Great Lakes use the nearshore zone in some way (e.g., feeding, spawning, or nursery area) for at least part of the year. Extensive shoreline alteration and development along Ohio's Lake Erie coast has reduced habitat complexity and changed ecological connections at the interface of land, water, and air. We hypothesized that shoreline features, such as the types of terrestrial vegetation and armoring, may affect the nearshore fish community composition. To determine relationships between shoreline types and the nearshore fish community, habitat features such as terrestrial vegetation, shoreline armor structure and submerged aquatic vegetation were classified at coastal sites in the western and central basins of Lake Erie where fish were sampled between 2011 and 2016. Nearshore fish community attributes, such as species diversity and predicted relative species abundances, were compared to shoreline habitat classifications. Both shoreline armoring and terrestrial vegetation were observed to influence the nearshore fish community interactively, indicating that both biotic and abiotic factors influence fish distribution in coastal zones. Shorelines armored with riprap revetments were found to have high species diversity and a high relative abundance of native species, however, the highest mean species diversity was found at unarmored shores with mixed vegetation (e.g., coastal wetlands). Unarmored (natural) shorelines support juvenile fish unevenly, with more prey species (e.g., shiners, darters) at sites without coastal vegetation and more sport fish species (e.g., percids, sunfish) occupying vegetated shorelines as juveniles. Understanding shoreline influences on fish communities informs best design principles that create a balance between erosion control, public/private access, and the need to protect and maintain natural resources.

2:00 p.m. **SMALLMOUTH BASS (*MICROPTERUS DOLOMIEU*) SPAWN SUCCESS AND TOTAL SUSPENDED SOLIDS (TSS) ON A 2.5-KM EEL RIVER STREAM REACH NEAR NORTH MANCHESTER, INDIANA.** Joshua Long (jalong2019@manchester.edu) and Jerry Sweeten. Manchester University, North Manchester, IN.

Concentrations of total suspended solids (TSS) of 50mg/L or higher have been shown to negatively affect the survival and growth of Centrarchids in laboratory experiments. Less is known if these laboratory results can be replicated within field studies. This study assessed how concentration and duration of exposure to TSS affect spawning success and growth of a natural Smallmouth Bass (*Micropterus dolomieu*) population in the Eel River near North Manchester, Indiana. TSS data was obtained from a water quality gage station 3 km downstream of the study reach. Smallmouth Bass spawn locations where documented from 2012-2016. The use of a smith-root boat electrofisher was used to collected smallmouth bass from a 500-meter study reach. Fish were tagged with a passive integrated transponder (PIT) for identification if recaptured. Dorsal spines were collected to assess fish age at time of capture. The principle result of this research supports the concept that timing, concentration and duration of exposure to elevated TSS levels affects spawn success, year class strength, and growth of SMB. In 2012, median TSS was 4.8 mg/L during the spawn season and mean first year growth was 10.23 cm SE ± 0.798. In 2013, median TSS was 101.26 mg/L and mean first year growth was 7.30 cm SE±1.04. In 2014, mean TSS was 173.5 mg/L and mean first year growth 7.15 cm SE± 0.48. Spawning success, survival and growth of smallmouth bass is dependent on the concentration and duration of exposure to TSS.

2:20 p.m. **EVIDENCE OF MORPHOLOGICAL AND FUNCTIONAL VARIATION AMONG BLUEGILL *LEPOMIS MACROCHIRUS* POPULATIONS ACROSS GRAND LAKE ST. MARY'S WATERSHED AREA.** Anthony Bell (bell.217@wright.edu) and Stephen J. Jacquemin. Wright State University–Lake Campus, Celina, OH.

A myriad of factors have been shown to influence the morphology of freshwater fish. However, despite the growing base of ecomorphology literature there is little information available exploring how physiological factors such as body size and sex or environmental factors such as habitat combine to relate to body morphology of Centrarchidae, especially in the *Lepomis* genera.

Moreover, follow up studies exploring the potential for this morphological variation to relate to function, such as swimming performance, are also understudied. Therefore, the primary objective of this study was to describe variation in body morphology of Bluegill (*Lepomis macrochirus*, Rafinesque 1819) across the Grand Lake St. Mary's watershed area (northwest Ohio, USA) and test for covariation of morphology with size, sex, and habitat. A secondary objective addressed in this study was to use laboratory studies to assess swimming performance to discern whether any differences in habitat (and morphology) corresponded with the potential functional aspects related to critical swimming velocity. Geometric morphometric methods were used to assess shape variation among individuals and general linear models were used to test for covariation of morphology with size, sex, and habitat. Analyses indicated that body size was the strongest driver of morphological variation followed by sex, habitat, and interactions—indicating the presence of allometry, sexual dimorphism, and the potential for habitat induced plasticity. Swimming performance trials supported functional differences as individuals from lotic habitats demonstrated significantly higher Ucrit swimming performance values (~ +20%) than lentic individuals. Broader applications of these findings can link to evolutionary ecology, management, and conservation.

^ 2:40 p.m. **BLACK BASS IN THE EEL RIVER OF NORTH CENTRAL INDIANA: A POPULATION ASSESSMENT.** Alan Mock (ajmock2017@manchester.edu) and Jerry Sweeten. Manchester University, North Manchester, IN.

The Eel River is a 177 kilometer (110 miles) 6th order stream and originates as an agricultural drainage ditch in Allen County, Indiana. The stream flows southwest where it joins the Wabash River near Logansport and land use across the watershed is approximately 80% row crop agriculture. Historically, black bass populations in the Eel have been inconsistent and a 12 inch (305 mm) minimum total length and a five fish bag limit was the harvest regulation. In 2012 a 12 inch (305 mm) to 15 inch (381 mm) slot limit with a bag limit of five fish with no more than two fish being greater than 15 inches was initiated by the Indiana Department of Natural Resources. To evaluate the new slot limit, surveys for black bass were conducted in 2013 and 2015 over seven stations ranging in length from 3.6 miles (5.8 km) to 10.9 miles (17.5 km). All Smallmouth Bass (Micropterus dolomeiu) (SMB) and Rock Bass (*Ambloplites rupestrus*) (ROB) collected were measured for total length (nearest mm) and weighed (nearest gram). Age and growth was determined by dorsal spine cross sections. In 2013 525 SMB were captured and 286 in 2015 with no recaptures. The 2012 year class accounted for 71% of fish aged in 2013 and 41% in 2015. There was no difference in CPUE across sample years, but growth rates for SMB were significantly higher in 2013.

Thursday, 16 February 2017

1:00–3:00 p.m.
Ball State University Alumni Center
Assembly Hall B
First Last, Affiliation—Moderator

^ 1:00 p.m. **DIET CONTENTS AND DIETARY SELECTIVITY OF FISHES IN THE U.S. GREAT BASIN.** Mario Minder[1] (mmminder@bsu.edu), Robert Shields[1], Mark Pyron[1], Emily Arsenault[2], Mike Thai[2], Jim Thorp[2], and Olaf Jensen[3]. 1—Ball State University, Muncie, IN. 2—University of Kansas, Lawrence, KS. 3—Rutgers University, New Brunswick, NJ.

The Great Basin Rivers are home to a large variety of fishes, both native and invasive. As part of a larger macrosystems project, we analyzed stomach contents from fish collected on the Carson, Humboldt, and Bear Rivers in Nevada, Idaho, and Utah. Using the Manly-Chesson diet selectivity index we compared the contents of our stomachs to results of invertebrate surveys performed concurrently with our fish sampling. The results of this study will be used in conjunction with future sampling efforts in Mongolia and the Yellowstone River.

1:20 p.m. **IMPINGEMENT AND ENTRAINMENT SAMPLING RESULTS AT TWO COAL FIRED GENERATING STATIONS ON THE LOWER WABASH RIVER.** Kenneth Cummings[1], Greg Seegert[1], and Daniel Arndt[2] (daniel.arndt@duke-energy.com). 1—EA Engineering, Deerfield, IL. 2—Duke Energy, Plainfield, IN.

The U.S. Environmental Protection Agency's 316(b) rule is applicable to the cooling water intake structures (CWIS) at Duke Energy's Cayuga Generating Station (CGS) and Wabash River Generating Station (WRS). The rule requires application of Best Technology Available to minimize adverse impacts to aquatic communities as a result of impingement and entrainment. As a result, Duke Energy conducted impingement and entrainment sampling in April 2006 through April 2007 at CGS and WRS to meet the following objectives: describe the ichthyoplankton composition in entrainment samples and the fish composition in impingement samples, document any rare or threatened species collected and discuss significance, note and discuss the presence of unusually large numbers of recreationally important species, describe temporal and diel patterns of the entrainment and impingement rates, and provide annual entrainment and impingement estimates by number for all species/taxa combined and for each taxa. At CGS, impingement sampling was conducted weekly from 14 April 2006 to 30 November 2006 and twice monthly from December 2006 to the first week of April 2007. Samples were collected in two in-sluiceway collection baskets at the CWIS. Entrainment samples were collected weekly from April 2006 to September 2006. Samples were collected at vent tubes installed in the circulating water lines before cooling water enters the condenser boxes. At WRS, impingement sampling was conducted weekly from April 2006 to November 2006 and twice monthly from December 2006 to the first week of March 2007. Samples at the three intakes were collected in in-sluiceway collection baskets equipped with 3/8 inch mesh. Entrainment samples were collected weekly from 19 April 2006 to 8 September 2006 at vent tubes installed in the circulating water lines before cooling water enters the condenser boxes. Impingement sampling at CGS resulted in the collection of 53 fish species, one hybrid, and six taxa. Impingement sampling at WRS resulted in the collection of 37 fish species and eight taxa. Entrainment sampling at CGS resulted in the collection of 4,833 ichthyoplankton specimens representing five life stages and twelve families. Entrainment sampling at WRS resulted in the collection of 1,386 ichthyoplankton specimens representing five life stages and eight families. In summation, while absolute impingement and entrainment numbers can vary from year-to-year at CGS and WRS, previous impingement and entrainment studies along with fisheries sampling near the vicinity of both facilities suggest catches to be dominated by the same few species or taxa, especially Gizzard Shad and Freshwater Drum.

^ 1:40 p.m. **DETERMINING POTENTIAL BIAS BY *CHAOBORUS* DURING HYDROACOUSTIC SURVEYS OF PREY-FISH BIOMASS IN OHIO RESERVOIRS.** Rebecca A. Dillon[1] (dillon.361@osu.edu), Joseph D. Conroy[2], and Stuart A. Ludsin[1]. 1—The Ohio State University, Columbus, OH. 2—Ohio Department of Natural Resources, Hebron, OH.

Hydroacoustic surveys provide lake-wide estimates of prey fish distribution, density, and biomass. These surveys, however, do not exclusively detect the target of interest. For example, the aquatic larval stage of the dipteran *Chaoborus*, a macroinvertebrate commonly found in inland lakes and reservoirs, has two air bladders which make it resonate well at a frequency (200 kHz) used for hydroacoustic surveys of prey fish. Although *Chaoborus* occupies deeper water during the day, it migrates into the water column at night and may contribute greatly to total acoustic backscatter, biasing hydroacoustic surveys. The Ohio Division of Wildlife conducts annual hydroacoustic assessments of prey-fish biomass using 200-kHz transducers but has not accounted previously for potential bias due to the presence of *Chaoborus*. To determine this potential bias, we combined multi-frequency (70- and 200-kHz) hydroacoustic surveys with discrete-depth (n = 3 depths) pump and vertical net (153-micrometer mesh) tows to provide zooplankton and *Chaoborus* density estimates and horizontal, discrete-depth (n = 2 depths) paired ichthyoplankton net (500-micrometer mesh) trawls to provide fish density estimates. Surveys were completed monthly during April–August 2016 in Alum Creek Lake. Combining multiple sampling approaches identified all acoustic scatters and provided in situ density estimates. We found *Chaoborus* on all dates sampled, with greater densities in samples collected at night. Hydroacoustic data indicated lower prey-fish biomass from the 70-kHz transducer data compared to the 200-kHz transducer data, indicating bias from *Chaoborus*. Additional analyses will more fully quantify the seasonal contribution by *Chaoborus* to total acoustic backscatter and its effect on hydroacoustic estimates of forage fish biomass.

^ 2:00 p.m. **INTRODUCED FISH SPECIES OF THE U.S. GREAT BASIN.** Robert Shields[1] (rcshields@bsu.edu), Mario Minder, and Mark Pyron. Ball State University, Muncie, IN.

Fish communities of U.S. Great Basin rivers have been historically dominated by native and endemic Western fishes. Introduced species and severe drought have challenged the stability of fish communities in these rivers across variation in stream size, gradient, and elevation. In this study we surveyed fish communities of the Carson, Humbolt, and Bear Rivers in Nevada, Idaho, and Utah. We compared the abundance and species richness of introduced fishes to those of native fishes, among several functional process zones present in these three river valleys. Understanding how the surrounding landscape influences invasive river fauna may be useful in both predicting invasion potential and mitigating the effects of an introduced species that is already established in the ecosystem.

2:20 p.m. **LOW-HEAD DAM REMOVAL ON THE EEL RIVER IN NORTHERN INDIANA: AN ECOLOGICAL ASSESSMENT.** Cassandra Root (ccroot2018@manchester.edu) and Jerry Sweeten. Manchester University, North Manchester, IN.

Low-head dams are common in streams across the Midwest. These dams pose serious danger to humans and negatively affect stream ecological integrity. In the late 1800s, there were 14 dams in the Eel River basin in northern Indiana and by middle of the 20th century only 6 remained. In 2012 two of these dams were removed that reconnected nearly 200 miles of streams in the watershed. The purpose of this study was to quantify the ecological response of removing a third low-head dam in the Eel River near Mexico, Indiana. In 2015 and 2016 Index of Biotic Integrity (IBI) and Qualitative Habitat Evaluation Index (QHEI) was determined above the dam in approximately 200 meter reaches for 1,000 meters, above the pool upstream of the dam, and downstream of the dam for 1,000 meters. Fish were sampled using a Smith-Root 5.0 GPP boat electrofisher and a Smith-Root 2.5 GPP tote barge electrofisher. A roving freshwater mussel survey was also conducted. Species richness (fish and mussels) increased significantly downstream of the dam and above the pool of the dam during both sampling years. The IBI scores increased slightly upstream from the dam 44 to 48 and the QHEI increased from 60 to 80 above the dam. Freshwater mussel abundance increased by 75% above and downstream of the pool behind the dam. After removal of the Mexico dam on 1 November 2016 350 miles of the streams in the watershed were reconnected.

2:40 p.m. **UPDATED ESTIMATED SPAWNING AND HATCH LOCATIONS OF NATURALLY SPAWNED GRASS CARP EGGS IN A GREAT LAKES TRIBUTARY.** Holly S. Embke[1] (holly.embke@rockets.utoledo.edu), Patrick M. Kocovsky[2], Tatiana Garcia[3], Christine M. Mayer[1] (christine.mayer@utoledo.edu), and Song S. Qian[1]. 1—University of Toledo, Toledo, OH. 2—U.S. Geological Survey, Sandusky, OH. 3—U.S. Geological Survey, Urbana, IL.

Invasive Grass Carp (*Ctenopharyngodon idella*) have been stocked for decades in the United States for vegetation control. Adults have been found in all of the Great Lakes except Lake Superior, but no self-sustaining populations have yet been identified in Great Lakes tributaries. Previous research suggested natural reproduction has occurred in the Sandusky River; hence we sampled ichthyoplankton using paired bongo net tows June through August 2015 to determine if Grass Carp are spawning. We identified and staged eight eggs that were morphologically consistent with Grass Carp. Five eggs were confirmed as Grass Carp using quantitative PCR and DNA sequencing, while three were retained for future analysis. All eggs were collected during high flow events, either on the day of or 1–2 days following peak flow, supporting a suggestion that high flow conditions favor Grass Carp spawning. From our findings, we used an unsteady-state hydraulic modeling process to calculate the most likely spawning and hatch locations for these eggs. Preliminary model results suggest eggs were most likely released near the hypothesized spawning site near Fremont, Ohio. Hatch locations extended from approximately river km 20 out into Muddy Creek Bay. These locations will help guide future sampling efforts, inform risk assessments and aid targeted control efforts.

POSTER PRESENTATIONS

7:00–9:00 p.m.
Ball State University Alumni Center
Assembly Hall

^Denotes participation in the Best Student Poster Award competition

^ ESTABLISHING LONG-TERM FLASHINESS INDEX VALUES FOR WEST FORK WHITE RIVER: ANALYZING TRENDS THROUGH GRAPHICAL ANALYSES. Caleb Artz[1] (ccartz@bsu.edu) and Drew Holloway[2]. 1—Ball State University, Muncie, IN. 2—Muncie Sanitary District, Muncie, IN.

Stream flashiness refers to the ability of a stream to manage varying flow altering events. Flashy streams are characterized by the rapid changes in stream discharge. Less flashy streams maintain steady discharge during these flow events. The Richards-Baker Flashiness index was established to characterize short term changes in a stream that can be quantified over time to observe trends in stream discharge. The objectives of this study were to establish long-term Richards-Baker Flashiness Index values (R-B values) for the West Fork of the White River in Muncie, Indiana. Using methods described by Baker et al. (2004), daily discharge data was obtained from USGS gage station #03347000 and used to calculate R-B values. After R-B values were established the next objective was to analyze and explore the long-term data set for any patterns or trends. Daily R-B values were averaged for each water year (October 1–September 30) from 1932–2016. West Fork White River R-B values ranged from 0.18–0.34. Graphically, temporal changes were observed and indicate that stream flashiness is decreasing. Historic changes to an existing White River impoundment could also influence stream flashiness because of its proximity to the USGS gage station. Future studies should be conducted to determine if yearly R-B values have affected the fish community of West Fork White River through Muncie.

^ INVESTIGATING THE IMPLICATIONS OF A RECENTLY ESTABLISHED SLOT LIMIT ON THE AGE AND GROWTH OF SMALLMOUTH BASS IN THE WEST FORK OF THE WHITE RIVER USING PAST AND PRESENT POPULATION ESTIMATE DATA. Seth Bogue[1] (sbogue@bsu.edu), Drew Holloway[2], and Jason Doll[1]. 1—Ball State University, Muncie, IN. 2—Muncie Sanitary District, Muncie, IN.

During the summers of 2012, 2013, 2014, and 2016, a Smallmouth Bass depletion study was conducted at four sites on the West Fork of the White River throughout Delaware County, Indiana with two objectives. The first objective was to describe the Smallmouth Bass population using age and growth rates for the stretch of the river that was sampled. The second objective was to investigate the implications of the 305–381 mm slot limit on Smallmouth Bass. All Smallmouth Bass were sampled using a tote-barge mounted pulse DC electrofishing unit. Dorsal spines were collected from each fish and subsequent age and lengths were calculated using FishBC 3.0. Lengths at last annulus were used to estimate von Bertalanffy growth models for each year. Population estimates ranged from 48 (2016) to 185 (2013) fish per km. Time taken to reach harvestable size (305 mm) ranged from 5.3 years (2012) to 5.6 years (2016).

DEVELOPMENT OF A RAPID ZOOPLANKTON ASSESSMENT TOOL FOR FISHERIES RESEARCH AND MANAGEMENT. Joseph D. Conroy (joseph.conroy@dnr.state.oh.us) and Richard D. Zweifel. Ohio Department of Natural Resources, Hebron, OH.

Each year, the Ohio Division of Wildlife stocks millions of juvenile sportfish into inland reservoirs. Sportfish are stocked as fingerlings (about 30 mm) or fry (about 6 mm), sizes particularly sensitive to zooplankton forage availability. Zooplankton biomass, community composition, and size have all been found previously to affect sportfish recruitment. However, determining these zooplankton community characteristics relies on detailed microscopic determinations, requiring skilled technicians and several hours per sample to process. Ultimately, we sought to decrease the time and expert skill needed to determine total zooplankton biomass at the time of stocking juvenile sportfish. Specifically, we compared microscope-based (B_{Micro}) zooplankton biomass estimates with those determined gravimetrically (B_{Grav}). Biomass varied by almost two orders of magnitude (observed B_{Micro} ranged 0.083–5.333 dry mg/L, min–max) and differed by reservoir type (two-way ANOVA $F_{2,87} = 12.5$, $P = 1.6 \times 10^{-5}$) and year ($F_{2,87} = 19.4$, $P = 1.1 \times 10^{-7}$) whereas the interaction was non-significant ($P = 0.16$). Microscope and gravimetric zooplankton biomass estimates directly correlate ($\log B_{Micro} = 0.0757 + 1.2858 \times \log B_{Grav}$, $r = 0.792$, $r^2 = 0.627$, $P << 1 \times 10^{-6}$) but significantly differed from a 1:1 relationship. Zooplankton species composition varied among size fractions. Small zooplankters, like copepod nauplii, dominated the smallest size fraction, whereas larger taxa, including *Daphnia*, comprised more than half the biomass of the two largest size fractions. Daphnid lengths increased by size fraction (two-way ANOVA $F_{4,1156} = 197.1$, $P << 1 \times 10^{-6}$) and differed between upground and tributary reservoir types ($F_{2,1156} = 11.3$, $P = 1.4 \times 10^{-5}$); the interaction was non-significant (P = 0.11). Some smaller daphnids were retained in larger fractions. Gravimetric determinations of zooplankton biomass correlate directly with microscope-estimated values for a wide range of biomasses and various types of systems. Further, dozens of samples can be processed simultaneously in one or two days. Hence, when rapid, non-taxonomically-resolved biomass estimates are needed, oven-based methods may be appropriate.

DO WE REALLY NEED FISHERIES SCIENCE? Samuel Guffey (guffey0@purdue.edu). Purdue University, West Lafayette, IN.

Are advances in fisheries science truly needed to improve fisheries management, or do we already have the understanding and tools necessary to do the job? In this interactive poster presentation, I explore the purpose of fisheries science and management in the Midwestern US. We will discuss the fundamental outputs of fisheries science, including improved understanding of how ecosystems work, improved understanding of cause and effect relationships, the development of new information-related tools, the development of new manipulation tools, and status assessments of specific systems. We will then examine the high-level goals of fisheries management and discuss what, if any, scientific and technological advances are needed to improve fisheries management. Some people have argued that investments in understanding and influencing human behavior and socio-political systems could improve natural resource management more than investments in technology and our understanding of ecosystems themselves. However, the relative importance of each avenue may depend on regional goals and key stakeholders, e.g., managing a fishery for recreational or commercial purposes, or the risk of system-altering phenomena such as invasive species or other rapid environmental changes.

UNDERSTANDING SWIMMING PERFORMANCE VARIATION IN OHIO MINNOWS (CYPRINIDAE). Stephen C. Huelsman, Cara G.

Schemmel, Austin J. Smith, and Stephen J. Jacquemin (stephen.jacquemin@wright.edu). Wright State University–Lake Campus, Celina, OH.

Understanding variability in swimming performance of freshwater fishes has implications for improving descriptions of ecological niches, establishing evolutionary relationships, and providing management and conservation recommendations. Previous research has noted patterns in swimming performance consistent with anatomical, physiological, and environmental variation. However, the vast majority of swimming performance research to date has focused on larger game species and has historically left many of the smaller non-game taxa which represent the largest portion of North American freshwater fish diversity out of research programs. Thus, the objective of this study was to assess swimming performance of several species of common Ohio Minnows (Cyprinidae) in relation to covariance with body size, sex, watershed, and habitat types. We used a Blazka style swimming performance chamber following a stepwise critical swimming performance (Ucrit) protocol to quantify individual variation in four species (Bluntnose Minnow, Spotfin Shiner, Sand Shiner, and Redfin Shiner). Using a series of general linear models at both a global (taxa combined) and local (taxa specific) scale we identified several trends across tested individuals (N = 150). First, species differed in swimming performance, even after controlling for cofactors such as body size. Second, slopes depicting relationships between swimming performance and body size were not consistent among taxa and moreover, sex did not appear to play a role in swimming ability. Lastly, species specific models indicated inconsistent differences among taxa related to watershed and habitat variation. Overall, these results provide an important contribution to furthering our understanding of small bodied non-game fishes.

LARVAL WALLEYE DISPERSAL FROM SPAWNING GROUNDS IN THE MAUMEE RIVER: FINE-SCALE TEMPORAL SAMPLING TO DETECT PATTERNS. Chris Kemp (ckemp@bgsu.edu), Dale Shank, and Jeff Miner. Bowling Green State University, Bowling Green, OH.

In lotic systems, hatching of larval fishes is thought to be episodic with pulses of newly hatched larvae drifting downstream. However, most sampling for larval fish occurs on a weekly basis, with only the rare sampling regimen occurring at shorter intervals. Thus, modeling of transport downstream or even abundances at different spatial locations to estimate mortality requires assumptions about this dispersal. Given the importance of accurate estimates of larval Walleye abundance (*Sander vitreus*) and the incomplete information about the temporal pattern of emergence and dispersal, we conducted ichthyoplankton sampling daily throughout the spawning season for Walleye in the Maumee River about 1 km downstream of the lowest recognized spawning habitat. Using USGS average daily flow data, we extrapolated densities to daily population estimates and compared densities and population estimates with flow conditions. We then estimate total population size by modeling estimates if sampling occurred on a less frequent basis to estimate error and to determine the importance of sampling with high frequency, especially during the difficult to predict peak in larval dispersal.

MAPPING AND MONITORING AQUATIC VEGETATION IN LAKE ERIE FOR GRASS CARP RISK ASSESSMENT. Nicole King[1] (nicole.king2@utoledo.edu), Jenny L. Hanson[2], Patrick M. Kocovsky[3], Christine Mayer[1], and Song Qian[1]. 1—University of Toledo, Toledo, OH. 2—U.S. Geological Survey, La Crosse, WI. 3—U.S. Geological Survey, Sandusky, OH.

Grass Carp (GC) are a large invasive herbivorous fish that have been present in the Great Lakes since the early 1980s. Indirect evidence of natural reproduction was first observed in 2012, and a 2015 survey yielded eight verified GC eggs, providing the first direct evidence of GC reproduction in a Great Lakes Basin. GC consume large amounts of plant biomass and have been known to cause decreases in abundance and diversity of submersed aquatic vegetation, which can adversely affect game fish, and macroinvertebrates and contribute to declines in water quality. Consequently, there is a heightened need to understand the potential ecological effects that a reproducing population of GC may have on the Great Lakes. We have created a 3 tier assessment tool using object-based image analysis from existing aerial imagery, hydroacoustics, and field sampling with a rake method as a tool for grass carp risk assessment. We aim to identify submersed and emergent aquatic vegetation distribution and species composition within Lake Erie to establish baseline data in the early stages of GC invasion. This study highlights the importance of pre-invasion mapping and surveys to track long term ecological impacts of invasive species.

^ RUSTY CRAYFISH CONSUMPTION OF SILVER CARP FECAL PELLETS. Zachary Laughlin (ztlaughlin@bsu.edu), Mark Pyron, and Robert Shields. Ball State University, Muncie, IN.

Large Midwestern U.S. rivers were invaded by Silver Carp (*Hypophthalmicthys molitrix*) during the past several decades. This invasive consumes and potentially alters phytoplankton communities, competes with native fishes, and likely contributed to a shift in functional trophic assemblage structure of native fishes. Recent research suggests that this invasive species affects food web structure by benthic subsidy of a novel food source via fecal matter, potentially increasing fitness of benthic consumers. We tested for effects of Asian carp fecal matter on growth and survival of rusty crayfish (*Orconectes rusticus*) in mesocosm experiments. One crayfish was added to each of 18 experimental mesocoms. Half of the mesocosms received chironimid larvae as food sources, and the other half received the same mass of Silver Carp fecal matter. Our results provide increased understanding for Silver Carp effects on river ecosystems.

^ SWIMMING PERFORMANCE OF BLUNTNOSE MINNOWS *PIMEPHALES NOTATUS* IN LENTIC AND LOTIC WATERS. Crystal C. Nichols[1] (ccnichols@bsu.edu), Jason Doll[1], and Stephen Jacquemin[2]. 1—Ball State University, Muncie, IN. 2—Wright State University–Lake Campus, Celina, OH.

Anthropogenic perturbations, such as culverts, can affect fish species distribution and potentially prevent fish movement. These structures often reduce stream width, thereby increasing water velocity to a rate at which fish cannot overcome. Increased velocities may inhibit species distributions because movement is largely dependent on the physical ability of the fish to cross these barriers. Further, individuals within a species also possess varying swimming abilities based on their sex, size, and the habitat they occur in. Thus, our objective is to assess swimming performance of the Bluntnose Minnow *Pimephales notatus*. Swimming performance was measured using a flow chamber in which the fish was placed in, following the UCrit procedure. After an hour

acclimation period fish were subjected to velocities starting at five and then increasing by five until the fish is unable to keep swimming. We compared Ucrit across habitat where the fish were collected (lentic vs. lotic), sex, and body size on the swimming performance of Bluntnose Minnows. We described swimming performance of Bluntnose Minnows across habitat, sex, and body size. Our results can be used to understand potential hydraulic barriers for this species.

^ TIMING AND ABUNDANCE OF NORTHERN PIKE SPAWNING MIGRATIONS IN RECONNECTED LAKE ERIE COASTAL WETLANDS. Nate Stott[1] (stottnd@bgsu.edu), Geoff Steinhart[2], and Jeff Miner[1]. 1—Bowling Green State University, Bowling Green, OH. 2—Ohio Department of Natural Resources, Sandusky, OH.

Recent coastal restoration projects have been aimed to reconnect diked wetlands to provide additional fish habitat. Common Carp invasion of these wetlands is a concern to wetland managers because of an associated increase in turbidity and decrease in macrophyte abundance. Northern Pike are a highly sought after game species and ecosystem-structuring predator that have declined in abundance in Lake Erie. The extent to which these reconnected wetlands are used by Northern Pike is unknown as Northern Pike often demonstrate natal site fidelity. We aim to assess Northern Pike use of reconnected wetlands by sampling wetlands encompassing a gradient of time since reconnection to Lake Erie. Fyke nets will be used to capture Northern Pike for mark recapture experiments to estimate abundances of spawning populations. Abundance estimates can be used to compare reconnected wetlands to historically connected systems to determine if Northern Pike use newfound spawning habitats. Preliminary Dual Frequency Identification Sonar (DIDSON) footage indicated fish immigration was strongly correlated to direction of flow ($P < 0.05$). This suggests hydroperiod may be an important cue that triggers spawning migrations. The DIDSON will be deployed to observe temporal patterns of spawning migrations of both Northern Pike and Common Carp to investigate if temporal differentiation occurs. In addition, larval Northern Pike will be sampled via quatrefoil light traps to quantify spawning success within each wetland.

EXPLORING POTENTIAL DRIVERS, SYNCHRONY, AND PREDICTIVE UTILITY OF AGE-0 BLACK BASS ABUNDANCE IN THE OHIO RIVER. Curtis P. Wagner[1] (curt.wagner@dnr.state.oh.us) and Jeremy J. Pritt[2]. 1—Ohio Department of Natural Resources, Akron, OH. 2—Ohio Department of Natural Resources, Hebron, OH.

Black bass, including Largemouth bass *Micropterus salmoides*, Spotted Bass *Micropterus punctulatus*, and Smallmouth Bass *Micropterus dolomieu*, are highly pursued sportfish in the upper Ohio River. To effectively manage these fisheries, we sought to understand the spatial and temporal variation in fall age-0 abundance and the mechanisms affecting this variation among the 10 navigational pools in the 724-km section of the upper Ohio River bordering Ohio. Specifically, our objectives were to explore potential abiotic and biotic drivers of age-0 abundance variation, examine the spatial synchrony in annual age-0 black bass abundance estimates, and evaluate the utility of age-0 abundance estimates for predicting future year class strength. Annual black bass population assessments were conducted in September from 2005–2015 using shoreline boat-electrofishing. Relative abundance of the spawning stock (ages-3+) appeared to influence the variation in age-0 relative abundance for Largemouth Bass and Spotted Bass, but not for Smallmouth Bass. Despite a lack of spatial synchrony for age-0 Largemouth Bass abundances across pools, fall Spotted Bass and Smallmouth Bass age-0 relative abundance estimates exhibited positive synchrony among pools nearer one another whereas pools farther separated exhibited negative synchrony. Although fall age-0 abundance of Spotted Bass was positively correlated with fall abundance of age-2 Spotted Bass from the same cohort two years later, the same predictive utility was not observed for Largemouth Bass and Smallmouth Bass. Future research will explore additional candidate drivers including prey densities and water temperature in the model selection framework aimed at explaining the spatial and temporal variation in fall age-0 relative abundance estimates. We are only just beginning to obtain adequate data to explore these relationships and data collection will continue to strengthen the analyses and inform the management of these species in the Ohio River.

^ USING EDNA TECHNIQUES TO IMPROVE EFFICIENCY AND ACCURACY OF MANAGING THE AQUATIC INVASIVE SPECIES CARIBBEAN LIONFISH. Adam Wishon (awishon@umail.iu.edu), Haley Erickson, Ben Grubbs, Austin Collins, and Stephen 'Chip' Glaholt. Indiana University, Bloomington, IN.

The Pacific Red Lionfish (*Pterois volitans*) invaded the Caribbean from an accidental or negligent release of this popular aquarium industry fish into Florida waters in the 1980's. Lionfish are known for their high reproductive rate (~2 million eggs/yr/female) and voracious appetite (consuming up to 20 fish in half an hour and reducing native reef fish density by 80–90% in areas) resulting in a dramatic decline in the health of coral reef ecosystems in the Caribbean. Current monitoring and suppression tactics (i.e., spear fishing) to combat the spread of lionfish throughout the Caribbean is dependent on the visualization of lionfish. This type of monitoring is known for its high costs (associated with search even small areas underwater) and inaccuracy (due to false reporting and difficulty finding lionfish when they hide during the day). The dependency on this inaccurate and time intensive methodology is limited the effectiveness of managing this aggressively destructive invader of reef communities.

To increase the accuracy and efficiency of tracking lionfish we've implemented the recently developed molecular techniques of environmental DNA (eDNA). Replacing the need to visualize the lionfish to determine its presence, we simply take a water sample of the area of interest and analyzing it for residual lionfish DNA release in the form of scales, fish slime, or excrement using standard molecular techniques. The eDNA technique eliminates inaccuracies associated with reported sightings and the need for costly underwater exploration to detect lionfish in an area. The equipment needs for this methodology are standard for molecular labs and consumable are inexpensive, with the cost of processing a single sample around $0.05.

This methodology was field tested to show how sensitive and field capable it is on a 2016 research trip to Bonaire. Though lab and field experiments we show that: 1) eDNA concentration can correlate with lionfish abundance (under controlled lab conditions), 2) this method is highly sensitive in detecting lionfish in coastal marine environments, and 3) eDNA persists in the Caribbean environment for only 2 days, giving us a timeframe in which the fish was present in that area. We believe this efficient and effective methodology will be instrumental in managing not only

the Caribbean lionfish invasion but other marine invasions as well as monitoring of endangered species in all aquatic ecosystems.

REVERSING HABITAT LOSS IN RESERVOIRS: NO ONE CAN DO IT ALONE. Matthew D. Wolfe[1] (matt.wolfe@dnr.state.oh.us) and Joseph D. Conroy[2]. 1—Ohio Department of Natural Resources, Akron, OH. 2—Ohio Department of Natural Resources, Hebron, OH.

Impoundments across North America face the dilemma of habitat loss due to the natural aging process. The natural resource agencies who manage these impoundments are limited in what they can accomplish due to constraints in manpower and budgetary resources. These consequences ultimately affect the success of angler groups, who in turn have their own limitations on what they can do. With so many problems, it is imperative that all user groups collaborate to find solutions to achieve a common goal. Pymatuning Lake is a large, impounded reservoir that spans the border between northeast Ohio and northwest Pennsylvania. Since the Shenango River was dammed to create the reservoir in 1934, the lake has lost significant in-lake habitat, including the rocky debris and wooden stumps that served its highly successful fisheries. Such a large reservoir (5,929 ha surface area) requires an approach that will serve all its user groups and address both short term and long term goals. Each year, the natural resource agencies (Ohio Division of Wildlife, Pennsylvania Fish and Boat Commission) collaborate with various user groups (Pymatuning Lake Association, Crawford County Conservation District) to place wooden cribs and rock reefs into the reservoir. The collaboration works well in that the user groups benefit immediately from these placements since they serve as fish concentration devices. But over time, the natural resource agencies are hopeful that these placements will serve as viable fish habitat that has been degrading away for decades.

RECFISH LM: AN ONLINE DATA PORTAL FOR RECREATIONAL FISHERIES IN SOUTHERN LAKE MICHIGAN. Mitchell Zischke[1] (mzischke@purdue.edu), Benjamin Gramig[1], Charles Rosewell[2], and Benjamin Dickinson[3]. 1—Purdue University, West Lafayette, IN. 2—Illinois Natural History Survey. 4—Indiana Department of Natural Resources.

More than 30 years of recreational fisheries data have been collected by state agencies in southern Lake Michigan. Recently, we've pulled together more than 50,000 data records and developed an interactive website for these data: "RecFish LM". RecFish LM is an easy-to-use, online data portal that allows stakeholders and fishers to explore long-term recreational fisheries data in southern Lake Michigan. Specifically, you can explore fishing effort, harvest, and socioeconomic characteristics such as expenditure and satisfaction. You can compare fisheries data by month, angler type, site and species through drop-down menus and dynamic charts. You can export the charts you create, as well as view and export the underpinning data. The goal of this website is to increase the utility of these great long-term data sets and to provide everyone with the opportunity to explore recreational fishing data in southern Lake Michigan.