# Wisconsin Chapter of the American Fisheries Society

## *Poster Abstracts*

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**NAME:** Josephine Barlament

**AFFILIATION:** UW-Green Bay

**PHONE:** 920-366-9390
**EMAIL:** barljm26@uwgb.edu

**Title:** Bowfin Feeding Ecology in Green Bay: Diet Analysis of an Underappreciated Native Fish Predator
**Co-Authors:** Patrick Forsythe, Christopher Houghton, Collin Moratz, Emily Weber

**Abstract:** Bowfin (*Amia calva*) are considered "primitive fish" because they have retained unique morphological, behavioral and life history traits. Bowfin are considered "rough fish" by most state agencies, and as such have been the subject of limited investigation across the species range. Reported studies often provide anecdotal or conflicting evidence regarding important aspects of their feeding or reproductive ecology (Lagler and Hubbs 1940, Ashley and Rachels 1999). The objective of this study was to 1) generally describe the diet of adult Bowfin in Green Bay and 2) determine if diets are different according to sex, body size and location of capture. During the summer of 2014 and 2015, fifty-three Bowfin were collected at seven locations throughout the bay of Green Bay. Sampling locations represented an important latitudinal gradient in coastal habitats ranging from drowned river mouths to coastal fringing marshes. Samples were collected using fyke nets and electrofishing. The length, weight and sex of each fish was recorded in the field and samples were immediately placed on ice to reduce stomach content decomposition. Stomachs were extracted in the lab and placed into 90% ethanol. The total volume of each stomach was measured at the onset of stomach processing. Cliethras (bones of the pectoral girdle) and visible external characteristics were used for identification of prey items down to species in most cases. A total of 823 prey items were counted and labeled as fresh, partial or well for the degree of digestion. A total of thirty-three different prey species including Yellow Perch (*Perca flavescens*), Mayflies (Ephemeroptera) and Scuds (Amphipoda) were identified. Our research suggests Bowfin are prolific predators and have a diverse feeding ecology

that includes both native, invasive fish and invertebrate species (e.g., Rusty Crayfish (*Orconectes rusticus*). Marked differences in feeding ecology by location, sex and fish size are apparent.

**NAME:** Hadley Boehm

**AFFILIATION:** UW Stevens Point

**PHONE:** 517-230-4083
**EMAIL:** hadley.i.boehm@uwsp.edu

**Title:** Evaluation of Sampling Techniques for Capturing age-0 Walleyes in Northern Wisconsin Lakes
**Co-Author:** Dan Isermann

**Abstract:** Previous studies have not provided definitive guidance regarding gear selection for collecting age-0 walleye at early life history stages. We used ichthyoplankton tows, light traps, 1/8” and 1/4” beach seines, 3/8” and 1/4” bar micro-mesh gillnets, and fall electrofishing to collect age-0 walleye from several northern Wisconsin lakes from May to October 2014-2015. Our objectives were to determine which gears were most effective for capturing age-0 walleye before they were collected in standard fall electrofishing surveys and if the effectiveness of each gear varied between day and night. We determined that surface ichthyoplankton tows conducted at night were more effective for capturing larval walleyes than day tows conducted at multiple depths and light traps. Micro-mesh gillnets (1/4”) set around dusk were more effective than beach seines or larger mesh gillnets for capturing age-0 walleyes in mid-summer.

**NAME:** Daniel Dembkowski

**AFFILIATION:** UW Stevens Point

**PHONE:** 715-346-4350
**EMAIL:** dan.dembkowski@uwsp.edu

**Title:** Influence of Habitat Additions on Survival, Growth, and Condition of Extensively-reared Muskellunge
**Co-Authors:** Steve Fajfer, David Ewald

**Abstract:** The influence of natural littoral structures such as coarse woody material (CWM) on fish populations is well documented. In general, CWM and other natural littoral structures have been associated with increased growth, survival, and production of a variety of fishes. Because increased growth, survival, and production are often goals of propagation facilities, fish population responses to structural habitat observed in natural settings have prompted production facility managers to consider integration of structural habitat in the extensive fish rearing process, which generally occurs in earthen or lined ponds devoid of structure. Therefore, our objective was to determine the influence of CWM-analogue addition on fish population characteristics in an extensive fish production setting. Specifically, we compared relative survival, growth, and body condition of age-1 Great Lakes spotted muskellunge Esox masquinongy between rearing ponds with and without CWM-analogue additions. Survival, growth, and body condition varied across ponds and treatments, but were qualitatively greater in ponds with habitat additions compared to those without. For ponds with habitat additions, mean relative survival was 78%, mean size at stocking was 366 mm TL, and mean relative condition factor was 1.03. For ponds without habitat additions, mean relative survival was 73%, mean size at stocking was 355 mm TL, and mean relative condition factor was 0.97. Although results are preliminary and only represent a single year of data collection, our findings suggest that habitat additions may be a viable strategy in terms of meeting goals of increased growth, survival, and production in a fish propagation context.

**NAME:** Bradley Erdman

**AFFILIATION:** UW Stevens Point

**PHONE:** 9204790245
**EMAIL:** berdm997@uwsp.edu

**Title:** Analysis of Potential Brood Sources for Wisconsin Brook Trout Propagation
**Co-Authors:** Keith Turnquist, Brian L. Sloss

**Abstract:** The Wisconsin Department of Natural Resources' (WDNR) Brook Trout propagation program seeks to increase Brook Trout abundance by means of stocking for both remediation and recreational purposes. Brook Trout propagation in Wisconsin has historically relied upon numerous sources and genetic strains; recently, Ash Creek has served as the primary brood source for statewide propagation needs. A decline in Brook Trout abundance in Ash Creek has prompted the WDNR to examine other potential brood sources consistent with stock-based management. From a genetic conservation perspective, two criteria are important to consider when exploring potential brood sources: 1) they should display levels of genetic diversity consistent with naturally-recruiting Brook Trout populations in the region/state, and 2) when genetic structure is detectable among watersheds/regions (consistent with genetic management units or stocks), the alternative source should be genetically consistent with Brook Trout populations in the management unit targeted for propagation. Our objectives were to develop a set of easily quantified and measurable genetic diversity metrics potential brood sources should meet to comply with stock-based management criteria, and determine if WDNR identified potential brood sources (Squaw Creek, South Fork of the LaCrosse River, Lowry Creek, Manley Creek, and Melanchthon Creek) were consistent with these criteria. We used a suite of 12 microsatellite loci to assess 42 populations of Brook Trout throughout Wisconsin and develop minimum threshold values (MTVs) for the mean number of alleles per locus, number of effective alleles per locus, expected heterozygosity, and observed heterozygosity. Bayesian admixture analysis (STRUCTURE) of the same 42 populations was also used to determine potential genetic units of Brook Trout throughout the state. By

comparing the genetic diversity of the 5 potential brood sources to the MTVs and observed patterns of genetic structure among populations throughout the state, we were able to determine if potential brood sources met the aforementioned criteria and therefore, from a conservation genetics perspective, would be suitable candidates for the WDNR's Brook Trout propagation needs.

**NAME:** William Granholm

**PHONE:** 708-601-1085
**EMAIL:** wagran13@smumn.edu

**Title:** Analysis of Fish Community Structure in Cascade Meadow Lake
**Co-Author:** Dr. Joshua Lallaman

**Abstract:** Cascade Meadow Lake is an artificial lake located in Rochester, Minnesota. During high water conditions it is connected to Cascade Meadow Creek. The fish community is comprised of native fish from Cascade Meadow Creek and stocked fish, which include: Yellow Perch, Northern Pike, and Forage Minnows. The objective of this study is assess the current fish populations, and determine possible management recommendations to enhance the fish community. Using Fyke Nets and Backpack Shocking, fish were collected, measured (length and weight), and released back into the lake. Our results revealed five different species in 168 fish that were collected. Our data indicates a poor over condition of fish populations in the lake. Green Sunfish and Black Bullhead are the dominant species in the lake. This indicates a lack of predatory fish species to control the overall fish populations. Our management plan is to introduce Largemouth Bass Cascade Meadow Lake. This plan should lower the number of Green Sunfish and Black Bullhead and bring Cascade Meadow Lake into a more balanced fish community.

**NAME:** Christopher Houghton

**AFFILIATION:** UW - Green Bay

**PHONE:** 414-943-3428
**EMAIL:** houghtoc@uwgb.edu

**Title:** Assessment of Lake Whitefish Larval Production from the Menominee River, Wisconsin
**Co-Authors:** Patrick Forsythe, Scott Hansen, Collin Moratz, Dave Lawrence

**Abstract:** Lake whitefish (*Coregonus clupeaformis*) historically spawned in Green Bay tributaries during late fall. However, in the early 20th century these spawning populations were extirpated, likely due to changing land use practices and pollution. A recent resurgence in lake whitefish spawning runs has been observed, but whether natural reproduction is occurring has not been determined. We used larval d-frame drift nets and towed neuston nets during the spring of 2015 to sample for lake whitefish larvae in the Menominee River. Available spawning habitat was also assessed using towed sidescan sonar. Larval sampling collected over 650 whitefish larvae and documented successful reproduction of tributary spawned lake whitefish for the first time. Lengths of larvae were recorded and will be compared against larvae from Green Bay to assess differences in growth that may affect survival. Future efforts will determine the habitat characteristics necessary for successful tributary spawning and the relative contribution of tributary spawned lake whitefish to the Green Bay metapopulation.

**NAME:** Janice Kerns

**AFFILIATION:** UW Stevens Point

**PHONE:** 715-346-2502
**EMAIL:** jkerns@uwsp.edu

**Title:** Evaluation of Vehicle Counters for Monitoring Angler Effort on Small Inland Lakes
**Co-Authors:** Daniel Isermann, Jonathan Hansen, and Joseph Hennessy

**Abstract:** Angler effort can affect both the quality and long-term sustainability of exploited fish populations. Angler effort dynamics may be especially important in lake-rich environments where proximity of lakes results in no measurable change in cost to anglers when deciding where to fish. Angler effort is typically estimated using creel surveys, although surveys are rarely conducted on most lakes due to costs and logistics. When creel surveys are possible, small sample sizes (few interviews) may lead to large variance and poor confidence intervals associated with estimates of effort. The objective of this study was to determine if use of low-cost remote vehicle counters can be used to estimate angler effort. During the spring of 2015, vehicle counters (n = 40) were buried at boat ramps throughout the state of Wisconsin. We compared results from car counters to creel clerk counts collected during a bus-route creel survey (n = 8 lakes) and to observed boat ramp use determined from trail cameras deployed at six study lakes. Linear regression was used to evaluate relationships among estimates of boat ramp use (i.e., effort). Effectiveness of vehicle counters varied between lakes. Vehicle counters explained between 0.2% and 81% of the variation in the number of boats using each lake. This suggests vehicle counters can be used to remotely monitor trends in angler effort on some water bodies, although the effectiveness of vehicle counters may be confounded by non-angler use and boat ramp design. Vehicle counters could provide more accurate estimates of temporal trends in angler effort through continuous monitoring at many lakes compared to sporadic counts conducted during traditional creel surveys.

**NAME:** Tom Meronek

**AFFILIATION:** Wisconsin DNR

**PHONE:** 715-359-7582
**EMAIL:** thomas.meronek@wisconsin.gov

**Title:** Restoration of Lake Sturgeon in the Wisconsin River
**Co-Authors:** Jennifer Bergman, Jason Spaeth, Jake Thompson

**Abstract:** The Wisconsin Department of Natural Resources restoration of lake sturgeon Acipenser fulvescens, in the Wisconsin River near Stevens Point started in 1991with the introduction of adult lake sturgeon transplanted from Lake Wisconsin. By 1997, they had developed an egg taking program using fish collected below the Kilbourn Dam on the Wisconsin River and Wisconsin Dells. The lake sturgeon re-introduction program has been successful with more than 250,000 lake sturgeon stocked in the river at Stevens Point and areas further north, mostly as fall fingerlings. In addition to the fingerlings, nearly 2800 yearling lake sturgeon have been stocked below Merrill Dam and Dubay Dam on the Wisconsin River. Part of the restoration program included tagging 20 yearlings with radio transmitters and releasing them during August 2005. The project tracked the movement of these fish to preferred habitat areas and determined the extent of their migration downstream. The lake sturgeon moved on average about 6 miles from their stocking site and habitat selection was split nearly equally, between fish either moving upstream to Lake Dubay Dam, or downstream near Lakeside Bay on the Stevens Point Flowage, Wisconsin River. This work helped the Wisconsin Department of Natural Resources in the formulation of future stocking and restoration strategies.

**NAME:** Joseph Mrnak

**AFFILIATION:** Northland College

**PHONE:** 847-609-5123
**EMAIL:** mrnakj564@myemail.northland.edu

**Title:** How to Best Estimate the age of Rainbow Smelt and have Populations in Whitefish Bay, Lake Superior Changed over the past 35 Years
**Co-Authors:** Mrnak, J.T.1&2, Ogle, D.H.1, and Vinson, M.R.2 1Northland College, Department of Natural Resources 2United States Geological Survey (USGS), Lake Superior Biological Station

**Abstract:** In the Laurentian Great Lakes, nonnative Rainbow Smelt (*Osmerus mordax*) provide forage for Lake Trout (*Salvelinus namaycush*) and other predatory fish and are potential competitors with and predators of young Coregonus species. In recent years, their populations have declined across the Laurentian Great Lakes. This study is centered on Whitefish Bay, located at the Eastern end of Lake Superior, which is warmer and has a lower abundance of Lake Trout than other parts of Lake Superior. We compared age, after identifying an appropriate ageing structure, and growth metrics between Rainbow Smelt collected from Whitefish Bay in 2015 to collections made in 1978-1981. We found no significant bias in estimated ages between readers for sectioned and whole cleared otoliths, but a significant bias between readers was detected for whole uncleared otoliths. Average coefficient of variation between readers was lowest for thin sectioned otoliths. For the same reader, the only significant bias detected was where whole uncleared otoliths underestimated the age for fish with an estimated otolith thin-section age of 3. We concluded that thin sectioned otoliths appear to be the superior structure for estimating the age of Rainbow Smelt. Maximum ages and growth rates were lower in 2015 than in 1978-1981. The oldest fish in 2015 was 3 years old compared to 5 years old in 1978-1981. Mean lengths-at-age were slightly lower (5mm) at age-1, did not differ at age-2, and were substantially lower (17mm) at age-3 in 2015. The maximum age and growth differences for Rainbow Smelt between these two periods may be related to the observed population declines. Additional studies will

be required to determine if this pattern is occurring in other years and locations in Lake Superior.

**NAME:** Dan Oele

**AFFILIATION:** Wisconsin DNR

**PHONE:** 6082216338
**EMAIL:** daniel.oele@wisconsin.gov

**Title:** Precision and Bias in Aging Northern Pike: Comparisons Among Four Calcified Structures
**Co-Authors:** Zachary J. Lawson and Peter B. McIntyre

**Abstract:** Age estimates based on calcified structures are central to the analysis and management of fish populations. A variety of structures have been used in studies of Northern Pike despite limited data on whether they provide comparable results. We quantified precision and bias of ages estimated from cleithra, otoliths, anal fin rays, and scales from Green Bay, Lake Michigan. For three independent readers, precision (CV) for otoliths, cleithra, and anal fin rays were not significantly different, while scales were significantly lower than all other structures. Similarly, partial agreement was greater than 90% among readers for otoliths, cleithra, and anal fin rays, whereas partial agreement among readers for scales was 76%. We discuss the tradeoffs associated with the precision and bias of each structure in the context of reader experience, fish age, and management goals. When fish mortality is not a concern, we recommend using otoliths or cleithra to achieve high-precision aging. For strictly nonlethal sampling scenarios, we conclude that anal fin rays will yield more precise age estimates than scales.

**NAME:** Frank Pratt

**AFFILIATION:** Retired

**PHONE:** 1-715-934-2411
**EMAIL:** fpratt32@gmail.com

**Title:** Eutrophication Endangers Cold-water Habitat in Lac Courte Oreilles
**Co-Authors:** Gary Pulford, Bruce Wilson, Hans Holmberg, Dan Tyrolt, Brett McConnell

**Abstract:** Lac Courte Oreilles is a large, deep, mesotrophic, soft-water, drainage lake in northwest Wisconsin. LCO is classed as an Outstanding Waters Resource and supports a unique coldwater fishery comprised mostly of cisco and some lake whitefish. The two-story fishery is threatened by eutrophication and Climate Change. One bay (Musky Bay) has been classed as "Impaired" under 303(d) of the Clean Water Act, due to excessive phosphorus (TP). In the main lake, cisco habitat as indicated by water temperature in the hypolimnion with a dissolved oxygen content > 3 ppm (TDO3) is very limited and endangered. Both the existing ambient, but increasing, TP of 12 ppb, and Wisconsin's "two-story lake" standard of 15 ppb put cold-water habitat at significant risk. The Couderay Lakes Association (COLA) and the LCO Band of Chippewa propose a site-specific criterion (SSC) of 10 ppb to protect cold-water habitat. In 2014-15 COLA paid for a Total Maximum Daily Load study (TMDL) to quantify the lake's phosphorus budget. Under proposed SSC of 10 ppb TP, 27% too much phosphorus (TP) is currently entering the lake from the watershed , atmosphere, and Musky Bay. An aggressive remediation program of riparian buffer zone restoration is already under way. Tail-water retention of agricultural effluent and treatment of the sediment phosphorus in Musky Bay is further recommended protect LCO's cold-water fishery.

**NAME:** Nick Rydell

**AFFILIATION:** UW Stevens Point

**PHONE:** 5073414545
**EMAIL:** nicholas.rydell@uwsp.edu

**Title:** Comparison of Two Larval Fish Sampling Gears on Northern Wisconsin Lakes
**Co-Authors:** Dr. Daniel Isermann, Dr. Justin VanDeHey

**Abstract:** The sampling of early life history stages of fishes can be used to determine spawning success, predict year class strength, and observe fine scale environmental changes. Several gears exist for sampling larval fish but each gear can be size and species selective. Our objective was to determine the species diversity and abundance and size structure of larval fishes caught in two gears. This study was conducted on six lakes in northern Wisconsin from late May to mid-July. Ichthyoplankton surface trawls and quatrefoil light traps were used within 24 hours of each other on each lake. Ichthyoplankton surface tows were conducted during daylight hours at up to 6 sites, while quatrefoil light traps were fished overnight at 4 sites on each lake. Catch per unit effort (#/net night for light traps; #/100m3 of water sampled for tows) will be compared between gear types.

**NAME:** Sam Schaick

**AFFILIATION:** UW Stevens Point

**PHONE:** (920)2798381
**EMAIL:** sscha974@uwsp.edu

**Title:** Influence of Supplementary Walleye Stocking on Year-Class Strength in Six Minnesota Lakes

**Abstract:** Walleye *Sander vitreus* are a highly targeted species in the Midwestern United States and Canada. To satisfy angler demand, stocking is a common management practice to create and maintain fisheries, or to supplement natural reproduction. Previous evaluations of Walleye supplementary stocking have produced variable results. My objective was to determine if supplemental stocking influences Walleye year-class strength in six Minnesota lakes. Walleye were sampled using gillnets and stocking records were obtained from the Minnesota Department of Natural Resources database. Ages were estimated from a combination of scales and otoliths and year-classes were determined by subtracting age from capture year. Year-class strength was determined using residuals by subtracting the expected catch proportion of a year-class from the observed catch proportion of that year-class across all surveys for the corresponding lake. Expected catch proportions were determined by the age of the year-class at the time of survey. T-tests indicated that no significant (p-value > 0.05) differences occurred when year-class strength was pooled across lakes and in 5 of 6 lakes when individually analyzed. In general, I recommend less frequent Walleye stocking for the lakes in this study.

**NAME:** Joshua Schulze

**AFFILIATION:** UW Stevens Point

**PHONE:** 715-303-8256
**EMAIL:** Joshua.C.Schulze@uwsp.edu

**Title:** Smallmouth Bass Movements in the Menominee River, Wisconsin-Michigan

**Co-Authors:** Daniel A. Isermann, Michael Donofrio, Aaron Schiller

**Abstract:** Several segments of the Menominee River that borders the states of Wisconsin and Michigan support exceptional fisheries for smallmouth bass. Fishery managers would like to know more about the seasonal movements of these populations in order to make more informed management decisions. Specifically, there is some concern that smallmouth bass congregate in relatively small areas during fall and winter months, making them more susceptible to harvest when compared to other portions of the open-water fishing season. We used acoustic telemetry to determine if smallmouth bass in the Menominee River between Grand Rapids and Park Mill dams all moved to the lower, more lacustrine section of the river during fall or if bass generally remained in the segment of river where they were tagged (i.e., upper, middle, lower). During May 2014 and May 2015, smallmouth bass ≥ 15 inches were collected by electrofishing and implanted with acoustic transmitters and their movements were monitored using both active tracking and fixed receivers (n=60). Preliminary results indicate some smallmouth bass inhabit the lower segment year-round, however many others utilize the full extent of the impoundment. There is some concern among anglers and biologists that smallmouth bass in the Menominee River congregate in relatively small areas during fall and winter months, making them more susceptible to harvest when compared to other portions of the open-water fishing season.

**NAME:** Joshua Schulze

**AFFILIATION:** UW Stevens Point

**PHONE:** 715-303-8256
**EMAIL:** Joshua.C.Schulze@uwsp.edu

**Title:** Lake Sturgeon Movements after Passage Upstream of Two Hydroelectric Dams on the Menominee River, Wisconsin-Michigan

**Co-Authors:** Daniel A. Isermann, Michael Donofrio, Steven Cooke, Robert Elliott, Edward Baker, Brian Sloss

**Abstract:** Lake sturgeon (*Acipenser fulvescens*) populations in the Great Lakes have declined dramatically over the last two centuries. Their recovery in the region is thought to be hindered by the presence of dams on Great Lakes tributaries. Dams deny these fish access to riverine habitat needed for spawning and survival during early life stages. We will attempt to mitigate this effect on the Menominee River by using a specifically designed elevator to pass 120 mature lake sturgeon upstream of the first two hydroelectric dams over a two year period. Our research objectives are to determine if: 1) lake sturgeon passed upstream return downstream within 1 or 2 years of passage; 2) lake sturgeon have the opportunity to spawn at least once above Park Mill Dam within 1-2 years after passage; 3) spawning opportunity, downstream return rates, and use of the downstream fishway at Park Mill Dam are related to biotic and abiotic variables; and 4) the number, length, sex, and timing of passage can be manipulated to maximize the number of eggs deposited above Park Mill dam by fish that were passed upstream. Each lake sturgeon passed will be surgically fitted with a VEMCO® V16 acoustic transmitter and their movements monitored with an array of VR2W receivers and a VR100 portable receiver. A total of 60 of the 120 lake sturgeon have been passed upstream to date. Preliminary results indicate most lake sturgeon return downstream within 1 year, however, number of spawning opportunities and individual movement patterns are variable.

**NAME:** Marian Shaffer

**AFFILIATION:** UW-Green Bay

**PHONE:** 715-923-2822
**EMAIL:** SHAFML03@uwgb.edu

**Title:** Spatial and Temporal Distribution of Ichthyoplankton in Lower Green Bay, Lake Michigan

**Co-Authors:** Patrick Forsythe, Timothy Strakosh, Ryan McManamay, Darin Simpkins, Touhue Yang

**Abstract:** Currently very little is known about the dynamics of larval ecology in Green Bay, Lake Michigan, U.S., and how these processes are affected by environmental conditions. Environmental degradation over recent decades has resulted in priority attention being given to Lower Green Bay mainly because of contaminated sediment, poor water quality, and lost or altered habitat, all of which have negatively impacted the fishery. The survival of fishes in the critical larval stage is the primary determinant of future cohort strength, and survival and mortality are both directly influenced by environmental conditions. The structure and composition of ichthyoplankton assemblages can reveal much about recruitment patterns, biodiversity, and fish population dynamics. These processes are poorly understood in nearshore areas of Green Bay, where most spawning and nursery habitats exist. The distribution and abundance of ichthyoplankton in locations within Lower Green Bay and the Fox River were investigated over a two year period (2014-2015), along with water quality data. Objectives of this project are to: (1) characterize the taxonomic composition of larval fish present in Lower Green Bay, (2) investigate if spatial and temporal differences exist in taxonomic richness and overall larval fish abundance in relation to habitat, and (3) develop maps of water quality parameters and taxonomic richness and abundance to describe general spatiotemporal patterns in Lower Green Bay. Ichthyoplankton were collected during nighttime hours on a biweekly basis from early- to late-summer using an active gear type, a 500-µm-mesh paired conical bongo net, and a passive gear type, quatrefoil light traps. Water quality data including temperature,

turbidity, dissolved oxygen, chlorophyll a, and pH was simultaneously collected at sampling locations. Evaluating assemblage patterns provides us with baseline ichthyoplankton data and gives us a better understanding of the mechanisms of larval fish ecology including habitat and resource utilization. Monitoring water quality parameters helps us to identify biotic and abiotic factors producing differences in assemblage patterns.

**NAME:** Jeremiah Shrovnal

**AFFILIATION:** UW-Green Bay

**PHONE:** 920-639-9206
**EMAIL:** shroj01@uwgb.edu

**Title:** Growth Rate Analysis of Coastal Wetland and Near Shore Great Lakes Fish using Otolith Dating
**Co-Authors:** Dr. Patrick Forsythe, Dr. Christopher Houghton, Collin Moratz

**Abstract:** Currently there is little information regarding the use of nearshore and wetland habitats by transient sportfish species in Green Bay. It is expected that these fish preferentially choose habitats to maximize growth and fitness. We assessed differences in growth of walleye (*Sander vitreus*) and yellow perch (*Perca flavescens*) using sagittal otoliths from fish collected at seven sites throughout the upper and lower bay. Nearshore and wetland habitats were sampled at each site in 2014 and 2015 using gillnets, fyke nets, and electroshocking. Annuli were identified independently by two readers using FishBC. RStudio was then used to calculate von Bertalanffy growth curves for fish from each site. Growth rates were compared between habitats and among sites to investigate differences in walleye and yellow perch growth. These data will be combined with otolith microchemistry results to determine habitat use over the course of each fish's lifetime. Pairing growth rates with habitat use will allow us to estimate the relative importance of these habitats to walleye and yellow perch in Green Bay.

**NAME:** Keith Turnquist

**AFFILIATION:** UW Stevens Point

**PHONE:** 7153463873
**EMAIL:** kturnqui@uwsp.edu

**Title:** Genetic Analysis of Chippewa River System Lake Sturgeon: Implications for Fish Passage
**Co-Authors:** Brian L. Sloss, Heath Benike, and Joseph Gerbyshak

**Abstract:** Water flow on the Chippewa River is intensively controlled by dams that restrict or eliminate upstream/downstream fish movement. Chippewa River Lake Sturgeon (*Acipenser fulvescens*) are of particular interest to fish managers because they migrate in search of food, suitable spawning habitat, and to meet seasonal habitat needs. Unfortunately, dams may separate these fish from resources and habitat they need to sustain the population. This lack of connectivity among genetic populations results in reduced or no gene flow which can reduce genetic diversity and fitness resulting in a greater risk for population decline or extirpation. The objectives of this project were to determine if: (1) genetic diversity levels are lower in the Lake Sturgeon populations from the upstream waters on the Chippewa River compared to the population below the Dells Dam; (2) the headwater Lake Sturgeon population on the Flambeau River is genetically different from the Lake Sturgeon populations below Jim Falls and the Dells Dam on the Chippewa River, and 3) the Lake Sturgeon population downstream of the Dells Dam is genetically discrete from the population upstream of the Dells Dam at Jim Falls. Genetic diversity was surveyed using a standardized suite of 10 commonly used microsatellite loci on 134 Lake Sturgeon collected below the Dells Dam and Jim Falls Dam on the Chippewa River, and below the Turtle Flambeau reservoir on the North Fork of the Flambeau River. Genetic diversity levels were consistently highest in the Lake Sturgeon population below the Dells Dam and lowest in the population from the Flambeau River. Bayesian admixture analysis using STRUCTURE showed no genetic differentiation among the three populations, however significant differences were observed according to pairwise estimates of $\theta$ (a measure of population differentiation) where the Lake Sturgeon population in the Flambeau River differed from both the population at Jim Falls ($\theta = 0.014$, $P = 0.001$) and the Dells Dam ($\theta = 0.012$, $P = 0.007$). All three Lake Sturgeon populations have genetic diversity values similar to those observed in other Wisconsin populations. However, because there is evidence of limited genetic differentiation, fish passage on the Chippewa River could allow greater gene flow and less isolation of Lake Sturgeon on the Chippewa River system and associated upstream tributaries.

**NAME:** Eric Wegleitner

**AFFILIATION:** UW Stevens Point

**PHONE:** 715-346-3221
**EMAIL:** eric.wegleitner@uwsp.edu

**Title:** On the Screen or Through the Scope: Is there a Difference when Estimating ages of Largemouth Bass and Walleyes from Sectioned Otoliths and Dorsal Spines?

**Co-Author:** Daniel Isermann

**Abstract:** Many biologists now use digital images to estimate ages of fish from calcified structures. However, capturing an image of a structure can result in changes in light and clarity when compared to directly viewing structures through a microscope. These differences could result in differences in age estimates obtained from the same structure. Our objectives were to determine if: 1) otolith-based age estimates for largemouth bass and otolith and dorsal spine age estimates for walleyes were similar when annuli were enumerated directly through a microscope or from digital images viewed on a computer monitor and 2) if trends in age assignments between the two viewing methods were similar among readers with varying levels of experience. Using 100-fish samples of largemouth bass and walleyes collected from multiple Wisconsin lakes, we determined that ages estimated using the two different viewing methods were similar and this was consistent among readers with varying levels of experience.

**NAME:** Kaitlyn Windschitl

**AFFILIATION:** Northland College

**PHONE:** 218-259-0974
**EMAIL:** windsk439@myemail.northland.edu

**Title:** Size and Age Characteristics of Leech Lake Burbot in 2002 and 2015

**Co-Authors:** Dr. Derek H. Ogle, David Boyarski (WDNR), Matt Ward (MNDNR)

**Abstract:** Burbot (*Lota lota*) (Lotidae) are not commonly harvested throughout most of their range. They are, however, of some recreational interest in some specific locations, such as Leech Lake, MN. Other coldwater-sensitive fishes have been shown to be negatively affected by increasing water temperatures, eutrophication, and other anthropogenic factors. A foundational understanding of size and age characteristics of Burbot may help managers understand the effects of this myriad of factors on Burbot populations. We sampled angler-caught Burbot in February 2002 and 2015 to describe how length, age, condition (weight-length relationship), growth, and mortality may have changed in the last 13 years. Fish from 2015 were longer, younger, and grew more quickly on average than fish from 2002. Condition and mortality rate did not differ significantly between years. These results suggest some temporal changes in the population dynamics of Burbot. We recommend building upon this foundational study by continuing to collect harvest, length, weight, and age data from Leech Lake Burbot.

**NAME:** Zachary Witzel

**AFFILIATION:** UW Stevens Point

**PHONE:** 612-508-6948
**EMAIL:** zwitz662@uwsp.edu

**Title:** Relative Precision of Northern Pike Ages Estimated from Multiple Calcified Structures: Preliminary Results from an Ongoing Statewide Evaluation

**Co-Authors:** Dan Isermann, Tom Meronek

**Abstract:** Ages of Northern Pike are estimated using a variety of calcified structures, including cleithra, scales, fin rays, and otoliths. Previous work has validated pike ages estimated from cleithra and suggested that differences in reader precision vary among structures. However, specific protocols for estimating the age of northern pike are lacking and most previous work including otoliths and fin rays has been conducted for fast-growing pike populations. We expect that reader precision will be lower for slower-growing (i. e., stunted) pike populations that are common in smaller inland lakes within the upper Midwest. Our objectives are to compare among-reader precision and northern pike age assignments among cleithra, scales, otoliths, and fin rays for pike populations located throughout the state. Wisconsin DNR personnel have collected more than 300 fish from 10 lakes throughout the state. We will report the preliminary results of this assessment which represents a collaborative effort between the Fisheries Analysis Center, the WDNR Fish Age Task Group, and the WDNR Northern Pike Team.