2022 Wisconsin AFS Annual Meeting
Abstract Submission – Posters

Title: **Evaluating maxillae as a non-lethal aging structure for Brook Trout and Brown Trout**

Author: Ben Breaker, *Wisconsin Department of Natural Resources*
Co-author(s): Emma Lundberg, Nick Hoffman, Mirjana Mataya, and Matt Mitro

Abstract:
Estimates of individual fish age are essential to effective fisheries management. Fish age is commonly determined by enumerating annuli on calcified structures such as otoliths, scales, or fin rays. Age estimates derived from otoliths are typically more precise and accurate than those derived from other calcified structures. However, otolith extraction is lethal, which may limit or preclude their use. Recently, maxillary sections have been identified as an accurate, precise, and non-lethal aging structure for long-lived coldwater fish species such as Lake Trout Salvelinus namaycush. However, the use of maxillary sections has not been assessed for inland salmonid species in Wisconsin such as Brook Trout Salvelinus fontinalis and Brown Trout Salmo trutta. The objectives of this study were to 1) compare age estimates derived from maxillary sections and otoliths and 2) assess long-term survival of maxillary-clipped fish. We collected Brook Trout (n=167) and Brown Trout (n=95) from 9 Wisconsin streams in October 2020. Maxillae and otoliths from each fish were thin-sectioned and independently aged by three readers. We also collected maxillae from PIT-tagged and released Brook Trout (n=11) and Brown Trout (n=6) in Upper Middle Inlet in September 2021 to assess survival. Age-bias plots of consensus age for each structure indicate maxillae and otoliths yield similar age estimates. Accuracy of age estimates for known-age fish was higher for otoliths (67%) versus maxillae (56%), though sample size was small (n=9). To date, 3 maxillary-clipped fish have been recaptured on Upper Middle Inlet with a maximum time-at-large of 28 days. Our results indicate maxillary sections could be used as a non-lethal alternative to otoliths for Brook Trout and Brown Trout, though further validation with additional known-age fish is warranted.

Title: **Potential shifts in angler effort in response to implementation of more restrictive panfish regulations**

Author: Daniel Dembkowski, *USGS-Wisconsin Cooperative Fishery Research Unit, University of Wisconsin – Stevens Point*
Co-author(s): Daniel Isermann, Alexander Latzka, Zachary Feiner

Abstract:
Angler effort in lake-rich landscapes can be dynamic and changes in angling regulations on some lakes may deter or redistribute anglers to nearby lakes with greater harvest opportunities. In Wisconsin, the statewide panfish regulation consists of a daily bag of 25 fish in aggregate. In response to poor panfish size structure in some lakes, presumably due to angler harvest, a series of more restrictive regulations consisting of 25/10 (25 total, ≤ 10 of any one species), 15/5 (15 total, ≤ 5 of any one species), and seasonal 15/5 (15 total, ≤ 5 of any one species during May and June; 25 fish in aggregate otherwise) were implemented in 2016 at lakes meeting criteria for

experimental regulations. We deployed remote car counters, which can provide a relative index of angler effort, at a subsample of lakes within each treatment group in 2015 (pre-regulation) and 2021 (post-regulation) to determine if angler behavior changed in response to regulation implementation. We were specifically interested in whether anglers shifted effort away from treatment lakes. Car counters (N = 28) were deployed at the same 6-8 lakes within each treatment group from May-September during 2015 and 2021. Mean daily counts did not differ between years but there was a significant interaction between year and treatment, indicating potential redistribution of effort among treatments between pre- and post-regulation time periods. Compared to pre-regulation estimates, mean daily counts decreased on lakes with the 25/10 and seasonal 15/5 regulations and increased on lakes in the reference group, suggesting potential shifts in effort away from some lakes with more restrictive panfish regulations and toward lakes with the less restrictive statewide regulation. Accordingly, implementation of more restrictive regulations at a broader spatial scale may be needed to counteract dynamic angling effort and potential harvest-related changes in panfish size structure at other lakes.

Title: **Temporal trends in gill lice Salmincola edwardsii infection and variation in attachment location on Brook Trout in 3 Wisconsin streams**

Author: Mirjana Mataya, *Wisconsin Department of Natural Resources*
Co-author(s): Matthew Mitro

Abstract:

"Gill lice Salmincola edwardsii, an ectoparasitic copepod, were first recognized as a concern in Wisconsin in the early 20th century. Their impact on wild Brook Trout populations did not garner the concern of managers until recent years when an epizootic swept through the Ash Creek fishery in the Wisconsin Driftless area, contributing to the decimation of a once- thriving Brook Trout population.
Subsequent studies have documented widespread variation in gill lice prevalence and intensity of infection across the state, but little is known about temporal variation within streams and the dynamics of gill lice attachment to Brook Trout. In this study, we explored how the prevalence and intensity of gill lice infection of Brook Trout varied seasonally and year-to-year in three streams in three ecoregions of Wisconsin for comparison to observations in Ash Creek. Data on adult female gill lice and signs of infection were collected seasonally for two or more years from Seas Branch (Vernon County), Lawrence Creek (Adams County), and Upper Middle Inlet (Marinette County). We also investigated temporal trends in infection for individual fish tagged with passive integrated transponder tags and recaptured over time. Finally, we also investigated gill lice attachment site on Brook Trout, having noted that gill lice sometimes attach to opercula or fins in addition to gill filaments. We explore factors such as size or age of the trout and season, which may contribute to success or failure of gill lice attachment."

Title: **What controls the co-occurrence of Driftless Trout?**

Author: Kristina Rands, *University of Wisconsin – La Crosse*
Co-author(s): Dr. David A. Schumann

Abstract:

Recreational anglers provide a total direct economic impact of $952 million annually through targeting the widespread and abundant trout populations in the Driftless Area. Native Brook Trout (Salvelinus fontinalis) populations have declined in the region despite the area's abundant groundwater inputs that maintain suitable coldwater habitats. Although Brook Trout and Brown Trout (Salmo trutta) numerically dominate the area's coldwater streams, relatively little is known about how environmental conditions influence their perceived interactions. Although these trout taxa utilize similar stream positions, studies show that Brown Trout negatively influence Brook Trout but few studies have quantitively demonstrated these interactions within the Driftless Region. Specifically, we: (1) estimated the occurrence probabilities of each trout & the probability that each trout is present in a stream habitat based on the presence of other trout species, and (2) described the strength of species interactions and linked these estimates to instream habitat conditions. Local chemical and physical characteristics of stream reaches were measured to describe their influence on the occurrence and co-occurrence patterns of brook, brown, and their hybrid the tiger trout in the Coon Valley watershed within Vernon County, Wisconsin. Fish assemblages were sampled via backpack electroshocking from 4 streams with three stream reaches per stream (500 meters) (N=12). Brown Trout were sampled at each stream transect; Brook Trout were less readily abundant with a naïve detection probability of 0.36. The total lengths of the Brown Trout varied per stream with a range of 133.3 ± 4.5 - 208.4 ± 4.4 mm average total length. Occupancy and co-occurrence modeling provides managers with evidence of which group of environmental characteristics that influence trout assemblages, obtaining this knowledge aid managers with the ability to maintain and preserve trout populations in the Driftless.

Title: **Mapping Habitat Availability in an Aging Southwestern Wisconsin Reservoir**

Author: Nathan Schimanski, *University of Wisconsin – La Crosse*

Abstract:
Muskellunge(Esox masquinongy) fisheries are popular throughout the Midwest, an area where anglers spend ~$425 million annually targeting the species. Stocking efforts to bolster Muskellunge populations and provide angling opportunities are common throughout Wisconsin. Since 2006, ~21000 fingerlings have been introduced to Neshonoc Lake, a 606-acre impoundment in Southwest Wisconsin. From 1940 to the 1970s, Neshonoc Lake suffered heavy sedimentation and habitat degradation, though with restoration efforts starting in 1982 (carp removal, dredging, and installment of a sediment trap) the health of the lake has improved. The degradation of habitat in aging reservoirs like this makes it important to understand habitat availability and complexity, habitat usage by Muskellunge, and their dispersal after stocking. We have started to describe available habitat, short-term movement, and habitat use of stocked Muskellunge in Neshonoc Lake. We stocked 100 large fingerlings(316 ± 4.4mm) in Sept 2021, of which we surgically implanted 30 with acoustic tags(V9-1x Innovsea, 24x9mm, 3.6g). Handling time was 177 ± 3.3 seconds for tagged fish and 70 ± 1.1 seconds for control fish with no initial mortality. Using 4 passive receivers(Vemco Vr2Tx Rx) above and below the dam we have yet to observe a fish escape the lake. We have begun tracking tagged fish using a hydrophone(Vemco VH110) and plan to overlay their locations with the available habitat. During Summer 2021, we digitized side-scan sonar images to map the sediments, depth, and available habitat using a Humminbird Helix 7 fish finder. The preliminary results show the main

substrate to be silt with some sand present, coarse structure mostly present in the form of sunken logs and stumps near shore, and clusters of fish cribs are present. Using this information gives insight into what habitats Muskellunge relate to and what environmental factors coincide with escapement, influencing what lakes may be suitable to stock Muskellunge.

Title: **Growth Evaluated by Otolith Age for Largemouth Bass, Yellow Perch and Bluegill from the Mississippi River Pools (5a-10)**

Author: Andrew Schneyer, *Wisconsin Department of Natural Resources*
Co-author(s): Kristina Pechacek, Jordan Weeks

Abstract:
The Mississippi River provides a valued and productive sport fishery for anglers of Wisconsin. We used sagittae otoliths collected from 113 Yellow Perch in Pool 7, 212 Largemouth Bass in Pool 8, and 661 Bluegill in Pools 5a, 8, and 10, to compare age and growth. Otoliths were initially aged using the surface aging method. Fish older than four years or where estimated age did not have consensus among 3 readers, were re-aged using the cross-section method. Von Bertalanffy's growth curves were calculated to evaluate trends of study species between and among pools. Values were also compared to the statewide averages from the Wisconsin Department of Natural Resources Fish Management Database. Preliminary estimates indicate that the study species grew faster than the statewide averages, except for Largemouth Bass. This project will assist in future fisheries management decisions and give a greater understanding of age and growth for these Mississippi River species.

Title: **Demographic and Life History Characteristics of Black Bullheads Ameiurus melas in a North Temperate USA Lake**

Author: Logan Sikora, *USGS-Wisconsin Cooperative Fishery Research Unit, University of Wisconsin – Stevens Point*
Co-author(s): Joseph Mrnak, Rebecca Henningsen, Justin VanDeHey, and Greg Sass

Abstract:
Black Bullheads Ameiurus melas are an environmentally tolerant omnivorous fish species that are found throughout much of North America and parts of Europe. Despite their prevalence, Black Bullheads are an infrequently studied species making their biology, ecology, and life history poorly understood. Although limited information has been published on Black Bullheads, evidence suggests that bullheads can dominate the fish biomass and have profound influences on the fish in some north temperate USA lakes. The goal of our study was to provide additional information on black bullhead population demographics, growth rates, life history characteristics, and seasonal diet preferences in a northern Wisconsin lake. Our results suggested that Black Bullheads exhibited relatively fast growth rates, early ages at maturity, moderate fecundity, and a diverse omnivorous diet. Due to these demographic and life history characteristics, Black Bullheads have the potential to dominate fish community biomass in their native and introduced range. Results from our study may inform management of Black Bullhead as native and invasive species.

Title: **Effects of Riparian Habitat on Macroinvertebrate Drift and Brook Trout Salvelinus fontinalis Diets in the Little Plover River, Wisconsin**

Author: Rachel Valeria, *University of Wisconsin – Stevens Point*
Co-author(s): Joshua Raabe, Ph.D.; Jered Studinski, Ph.D.; Jeffery Dimick, Logan Cutler

Abstract:
Groundwater fed, headwater streams and rivers are essential regulators within a Wisconsin watershed. By maintaining a flow of cold water all year long, aquatic inhabitants rely on the river's underwater habitat, surrounding riparian habitat, and nutrients drifting downstream from both. For drift-feeding salmonid species, specifically Brook Trout Salvelinus fontinalis, the composition of invertebrate drift is of great importance, based on the season and life cycle of the fish. Central Wisconsin's Little Plover River supports a self-sustaining Brook Trout population and is surrounded by multiple riparian habitat types with differing inputs. The focuses of this study are to compare Brook Trout diets with macroinvertebrate drift composition in the Little Plover River (LPR), and to compare the differences in Brook Trout diet composition between three riparian habitats alongside the LPR. Locations were chosen on the Little Plover River based on three riparian habitat types; forested, restored wetland, and agricultural grassland. In fall 2019 and 2021, drift nets were deployed for 24 hours at all three sites. A week later, eleven Brook Trout from each habitat site were collected using backpack electro shockers. Brook Trout diets were obtained nonlethally through gastric lavage. All invertebrates collected from drifts and diets were preserved, sorted, and identified to family. Macroinvertebrate drift and Brook Trout diet compositions were compared among each other and the other riparian habitat types. Results from the samples exhibited higher proportions of aquatic invertebrates overall, while terrestrial invertebrates varied among the three stream sections and diets compared to drifts. Amphipoda Gammaridae, Diptera Chironomidae larvae, Ephemeroptera Baetidae larvae, Trichoptera Brachycentridae larvae, and Trichoptera Limnephilidae larvae were the most occurring families in the Brook Trout diets. This study provides an understanding on Brook Trout selectivity towards available prey and how that it is affected by forested, wetland, and agricultural riparian habitats along a cold-water stream.