Wisconsin Chapter of the American Fisheries Society

Poster Abstracts

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Rock Garden / Comfort Suites, Green Bay, WI

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Presentation Type: Poster
Dates: Both Wednesday and Thursday

Title: Use of a Portable Ultrasound to Determine Sex of Largemouth Bass
Co-Author: Kaitlin Schnell

Abstract: Determining the sex of fish represents an important component of monitoring and managing many fish populations. Sex can often be determined by external morphology or extrusion of gametes, but in certain cases, invasive procedures or fish sacrifice are necessary. We are working to determine whether a portable ultrasound unit commonly used by large animal veterinarians can be used to determine the sex and maturity stage of lake sturgeon. As an initial test of this device, we determined whether we could accurately determine the sex of largemouth bass captured in May and June from 3 northern Wisconsin lakes. Our results indicate that the ultrasound can be used to accurately determine the sex of mature largemouth bass and for identifying bass that are not mature. However, we were unable to determine the sex of immature bass using the ultrasound. Although our findings could be useful to biologists working with black bass (i.e., sex of mature fish is not always clear from external cues) our results also indicate that the ultrasound may be effective for determining sex of mature lake sturgeon.

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Presentation Type: Poster
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Title: Replicating Otolith Ages for Walleyes in Wisconsin Using Dorsal Spines: Development of Correction Factors
Co-Author: Ryan Koenigs and Connie Isermann

Abstract: Estimating ages is an important step in monitoring and managing walleye fisheries and Wisconsin DNR staff assign ages to hundreds of walleyes each year. While otoliths likely provide the most accurate structure for estimating walleye age, dorsal spines are routinely used for age assignment because spines can be removed without sacrificing fish. Dorsal spines tend to yield younger ages than otoliths for older walleyes, but the age at which disagreement begins and the severity of these disagreements is likely to vary among populations in relation to growth rate. Discrepancies in ages between structures could result in meaningful differences in important population parameters such as growth rate and mortality. Using otoliths and dorsal spines collected from more than 700 walleyes across the state of Wisconsin, we described relationships between ages estimated from otoliths and dorsal spines for fast-, moderate-, and slow-growing walleye populations in order to develop correction factors that could be used to adjust dorsal spine ages. Our initial results suggest that these correction factors can be used to provide estimates of growth and mortality parameters similar to estimates obtained when using otoliths to estimate walleye ages.

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Presentation Type: Poster
Dates: Both Wednesday and Thursday

Title: Use of Car Counters to Monitor Use of A Boat Launch on Lake Superior
Co-Author: Daniel Isermann, Jared Myers

Abstract: Estimating recreational angler effort and harvest are important to the management of many fish populations within the Great Lakes. These metrics are commonly estimated using access-based creel surveys, where angler effort is estimated from point or interval-based counts of fishing vessels conducted at numerous access points. This process is often complicated by the large number of access points and a limited amount of time and personnel available for collecting count data. Estimating effort based on boat traffic observed at specific access points represents a perfect scenario for using remote devices such as car counters or cameras. We deployed car counters at a two-lane boat launch on Lake Superior to determine if this method could be used to monitor boat ramp usage; this information could then be used to estimate angler effort. We visually monitored angler use at specified time intervals to test the accuracy of the counters. We will present the results of these analyses and discuss future plans for evaluating this method.

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Dates: Both Wednesday and Thursday

Title: Harvest dynamics of Largemouth and Smallmouth Bass in northern Wisconsin lakes
Co-Author: Jonathan Hansen (Wisconsin DNR)

Abstract: Creel survey data over the past 23 years show that the number of Smallmouth Micropterus dolomieu and Largemouth Bass M. salmoides caught in northern Wisconsin has increased. Reasons for this observed increase are unknown, but catch and release fishing may be a contributing factor. We observed overall harvest rate for both species has decreased during this period. Forty percent of anglers reporting why they released fish (2007-12) said they were practicing catch and release, and fish these anglers returned accounted for 56% of total bass released. Anglers targeting bass make up the majority of those harvesting them; however, many panfish and other game fishermen also harvest bass. There is increased interest in liberalizing bass fishing regulations in Wisconsin to encourage harvest and reduce bass abundance. We saw that only 15% of anglers harvested more than 1 bass, so bag limit increases will likely not accomplish this goal. We observed 25% of anglers released bass because they were sub-legal, suggesting liberalization of length limits is more likely to facilitate reduction in bass abundance through increased harvest. If liberalizing length limits, implications on size structure should be considered if harvest objectives are to be achieved. However, with current low harvest rates, length limit liberalization alone is not likely to reduce bass abundance without education and outreach.

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Title: Growth, fecundity and subsequent progeny of domestic brown trout Salmo trutta broodstock fed two different commercially available diets.
Co-Author: Jacob Utrie, Thomas Van Effen, and Todd Rice

Abstract: Proper nutrition in broodstock is critical to gonadal development, fecundity and production of viable offspring. During the 2012 production year (September 2011 – June 2012) we fed two different commercially available diets to female brown trout Salmo trutta at the Wild Rose State Fish Hatchery to determine if there were differences in (1) growth and fecundity, and (2) egg size, percent of eyed eggs and size at first feeding for fry. Female broodstock (all age-4 at spawn) were reared in two identical, side-by-side raceways (n = 160 per raceway) with fish in one raceway fed Skretting (Brood 8.0 mm; formerly Silver Cup) and the other fed BioBrood (9.0 mm; Bio-Oregon) diets. Mean standard length ($p < 0.001$) and weight ($p < 0.001$) at time of spawning, and egg size ($p = 0.003$) and size of fry at first feeding ($p = 0.033$) were all significantly larger for fish reared on the BioBrood diet than those reared on the Skretting diet. Additionally, fecundity was higher in fish reared on Biobrood (mean = 7,547 eggs) than Skretting (mean = 7005 eggs), and the mean percent eye up was higher for Biobrood (82% ± 9%) than Skretting (76% ± 6%); although these differences were not statistically significant. While manufacturers recommend using these feeds for over 1 year for the best results, we found significant differences between broodstock in only 10 months of feeding. BioBrood feed was substantially more expensive, but we believe, for broodstock, the benefits outweigh the costs.

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Presentation Type: Poster
Dates: Both Wednesday and Thursday

Title: Implementation of an Automated Fish Harvesting System at the Governor Thompson Fish Hatchery
Co-Author: Timothy Parks, Neal Rosenberg, and Phil Neubich

Abstract: The Wisconsin Walleye (Sander vitreus) Initiative provided funding to nearly triple the production of fall walleye fingerlings at the Governor Thompson Fish Hatchery. Production capacity was adequate to meet the new demand, but pond harvest efficiency needed to improve to distribute walleye, as well as muskellunge (Esox masquinongy), fingerlings in a timely manner. Harvested fingerlings were historically hand counted and carried up an in-pond stairway to be loaded on distribution trucks. In 2013, the hatchery acquired an automated fish loader to reduce harvest time and increase hatchery staff safety by pumping fish from ponds directly into distribution tanks. We assessed performance of the fish loader and methodology used to inventory fish transported in stocking trucks. Specifically, we wanted to determine an optimal sample size of fish measured to estimate the number of fish stocked using a water displacement method. Distribution truck tanks were calibrated to measure the weight of loaded fish by water displacement. Total harvest was estimated by multiplying the weight of fish loaded by the number of fingerlings per pound for walleye and muskellunge. We compared the muskellunge harvest estimates to counts obtained while tagging. We also conducted simulation modeling to determine optimal sample sizes for individual weights used to calculate weight counts. Water displacement estimates of harvested muskellunge differed from actual counts by -25% to 12%. Simulation modeling suggested a sample size of 60 muskellunge fingerlings would reduce weight count average error to the management goal of 5%. A sample of 60 walleye fingerlings would result in an average weight count error of 7%. We will discuss an alternative to estimating weight counts to improve the accuracy of harvest estimates.

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Presentation Type: Poster
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Title: Modeling and monitoring to understand climate change impacts on Wisconsin trout streams
Co-Author: John Lyons, Jana Stewart, Steve Westenbroek, Leah Kammel, and Cheryl Buchwald

Abstract: Initial modeling efforts to quantify the impact of climate change on Wisconsin trout streams suggested significant losses of native brook trout and naturalized brown trout based on changes in water temperature. Here we present updates to our stream temperature model along with stream monitoring data to show how climate change impacts may be realized in Wisconsin streams. We developed a soil-water-balance model, as an addition to our original artificial neural network stream temperature model, to generate daily time series estimates of potential groundwater recharge from precipitation, thereby linking precipitation to groundwater and stream temperature. The updated models highlight the relative resilience to climate impacts of Driftless Area streams, which are heavily influenced by inputs of cold groundwater, compared to streams in other areas of Wisconsin. We estimated changes in coldwater thermal habitat suitable for trout under the A1B emissions scenario using 10 global circulation models. Current climate conditions support 57% of stream kilometers across the state as thermally suitable for trout. By mid-century our models project a decrease to 47% (best-case) or 26% (worst-case). Following monitoring efforts that began in 2007 we have experienced significant flooding caused by multiple heavy precipitation events, drought, and wide ranges of air temperatures at various times of the year. We present empirical stream monitoring data to show how thermal refugia and trout populations may persist, albeit at reduced levels, under projected changes in Wisconsin's climate.

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Title: Use of DNA Barcoding as a Method for Identifying Partially-Digested Fish in Diet Studies
Co-Author: Dr. Daniel Isermann, Dr. Brian Sloss, and Keith Turnquist

Abstract: Visual identification of prey items removed from fish stomachs is often difficult because of digestion and represents a potential source of error in most diet studies. Prey identification using DNA barcoding has occurred, but application of this method has been limited. Our objectives were to determine if: 1) DNA barcoding was accurate for identifying unidentified fish parts removed from largemouth bass and walleye stomachs and 2) the use of DNA barcoding improved our ability to describe diet composition for these fish. Diet samples were collected via gastric lavage from adult largemouth bass and walleye in Big Sissabagama and Teal lakes during 2012 and from Big Arbor Vitae and Little John lakes during 2013. We used DNA barcoding to identify all unidentifiable fish in diet samples. Additionally, a subsample of fish that were visually identified to species with 100% confidence underwent DNA barcoding in order to validate DNA assignments. Identification of prey items between the two methods was nearly identical, which suggest that DNA barcoding was an accurate method for identification. Additionally, the application of DNA barcoding allowed for a substantial reduction in the amount of unidentified fish in our diet samples. DNA barcoding offers an effective tool for identification of prey items, but could be cost-prohibitive in some situations, depending on the number of samples that need to be identified.

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Title: Age and Growth of Pygmy Whitefish, Prosopium coulterii, in Lake Superior
Co-Author: Derek H. Ogle, Mark R. Vinson

Abstract: In 1952, Pygmy Whitefish (Prosopium coulterii) were discovered in Lake Superior, which was at least 1770 km from all previous records of occurrence. A comprehensive life history study was published in 1953, but no further life-history studies of Lake Superior Pygmy Whitefish have occurred. In 2013, we collected Pygmy Whitefish at 26 stations from throughout Lake Superior. The total length of all fish and the total length, weight, sex, and maturity were recorded and scales and sagittal otoliths were collected for a subsample of fish. Age assignments from scales and otolith thin-sections from fish collected in 2013 were similar. As in 1953, assigned ages in 2013 ranged from 1 to 6 years for females and 1 to 5 years for males, the maximum mean length for females (180 mm) was greater than for males (110 mm), and growth rates for both sexes were similar. Our results suggest that the age and growth dynamics of Pygmy Whitefish have not changed much in 60 years and support the conclusion that Pygmy Whitefish in Lake Superior are a small, slow growing, short-lived species.

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Dates: Only Wednesday

Title: Trends in PCB Concentrations of Lake Michigan Coho and Chinook Salmon, 1975-2010
Co-Author: Rasmussen, Schrank, and Williams

Abstract: The manufacture and use of polychlorinated biphenyls (PCBs) was banned in the United States in 1977, after it was determined that these compounds adversely affect animals and humans. The Wisconsin Department of Natural Resources has collected data on PCB concentrations in Lake Michigan chinook (n=765) and coho (n=393) salmon (Oncorhynchus tshawytscha and Oncorhynchus kisutch, respectively) filets since 1975. We analyzed these data to estimate trends in PCB concentrations in these fish (1975-2010). We used generalized linear models with a gamma error distribution and log link fit to the untransformed concentrations. Trend forms were examined using graphical smoothing and generalized additive models. We identified a candidate set of models that included time trend and other predictor variables. Using the Akaike Information Criterion to select among models we found the best models for both species included piecewise linear time trends, total body length, % lipid, and collection season as predictor variables. The intersection of the two trends was 1985 for chinook salmon and 1984 for coho salmon. PCB concentrations in both species increased with body length and % lipid, and were higher for individuals caught in the fall. Our data reveals a dramatic decline in PCB concentrations of -16.7% and -23.9% for chinook and coho, respectively, up until the intersection year likely reflecting implementation of restrictions on Aroclor-based PCBs. After the intersection year to 2010, PCB concentrations declined at a rate of -4.0% (95% CI: -4.4% to -3.6%) and -2.6 (95% CI: -3.3% to -1.9%) for chinook and coho, respectively.

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Dates: Only Wednesday

Title: Lake Sturgeon (Acipenser fulvescens) and Shovelnose Sturgeon (Scaphirynchus platorynchus) Larval Drift Net Sampling in the Chippewa River, Wisconsin
Co-Author: Ryan Veith

Abstract: The shovelnose sturgeon and lake sturgeon are an important ancestral fish that are being threatened in numerous inland waterways due to dam construction, water quality reduction, and over-exploitation. The Chippewa River has been known to support sustaining populations of both species recently, but the Red Cedar River, a tributary of the Chippewa, has lost the capability of supporting these fish over the past 30 years. Numerous abiotic and biotic factors could have contributed to the change in shovelnose and lake sturgeon populations. Early life stages of sturgeon give us a good understanding of the location, time, and abiotic factors that occur during their spawning period. Our larval drift net sampling in both rivers has provided many larval fish species including sturgeon in the Red Cedar River. The in situ measurements and catch per unit effort (CPUE) analysis will help correlate the sustaining spawning populations in the Chippewa River with those of the Red Cedar River. Our analysis of the early life stages of the sturgeon can be used to aid future restoration efforts for better spawning habitat in the Red Cedar River.