North Central Division American Fisheries Society

Centrarchid Technical Committee

2019 Meeting Notes

Summer Meeting Location: Webster, SD

Summer Meeting Dates: July 16-18, 2018

Dakota

Northeast South Dakota Bluegill study

Research began at Lake Enemy Swim in 2019 to examine bluegill population dynamics in select northeast South Dakota lakes. Bluegills were collected in modified-fyke nets during June. A total of 850 non-reward tags and 150 reward tags ($100) were attached to the released bluegills. The bluegill population (≥6 inches) was estimated (Schnabel estimate) at 18,152 (95%CI = 16,016 – 20,945). Bluegill fishing on Lake Enemy Swim was slow during 2019 as anglers submitted only 30 (3.5%) of the non-reward tags and 9 (6.0%) of the reward tags during 2019. In addition to the tagging component, standard bluegill sampling and angler use and harvest surveys are being completed at each lake when included in the study. Collected information (e.g., natural mortality, exploitation, growth, recruitment) from this project will be used to model potential population responses to various regulations. Tagging and population estimates will continue at Lake Enemy Swim in 2020 and 2021 and an additional lake will be added in 2020 with a third lake scheduled to be added in 2022.

Evaluating consumption rates of stocked age-0 Walleye *Sanders vitreus* by Smallmouth Bass *Micropterus dolomieu* and adult Walleye in Lake Oahe

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Smallmouth Bass *Micropterus dolomieu* were introduced to the Missouri River reservoirs in the 1980s and have since become abundant, providing relatively new angling opportunities and economic growth. However, Walleye *Sander vitreus* anglers have expressed concerns regarding the potential effects of Smallmouth Bass on Walleye populations. Walleye are popular sportfish in South Dakota, but standardized South Dakota Game, Fish & Park (SDGFP) lake surveys the

past decade have indicated declining populations in several Missouri River reservoirs. Concerns regarding what factors may be resulting in Walleye population decline has incentivized research evaluating post-stocking predation by Smallmouth Bass and adult Walleye. Thus, our objective is to evaluate predation of adult Smallmouth Bass and Walleye on wild and stocked age-0 Walleye in Lake Oahe through intensive diet analysis in two bays that were stocked with Walleye and one bay that was not stocked. Captured adult Walleye and Smallmouth Bass were marked with jaw tags in order to estimate population sizes within each bay and stomach contents were recovered via pulsed gastric lavage. This is a two-year project, with May to September 2019 being the first field season with age-0 Walleye stocked in Spring Creek and Okobojo and no stocking occurred in Cow Creek. Across bays, we collected and lavaged 1,146 Smallmouth Bass and 287 adult Walleye. Of the individuals lavaged, 81% of Smallmouth Bass and 72% of adult Walleye had stomachs containing at least one prey item. Age-0 Walleye were recovered from Smallmouth Bass stomachs for the first 11 days post-stocking, but never thereafter. Additionally, tissue samples were collected from Smallmouth Bass, adult Walleye, and a variety of prey species for stable isotope analysis. With Smallmouth Bass populations increasing on all four Missouri River reservoirs, this work will greatly enhance fishery managers understanding of interactions between Walleye and Smallmouth Bass. This is particularly important when considering discussions with Walleye anglers who believe Smallmouth Bass competition/predation is a major driver in Walleye recruitment. Moreover, with the limited space and high demand for SDGFP hatchery products, this project also examines the impacts of stocking Walleye in the face of possible Smallmouth Bass and adult Walleye predation.

Update from the Federal Fish Hatcheries in North Dakota

The NDGF relies on trap and transport of bluegills to reestablish or supplement populations. We occasionally propagate crappie at Valley City with wild captured brooders from Jamestown Reservoir and allowed to spawn in ponds but no real efforts going into the production there. Our requests are minimal when we have one with the last request in 2017.

We have had LMB requests of ~150,000 annually and are getting larval LMB from the State of Colorado to grow out at Garrison Dam NFH, but the past couple years we have had poor survival of the larvae. In 2017 the larvae were DOA. In 2018 there was some survival of the larval shipments but still very little success in the ponds. Last year we held the larvae in hatchery tanks for a couple days prior to stocking them out to get a better handle on shipping survival. Still poor results from the ponds. At Valley City we have been getting in a couple dozen broodstock from Brewer Lake and putting them in two 1/10 acre ponds with gravel spawning pads. The success has been minimal. I'm thinking we need to get the broodstock a little earlier in the year or start holding them at the hatchery year around to get around the stress of capture at spawning time. Spawning has been pretty hit and miss.

Iowa

- No updates

Illinois

- No updates

Indiana

- No updates

Kansas

Factors influencing Bluegill growth in small Kansas impoundments
Ben C. Neely, Jeff D. Koch, Keith B. Gido, Connor J. Chance-Ossowski, Elizabeth A. Renner

Abstract
Growth of Bluegill *Lepomis macrochirus* was evaluated in 33 small Kansas impoundments to understand statewide population dynamics. Ages were assigned to 1,621 Bluegill, and when combined, growth parameters using the Ogle-Isermann parameterization of the von Bertalanffy growth model were: L_∞ = 198 mm, K = 0.39, and t_{152} = 3.49 years. Growth was variable and t_{152} ranged from 2.2 to 5.4 years in the 28 populations where growth models converged. Three representative limnological variables (latitude, total nitrogen, and maximum depth) and three representative catch variables (95th percentile of Bluegill TL, catch-per-effort (CPE) of stock-length Largemouth Bass *Micropterus salmoides*, and CPE of Gizzard Shad *Dorosoma cepedianum*) were selected to elucidate mechanisms that explained t_{152} in Bluegill populations. All subset candidate models were fit using the six variables to predict t_{152}. Model selection was used to identify top candidate models ($\Delta AIC_c \leq 2$) and identify a confidence model set. Model averaging was used to calculate weighted parameter estimates with 95% confidence intervals for each independent variable present in the confidence model set to develop a single explanatory model. An estimated 35% of variation in Bluegill t_{152} was explained by the weighted averaged model that included 95th percentile of Bluegill TL, CPE of stock-length Largemouth Bass, latitude, and total nitrogen. Results from this study summarize Bluegill growth in Kansas and highlight the importance of social structure as well as biotic and abiotic interactions that influence Bluegill growth in small Kansas impoundments.

Evaluating growth of angled bluegill relative to the randomly sampled population
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Bluegill *Lepomis macrochirus* contribute to unique fisheries in Kansas where they fill many niches. One niche that has been gaining recent attention from anglers is pursuit of large individuals. These efforts typically occur during the Bluegill spawn in May and June when anglers can visually target nest-guarding fish. A combination of being visually evident and aggressively defending nests makes Bluegill especially susceptible to angler harvest during this time. There is concern that harvest of nest-tending Bluegill may remove the fastest growing individuals from the population and ultimately results in populations that do not support quality

Bluegill fisheries. To this end, Bluegill were sampled from 14 Kansas impoundments with both fall electrofishing at random shoreline locations and spring angling for nest-tending individuals in 2017 and 2018. Total length was recorded from all captured individuals and otoliths were collected from up to five individuals per centimeter group for age and growth estimation. In all impoundments, length distribution of sampled bluegill differed between gears with angled fish shifted toward larger individuals. Similarly, angled fish exhibited more rapid growth than randomly sampled individuals in some populations. These results highlight the vulnerability of the fastest growing individuals in bluegill populations to angler harvest while preparing and guarding spawning sites. Further, these results suggest that instituting some level of protection to nest-guarding Bluegill might result in increased size structure and promote development and maintenance of quality Bluegill fisheries.

Effect of Largemouth Bass Virus on Bass Populations in Kansas Impoundments
Jeff Koch, Vanessa Salazar, Ernesto Flores, Ben Neely, Chris Steffen, Susan Steffen

Twenty-six Kansas Largemouth Bass populations were tested for presence of Largemouth Bass Virus (LMBV) and population parameters (i.e., growth, mortality, and electrofishing catch rates) were compared between LMBV positive and negative populations. Of the 26 study impoundments, 15 tested positive for LMBV. Otoliths were collected from all sampled fish and populations parameters were estimated for each population. Growth was greater for populations that tested positive for LMBV, while mean morality estimates were similar for study lakes that were positive and negative for LMBV. Spring electrofishing catch rates (stock and preferred CPUE) were less for populations with LMBV in 2018, but this difference was not observed in previous years. No study impoundment tested positive for LMBV in 100% of lots (i.e., five fish test lots), while prevalence in test lots varied from 17% to 92%. Further research is needed to determine individual- and population-level effects of LMBV.

New Slot Limits on Bluegill and Redear Sunfish
We implemented a 6-9" protected slot length limit on bluegill and redear sunfish with unlimited under 6” and 5 over 9” at four small impoundments effective January 1, 2019. We identified four companion impoundments and collected growth information from bluegill and redear sunfish, where applicable, from each of the eight study impoundments using September electrofishing in either 2017 or 2018. September electrofishing will continue annually through 2022 when age structures will again be collected. We will be comparing relative abundance, size structure, and growth in all impoundments and creel survey results at a subset.

Michigan

- No updates

Minnesota

- DNR conducted a statewide creel and found anglers are dissatisfied with the size of panfish
    - The number of lakes with experimental regulations will be increased to 250 by 2022 following a push from public panfish groups

        - Five fish daily limits on panfish have been found to be successful at improving size structure, but 10 fish limits have not.
        - Anglers have been actively seeking out lakes with special regulations because they believe something is going on at that waterbody and think they will have a greater chance at success.
    - It is believed that social media may have an impact on the harvest of big male Bluegill
    - The governor has expressed interest in this topic, and an additional 2-3 creels on panfish will be conducted in each region as a result
- Tournament weigh in procedures have changed → nylon bags are now in use to keep fish in the water for the maximum time possible. Most tournaments are in compliance with this change.
- High school angling clubs have been increasing dramatically (Leech, Vermillion, Minnetonka areas)
- Increased effort to conduct population estimates on Largemouth Bass in MN lakes
    - This stems from a concern that springtime electrofishing may not be providing accurate data on bass populations.
- Concerns have arisen about the recruitment of Smallmouth Bass in the Mississippi River. High flows appear to be detrimental to recruitment.
- An evaluation of sex-specific harvest has indicated that 60-70% of Bluegills harvested in summer are males.
- A new research project began fall of 2019 on 24 waters titled, "Assessing Yellow Perch Populations with Experimental Sampling Gears". The gears consist of electrofishing and fine mesh gill nets. Information collected as part of this project will be used to evaluate Yellow Perch growth and maturity in 30 lakes across the state, to understand recruitment into standard gears, and to help focus future research questions.

Missouri

The following summarized research and management activities related to centrarchids is ongoing in Missouri. Only the primary researcher and their affiliated organization is listed after the research or management activity.

1) **Smallmouth bass electrofishing catchability in mid-sized Ozark rivers – Mike Thomas (Missouri University Cooperative Fish and Wildlife Unit)**

Boat electrofishing is widely-used to sample Smallmouth Bass (M. dolomieu), but unknown estimates of catchability has limited our ability to evaluate management actions in medium-sized streams. We sought to determine how power levels (i.e., at, and 20% reduced, power goal), fish size, and water temperature affect electrofishing catchability in Missouri Ozark Rivers. We conducted mark and recapture trials (n>14) with known numbers of Smallmouth Bass (n>850) in mid-sized rivers (n>7) in summer and fall 2018 and 2019. Fish were marked using passive integrated transponder (PIT) tags and held overnight in net pens prior to release 1-2 hours before recapture attempt. Preliminary analysis suggests that catchability increased from 17% (± 6%) for

25 cm fish to 35% (± 8%) for 43 cm fish at the recommended power goal. At a reduced power (80%), catchability was more variable and increased from 15% (± 12%) for 25 cm fish to 25% (± 18%). We mapped the electrical field from a boat electrofisher at three depths (i.e., 0.46 m, 0.91 m, 1.83 m) and found a 35% reduction in immobilization field size (0.2 V/cm) from 0.46 m to 0.91 m, but did not measure a field intensity sufficient to elicit immobilization at a depth of 1.83 m. Smallmouth Bass managers may find our methods useful for future research involving electrofishing and our results may assist in the development of standard electrofishing protocols for this popular sportfish.

2) **Genomic divergence, admixture, and signatures of local adaptation in the subspecies of smallmouth bass (*Micropterus dolomieu velox*) – Joe Gunn (Missouri University Cooperative Fish and Wildlife Unit)**

High-throughput DNA sequencing has revolutionized conservation biology by providing efficient and cost-effective analyses of genome-wide diversity in non-model taxa. Thousands of single nucleotide polymorphisms (SNPs) can be used to answer elusive questions about divergence, admixture, or local adaptation in fish and wildlife. We used a reduced-representation sequencing method (double digest RAD-seq) to genotype 127,428 SNPs for 95 individuals to examine evolutionary divergence and hybridization between the widespread Northern Smallmouth Bass (*Micropterus dolomieu dolomieu*) and the narrowly-distributed Neosho Smallmouth Bass (*M. d. velox*) where their ranges naturally meet in the Central Interior Highlands (CIH). Because both are popular sportfish and often supplemented in their ranges, delineating the extent of genomic diversity attributable to the Neosho subspecies is crucial for guiding Smallmouth Bass management in the region. We sought to assess for both subspecies: 1) genomic differentiation using Spotted Bass as an outgroup; 2) extent, distribution, and timing of admixture; and 3) signatures of local adaptation. We found evidence for strong genomic differentiation and population structure despite admixture in the Neosho range. We identified multiple SNPs that are potentially under natural selection based on outlier FST analysis, and we found clear differentiation at these SNPs across both subspecies' native ranges. Ultimately, we found unique evolutionary paths for the Smallmouth Bass subspecies and reveal previously unknown levels of genomic diversity in the CIH.

3) **Assessing the effects of length limit regulations of the Mark Twain Lake crappie fishery – Annie Hentschke (Missouri Department of Conservation)**

Mark Twain Lake (MTL) is an 18,600-acre reservoir in Northeast Missouri that is popular for both resident and non-resident anglers. No length limit regulations currently exist for highly targeted crappie because crappie growth is often slow in this reservoir. However, population size structure might be improved with a minimum length limit without negatively impacting yield if exploitation is high. Exploitation is currently unknown. Our objective is to measure crappie exploitation, then use this information with existing estimates of growth and total mortality to simulate the potential impacts of a minimum length limit. We began a two-year crappie exploitation study on MTL in spring 2019. Trap nets were dispersed evenly across the lake to capture and tag 1,000 crappie (at least 8 inches long) with $25 or $75 Carlin-dangler reward tags. As of October 2019, 214 tags have been returned from harvested crappie. Based on these tag

returns, exploitation would be 22% after correcting for tag loss and tag non-reporting. This estimate is expected to increase slightly as the fish have not yet been at large for a full year. Tag retention (98 percent) and handling mortality (less than 2 percent) were estimated during a pond study in 2018. Another 1,000 crappie will be captured and tagged in spring 2020.

4) **Responses of fish communities to predator introductions in small Missouri impoundments – Paul Michaletz (Missouri Department of Conservation)**

Hybrid striped bass and flathead catfish were stocked in four small impoundments in an effort to reduce gizzard shad and common carp abundance. Hybrid striped bass were also stocked in another five impoundments. Small fingerling (50 mm total length, TL) hybrid striped bass have been stocked annually at 250 fish/ha since 2014 and flathead catfish (200-380 mm TL) were stocked at 40 fish/ha in 2014 and 2015. The nine treatment lakes were each paired with a reference lake where no predator stockings have occurred. The goal of these predator stockings is to improve growth and size structure of panfish populations. There have been some slight improvements in bluegill growth in most of the treatment lakes. Fieldwork for the study is completed and a final report is being prepared.

5) Creve Coeur Park Lake invasive carp removal and white crappie response – Kevin Meneau (Missouri Department of Conservation)

Staff from the Missouri Department of Conservation (MDC), US Fish and Wildlife Service, US Geological Survey, and St. Louis County partnered to remove approximately 47,000 invasive Asian carp from a 320-acre, high-public use oxbow lake of the Missouri River near St. Louis. Spring electrofishing surveys 6 years prior to the discovery of invasive carp and 6 years after their discovery in the lake (2011-2016) suggested a decline of 42% in white crappie CPUE, 4% PSD, and 88% RSD12. Spring 2019 electrofishing surveys showed a slight increase in young crappie, while 2019 fall fyke net surveys showed further improvement in white crappie over catch rates from 2017 and 2018. MDC staff will continue to monitor and analyze the white crappie population of this lake after the large-scale invasive carp removal project to see how popular sportfish populations respond.

Nebraska

In 2019, several centrarchid related projects took place within Nebraska. Two major projects are of most interest for the purposes of this report. The Nebraska Game and Parks Commission (NGPC) has been experimenting the last few years with stocking hybrid bluegill/green sunfish (*Lepomis macrochirus X Lepomis cyanellus*) ahead of family fishing events to hopefully increase catch at the events. In 2019, they found that they are successfully increasing catch rates during the events. However, they have seen some variation on the longevity of the stocked fish after the family fishing events. Further investigation will be conducted moving forward to determine what is happening to the stocked fish after the family fishing nights. Included in that investigation will be an evaluation of largemouth bass (*Micropterus salmoides*) food habits to determine if they are being consumed by them.

The second major project involves ongoing work being conducted at Harlan County Reservoir near Republican City in south central Nebraska. During the spring, summer and fall of 2017 and 2018, the fish communities within coves of Harlan County reservoir were sampled. Several of the sampled coves have been disconnected from the main reservoir due to sediment deposition into the cove mouth developing into a berm and isolating the cove waterbody. Within disconnected coves, orangespotted sunfish (*Lepomis humilis*) and green sunfish (*Lepomis cyanellus*) were often the dominate species within the fish communities, likely due to their tolerance to reduced water quality conditions that are often present in these environments. Centrarchid species found within coves connected to the main reservoir tended to be more evenly distributed and consisted mainly of largemouth bass, bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*) and white crappie (*Pomoxis annularis*).

In addition to sampling the species assemblage within connected and disconnected coves, up to 10 black crappie for each cm length bin were collected for otolith extraction and ageing to examine growth. Although black crappie at age 1 (year) were similar in length between connected and disconnected coves, fish at ages 2 and 3 sampled within disconnected coves were significantly shorter than those of the same age sampled within coves connected to the main reservoir. Black crappie within disconnected coves also were found to have reduced relative weight (W_r) compared to those sampled in connected coves. This study suggests that rehabilitation projects to reconnect isolated cove environments could improve the growth and condition of resident black crappie within these systems.

Ohio

- No updates

Wisconsin

Wisconsin Department of Natural Resources

Bass

Bass-Walleye interactions

• A project examining interactions between largemouth bass and walleye is ongoing. The goal is to liberalize largemouth bass regulations to reduce their abundance and determine whether this results in an increase in walleye recruitment. Largemouth bass minimum length limits were removed and stricter length limits for walleye were implemented on 7 lakes from 2007-2011 with an evaluation time period of 8 years, with regulations remaining the same on 11 reference lakes. Updates will be provided as they become available.

Panfish

The WDNR Panfish Team has initiated a series of research projects examining trends and relationships between panfish population characteristics, angler effort, catch, and harvest rates, and regulations across Wisconsin lakes, including:

Angling rate hyperstability in panfish

• An investigation of seasonal patterns and hyperstability in angling rates of panfish, including bluegill, black crappie, and yellow perch across 300-500 lakes. We found that most effort and highest catch rates for bluegill and black crappie occurred in the spring and summer (May-July) as compared to either fall (August-October) or winter (December – February), but that ice fishing effort is increasing over time. Catch and harvest rates generally increased for black crappie, whereas bluegill catch rates increased while harvest rates were stable or declining. Effort, catch, and harvest rates for all species exhibited strong hyperstable relationships with population relative abundance, meaning angling rates were maintained across wide ranges of relative abundance (20-200 bluegill · km electrofished^{-1}, 5 – 30 black crappie · net-night^{-1}, and 10 – 300 yellow perch · net-night^{-1}) and did not decrease until relative abundance declines were conspicuous (<5 fish per unit effort). A manuscript describing these results (Feiner et al.) is in review at Fisheries Research.

Angler size selectivity and response to regulations

• We examined patterns in the size selectivity of anglers in response to population size structure and regulations (10, 25, or 50 fish bag limits) by comparing size structure of harvested fish from creel surveys to population size structure in standardized DNR panfish surveys in ~100 lakes. The median size of harvested bluegill and median size in WDNR surveys increased over time, whereas black crappie sizes were stable. Panfish anglers exhibited positive size-selection and consistent size preferences for ~7.5 inch (190mm) bluegills and ~10 inch (250mm) crappies. Size selectivity of anglers was only weakly related to population size structure (PSD or median length) in bluegill and not related to population size structure in black crappie, suggesting strong angler preferences for these sizes without regard to population size structure. An initial analysis also indicates that, after accounting for the effects of lake and population PSD, anglers selected for significantly larger fish under a 10-bag than a 50-bag limit. A complete version of these results was presented at the national AFS meeting in Reno, NV, and a paper will be contributed to an upcoming book on harvest management edited by Kevin Pope and Larkin Powell, University of Nebraska-Lincoln.

Effects of electronics on ice fishing angling rates

• In an effort to understand how the use of electronics might influence angler catch rates, the Panfish Team added two questions to WDNR's winter creel surveys asking whether anglers were using electronics while fishing, and whether anglers used electronics to locate their fishing spot that day, on creel surveys of 11 lakes in the 2018-2019 ice fishing season. Electronics use was prevalent – on average, 80% of panfish anglers reported using electronics while fishing, and ~50% used electronics to locate fishing spots, although the exact proportions varied among lakes. Electronics use while fishing increased panfish catch rates 50-300% and harvest rates 50-150% while electronics used to locate fishing spots increased the likelihood of catching fish but not overall catch or harvest rates. In simulations of increasing electronics adoption by anglers on a representative lake, total catch and harvest of bluegill and black crappie increased by hundreds to thousands of fish. An essay describing these results is currently in review at Fisheries.

Experimental regulations assessment

• An experimental assessment of different regulation methods to improve panfish size structure is currently ongoing. In 2016, three experimental regulations, a 25/10 (25 fish bag, 10 of any one species), 15/5 (15 fish bag, 5 of one species), or seasonal 15/5 (15/5 in May and June, 25 fish bag otherwise), were assigned across 93 lakes. Panfish surveys were performed before the regulations were implemented and will be performed again during 2019-2021. An initial analysis will take place in 2021-2022, followed with a second round of surveys from 2022-2026 and final analysis in 2026-2027. Results from this project will be reported to the Centrarchid Tech Committee as they become available.

University of Wisconsin-Madison and University of Wisconsin-Stevens Point

Centrarchid removal project

• WDNR, USGS, UW-Madison Center for Limnology, and UW-Stevens Point are currently collaborating on a large scale centrarchid removal project at McDermott Lake, WI, to evaluate whether reductions in centrarchid abundances could improve recruitment or abundance of other species (walleye, yellow perch) and evaluate compensatory responses of centrarchid populations. Baseline monitoring occurred in 2017, followed by intensive monitoring and removals via cloverleaf traps, mini-fykes, fyke nets, and electrofishing in 2018 and 2019. Monitoring will continue until 2021. In 2018, >85,000 centrarchids, including largemouth bass, smallmouth bass, black crappie, bluegill, pumpkinseed, rock bass, and green sunfish, were removed across nearly 2500 net-nights and 26 hours of electrofishing effort. This year's removals are ongoing and results will be reported as they become available.

Smallmouth bass population genetic structure

• UW-Stevens Point, WDNR, USGS, and Michigan DNR collaborated on a project to understand smallmouth bass genetic population structure across 32 sites in the Upper Mississippi River and Lake Michigan watersheds. Smallmouth bass were genetically distinct between these major basins. There was further subdivision of genetic strains into 2-6 distinct units in the Lake Michigan watershed delineated by habitat types (rivers or lakes), and 2-9 units in the Mississippi watershed that were generally delineated by watershed boundaries, suggesting low gene flow among these subpopulations. A manuscript detailing these results (Euclide et al., in prep) will be submitted soon.

Contributors

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