AFS NCD Rivers and Streams Technical Committee
2016-2017 Wisconsin Chapter Report

Prepared by Timothy Parks, WI DNR, 810 W Maple Street, Spooner, WI 54801
Phone: 715-635-4163, Email: Timothy.Parks@wisconsin.gov

WISCONSIN DEPT OF NATURAL RESCOURCES
BUREAU OF SCIENCE SERVICES
FISHERIES AND AQUATIC SCIENCES RESEARCH SECTION

PREDICTED EFFECTS OF CLIMATE CHANGE ON WISCONSIN STREAM FISHES

By: John Lyons, Jeff Kampa, Matthew Mitro, Andrew Rypel, and Greg Sass

Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVES:

1. Improve the sensitivity of an existing GIS-based, watershed-scale model that predicts stream suitability for stream fish species to variation in climate and groundwater flows by developing a hydrologic model to link changes in air temperature and precipitation to changes in water temperature and stream flow

2. Use the improved model to predict how various climate change scenarios predicted specifically for Wisconsin will alter the distribution and abundance of Wisconsin stream fishes

3. Examine long-term datasets on fish reproduction to determine if migrations and spawning have changed in response to climate warming over the last 50 years.

STUDY PUBLICATIONS:

Lynch, A. J., B. J. E. Myers, C. Chu, L. A. Eby, J. A. Falke, R. P. Kovach, T. J. Krabbenhoft, T. J. Kwak, J. Lyons, C. P. Paukert, and J. E. Whitney. 2016. Climate change effects on North American inland fish populations and assemblages. Fisheries 41:346-361. Doi: 10.1080/03632415.2016.1186016.

RESTORATION OF A BROOK TROUT FISHERY IN TENNY SPRING CREEK USING AN ARTIFICIAL BARRIER

By: Matthew Mitro and Paul Kanehl (Mike Aquino, Jason Himebauch, Gene Van Dyck, and Jordan Weeks, DNR cooperators)

Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVE:

In this study we investigated the restoration of a Brook Trout population in Tenny Spring Creek via installation of a barrier and mechanical removal of a Brown Trout population. Specific objectives included evaluating changes in the trout population and stream fish community following restoration, evaluating movement across the stream barrier (upstream and downstream), and determining if Brook Trout restoration upstream of the barrier in Tenny Spring Creek improves the Brook Trout population downstream of the barrier in Elk Creek.

We also used this study on Tenny Spring Creek as an opportunity to evaluate the stocking success of first and second filial generation Brook Trout. The stocking of Brook Trout was necessary to build the Brook Trout population and provide a fishery. We stocked both F1 and F2 Brook Trout and evaluated their contribution over time to the Brook Trout population in Tenny Spring Creek.

FISH PASSAGE AND STREAM CONNECTIVITY RESEARCH

By: Matthew Diebel

Period Covered: 1 July 2015 - 30 STUDY OBJECTIVES:

STUDY OBJECTIVES:

1. Develop infrastructure for collection, storage, and analysis of barrier data across the Great Lakes Basin.
2. Develop a volunteer monitoring program for evaluating fish passage at road crossings.June 2016

LONG-TERM VIABILITY OF SOURCE POPULATIONS OF WILD BROOK TROUT AND BROWN TROUT FOR WISCONSIN'S WILD TROUT STOCKING PROGRAM

By: Matthew Mitro and Paul Kanehl (Mike Aquino, Robert Fahey, Jason Himebauch, John Komassa, Gene Van Dyck, and Jordan Weeks, DNR cooperators)

Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVES:

This study investigates the long-term viability of wild Brook Trout and Brown Trout populations as source populations for Wisconsin's wild trout stocking program. Specific objectives include:

1. Quantify the apparent survival, recruitment, and population growth rates of Brook Trout and Brown Trout in Ash Creek, Timber Coulee Creek, and two control streams (one Brook Trout and one Brown Trout).

2. Quantify the proportion of Brook Trout and Brown Trout removed from populations in Ash Creek and Timber Coulee Creek during spawning season each year.

3. Quantify the annual apparent survival rate of trout removed, brought to the hatchery, and later returned to the streams versus the apparent survival rate of trout remaining in the stream (i.e., determine if there is a hatchery effect on apparent survival rate).

4. Test predictions of stock-recruitment models for each trout population in terms of age-0 recruitment and population size and age structure.

5. Quantify the population-level effects of egg collection on the source populations for the wild trout stocking program using matrix population models.

6. Quantify the relative return of F1 and F2 generation Brook Trout stocked in streams.

7. Quantify the prevalence, intensity, and population-level impact of gill lice infection in Ash Creek Brook Trout

STUDY PUBLICATIONS:

Mitro, M. G. 2016. Brook Trout, Brown Trout and ectoparasitic copepods Salmincola edwardsii: species interactions as a proximate cause of Brook Trout loss under changing environmental conditions. Transactions of the American Fisheries Society. In press.

DEVELOPMENT AND EVALUATION OF WATERSHED MODELS FOR PREDICTING STREAM FISHERY POTENTIAL

By: John Lyons, Matthew Diebel, and Matthew Mitro

Period Covered: 1 July 2015- 30 June 2016

STUDY OBJECTIVES:

The primary goal of this project is to develop and evaluate watershed models that quantify the inherent fisheries potential of streams and predict how watershed land-use will influence the realization of this potential. Specific model-development objectives are:

1. Modify as necessary existing Michigan models for predicting stream groundwater delivery, water temperature regime, and overall stream flow regime based on climate, surficial geology, topography, soils, vegetation, and land uses for various regions of Wisconsin. Test model predictions against observed temperatures and flows in stream reaches throughout the state.

2. Develop and test statistical models that relate observed stream temperatures and flows to observed fish community and fishery attributes in stream reaches throughout the state.

3. Link the models from 1) and 2) and classify and map Wisconsin stream reaches based on their actual and potential fisheries. Use current land-use data to estimate actual conditions and historical and “least-impacted” data to estimate potential.

4. For selected watersheds, use the models to explore how projected changes in land-use may affect stream fisheries.

STUDY PUBLICATIONS:

Stewart, J. S.. A. Covert, N. J. Estes, S. M. Westenbroek, D. Wieferich, D. Krueger, M. Slattery, J. D. Lyons, J. E. McKenna, Jr., D. Infante, and J. L. Bruce. 2016. FishVis – A regional decision support tool for identifying vulnerabilities of riverine habitat and fishes to climate change in the Great Lakes Region. USGS Scientific Investigations Report 2016-XXXX. Reston, Virginia. In press.

STATUS AND TRENDS IN SPORTFISH POPULATIONS OF SOUTHWESTERN WISCONSIN WARMWATER STREAMS

By: John Lyons and Paul Kanehl

Period Covered: 1 July 2015-30 June 2016

STUDY OBJECTIVES:

1. Monitor sportfish abundance, reproductive success, size structure, and growth rate each year in seven streams in southwestern Wisconsin, continuing annual surveys begun in 1989.

2. Maintain a database containing information from 1).

3. Produce annual report.

STATUS AND TRENDS IN THE FISH COMMUNITY OF THE LOWER WISCONSIN RIVER

By: John Lyons

Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVES:

1. Monitor long-term fish community dynamics each year over the entire Lower Wisconsin River.

2. Evaluate sportfish abundance, reproductive success, size structure, and growth rate each year for the Prairie du Sac Dam tailwater, continuing annual surveys begun in 1987.

3. Maintain a database containing information from 1) and 2).

EFFECTS OF FLOW ALTERATIONS ON STREAM FISHES
By: Matthew Diebel
Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVES:

1. Develop hydrologic models that relate climate and landscape characteristics to temporal and spatial variation in stream flows across Wisconsin.
2. Use hydrologic model predictions to calculate hydrologic indicators that describe components of flow regime that may be related to stream ecological structure and function.
3. Develop statistical models that relate modeled hydrologic indicators to the measured occurrence and abundance of fish species in Wisconsin streams.
4. Develop a hydrologic model to predict flow intermittency in Wisconsin streams.
5. Collect stream temperature data to support development of a new temperature model for Wisconsin streams.

STUDY PUBLICATIONS:

Diebel, M., A. Ruesch, D. Menuz, J. Stewart and S. Westenbroek. 2015. Ecological limits of hydrologic alteration in Wisconsin streams. Wisconsin groundwater management practice monitoring project, Publication DNR-209, Madison, WI.
http://digital.library.wisc.edu/1711.dl/EcoNatRes.DiebelHydrologic

TROUT AGE AND GROWTH IN WISCONSIN STREAMS
By: Matthew Mitro
Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVES:

Quantify variation in age and growth of Brook Trout and Brown Trout in Wisconsin streams by:

1. Validating the use of otoliths for determining trout age.

2. Quantifying age and size structure and growth in different types of streams

3. Parameterizing growth models and age-structured models for stream trout

EFFECTS OF KNOWN EXPLOITATION RATES ON TROUT POPULATION DYNAMICS

By: Matthew Mitro and Paul Kanehl (Gene Van Dyck and Jordan Weeks, DNR cooperators)
Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVE:

In this study we are investigating the effects of exploitation on a Brown Trout population in a Driftless Area stream in Wisconsin. Specific objectives include quantifying the effects of a known exploitation rate on trout population abundance, size structure, recruitment, growth, and mortality.

MONITORING TEMPORAL TRENDS IN TROUT POPULATIONS AND BASE FLOW IN STREAMS

By: Matthew Mitro and Paul Kanehl (Jordan Weeks, DNR cooperator)
Period Covered: 1 July 2015 - 30 June 2016

STUDY OBJECTIVES:

1. Determine the utility of temporal-trend monitoring of fixed sites in coldwater streams as part of the statewide baseline monitoring of wadeable streams.

Data collected from fixed sites sampled over time will allow the separation of temporal and spatial variability in baseline monitoring and will provide the information necessary to formulate insightful hypotheses about how and why trout populations vary over time.

2. Quantify the relationships between stream base flow and annual flow variability, precipitation, and trout population dynamics in coldwater wadeable streams.

A better understanding of stream flow dynamics and trout population response may assist in determining appropriate minimum flows, and in identifying risks to base flow and trout populations from changing land and groundwater use and from changing climate regimes.

STUDY PUBLICATIONS:

Mitro, M. G. 2016. Brook Trout, Brown Trout and ectoparasitic copepods Salmincola edwardsii: species interactions as a proximate cause of Brook Trout loss under changing environmental conditions. Transactions of the American Fisheries Society. In Press.

Mitro, M., and J. Griffin. 2016. Driftless trout numbers dynamic: some recent trends in trout numbers in Driftless Area streams. Wisconsin Trout (January 2016 issue). Pages 6-7.

Stewart, J. S., S. M. Westenbroek, M. G. Mitro, J. D. Lyons, L. E. Kammel, and C. A. Buchwald. 2015. A model for evaluating stream temperature response to climate change in Wisconsin. U.S. Geological Society Scientific Investigations Report 2014-5186, 64 pages. (http://dx.doi.org/10.3133/sir20145186)

WISCONSIN DEPT OF NATURAL RESCOURCES
FISH MANAGEMENT
RECENT PROJECTS AND PROJECT SUMMARIES:

2015 ST. LOUIS RIVER LAKE STURGEON SURVEY SUMMARY

St. Louis County, Minnesota and Douglas County, Wisconsin
Wisconsin Waterbody ID Code (WBIC): 2843800
Wisconsin Department of Natural Resources
Lake Superior Fisheries Unit – Superior Office
Paul Piszczek - Senior Fisheries Biologist
Aaron Nelson – Advanced Fisheries Technician
Madeline Wedge – LTE Fisheries Technician
Minnesota Department of Natural Resources
Duluth Area Fisheries
Anna Varian - Assistant Supervisor
Fond du Lac Band of Lake Superior Chippewa
Fond du Lac Resource Management
Brian Borkholder - Fisheries Biologist
February, 2016

Summary: Led by Minnesota Department of Natural Resources (MDNR), Wisconsin DNR (DNR) and Fond du Lac Band of Lake Superior Chippewa (FDL) assisted with a survey of lake sturgeon Acipenser fulvescens in May 2015. The purpose of the survey was to gather basic population information and to increase the number of tagged lake sturgeon for future recapture information in the St. Louis River and Lake Superior. The survey was conducted during a non-contiguous six-day period using backpack electrofishing, boat electrofishing, and hand netting. A total of 196 fish were captured and released, with 114 positively identified males. Total length ranged from 774 mm (30 in) to 1,465 mm (58 in) and averaged 1,168 mm (46 in). Of the 196 fish, 14 were recaptured (11 with initial tagging information) from previous tagging surveys, whereas 182 fish were not previously tagged. Annual growth computed from years-at-large between capture events was inversely related with initial lengths at capture. Based on agency records, previously tagged fish were initially tagged throughout the St. Louis River and along Lake Superior's south shore from the City of Superior east to Chequamegon Bay and Michigan's Sleeping Bay, nearly 150 miles east of the St. Louis River. Fourteen lake sturgeon had curled fins, a trait typically associated with hatchery-reared fish. In addition to gathering lake sturgeon data, the survey exemplified the efficiency of using

backpack electrofishing gear in a large river under relatively low-flow conditions.

MISSISSIPPI RIVER CHANNEL CATFISH SAMPLING, POOLS 8 AND 9, 2007-2013.
David Heath, Kenneth Von Ruden, Patrick Short, Jacob Schweitzer and Keith Weaver
Wisconsin Department of Natural Resources,
Mississippi River Fisheries Team, La Crosse, WI.
January 2017
Objective: The purpose of this work is to continue monitoring channel catfish populations in pools 8 and 9 of the Mississippi River.

Summary Report: 2015 Mississippi River Pool 8 Fall Walleye and Sauger Young-of-the-Year Assessment
By David Heath and Troy Clemment, Wisconsin Department of Natural Resources - La Crosse
Contact: 608-785-9993, david.heath@Wisconsin.gov
MARCH 2017
Objective: To determine pool 8 walleye and sauger young-of-the-year abundance using fall electrofishing.

2015 Point Creek Smallmouth Bass Survey
Steve Hogler, Steve Surendonk and Rod Lange, DNR-Green Bay
Summary: Point Creek is located in eastern Wisconsin in Manitowoc County and is a direct tributary to Lake Michigan. This 19.3 km stream drains a 55.9 km2 watershed that is mostly agricultural cropland. It is classified as having a warm water sport fishery although it does support seasonal migrations of Lake Michigan trout and salmon in its lower reaches.
Historically, Point Creek supported a robust Smallmouth Bass fishery that was well known across the state. This fishery was severely impacted by declining water quality, habitat loss and a series of fish kills. By the early 2000's, the fish community of the river was dominated by forage fish with very low numbers of gamefish present.
The purpose of the 2015 survey was to determine the status of Smallmouth Bass in Point Creek and to qualitatively assess habitat in the stream

allowing for a comparison of the results from the current survey to those conducted in 2004, 2005 and 2010.
The survey in 2015 mirrored the 2010 survey in that the same sites were sampled unlike in 2004 and 2005 when a subset of these sites were sampled. The 2010 survey found a mixture of Smallmouth Bass, Largemouth Bass and Northern Pike and panfish at each survey location. In 2015, no bass and only one Northern Pike was captured. In 2015, IBI scores declined from those calculated in 2010. As with past surveys, forage fish dominated the catch in 2015. Habitat scores calculated in 2010 and 2015 were similar indicating that habitat was stable and classified as good.

2014 Smallmouth Bass Survey of the Platte River
Grant County, Wisconsin
Waterbody Identification Code: 943600
Bradd Sims
Fisheries Biologist
Wisconsin Department of Natural Resources
Dodgeville Field Office
Summary: Currently, the Platte River is able to support a fishable population of smallmouth bass and provide angling opportunities on an annual basis. The size structure and catch rates of adult smallmouth bass are similar to the statewide averages of other rivers and small streams. The year class strength of wadable stream smallmouth bass populations is dependent on seasonal rains and stream flows. During dry or drought years the year class strengths tend to be stronger. We only sampled 19 young of the year per mile which is low. Good reproductive years within the area sampled will produce around 100 young of the year per mile. It is possible to have significant fluctuations of year class strength taking place from year to year. Even with these fluctuations, this population like others in Southwest Wisconsin continues to provide stable angling opportunities for smallmouth bass. For the mid sections of the Platte River, anglers can expect most of their smallmouth bass catch to be in the 8 to 11 inch range with a 14+ inch kicker smallmouth. Anglers fishing near cold water tributaries such as the Austin, McPherson, Culver and Lee Branches can also expect brown trout to show up in their creel.

Historically the Platte River has lacked public access for fishing with only a small piece of land available for access near Ellenboro. The second public stream bank easement was recently obtained directly downstream of

county road B. Due to the scarcity of public fishing easement along this river system, paddling has become popular throughout the mid and lower sections. More anglers are utilizing canoes and kayaks to access the Platte River for smallmouth bass fishing opportunities. Most of these anglers tend to practice catch and release. Future management may have to account for this change in user dynamics. Two paddling launches have been developed by the Friends of the Platte River. They are located at Hudson Hollow Road in Ellenboro and the confluence of the Blakely Branch.

2014 Smallmouth Bass Survey of the Mineral Point Branch
Iowa County, Wisconsin
Waterbody Identification Code: 927900
Bradd Sims
Fisheries Biologist
Wisconsin Department of Natural Resources
Dodgeville Field Office
Summary: The Wisconsin Department of Natural Resources Fisheries Management staff conducted a baseline survey for smallmouth bass on the upper reaches of the Mineral Point Branch during August of 2014. The primary purpose of the survey was to sample the smallmouth bass population for relative abundance and size structure. The survey targeted all fish species with emphasis on smallmouth bass. Along with smallmouth bass other species sampled included largemouth bass, channel catfish, northern pike, bluegill sunfish, rock bass, black bullhead, bluntnose minnow, central stoneroller, common shiner, hornyhead chub, blackside darter, banded darter, fantail darter, johnny darter, shorthead redhorse, golden redhorse, stonecat, spotfin shiner, northern hogsucker, and white sucker.

Below Ludden Lake, the Mineral Point Branch is able to support a reproducing population of smallmouth bass and provide limited angling opportunities on an annual basis. The size structure and catch rates of adult smallmouth bass are below statewide averages of other rivers and small streams. There is limited adult holding habitat within the North Oak Park Road station, however there were still a fair number of adult smallmouth present. This was evident with a catch per effort of 38 adults per mile, slightly above the statewide average from the previous ten years. We sampled 88 young of the year smallmouth bass with a catch per effort of 176 young of the year per mile which is good. Good reproductive years

within the area sampled will produce over 125 young of the year per mile. It is possible to have significant fluctuations of year class strength taking place from year to year. Even with these fluctuations, this population like others in Southwest Wisconsin continues to provide angling opportunities for smallmouth bass.

Other game fish species (black bullhead, channel catfish, largemouth bass, northern pike, and bluegill sunfish) were present in the station below Ludden Lake. They are believed to be fish which have migrated downstream from the lake.

Upstream of Ludden Lake habitat is limited for supporting a fishable smallmouth bass population as evident by the low sample size of 11 smallmouth bass (only 3 adults). The habitat and size of the Mineral Point Branch seems to support reproduction for smallmouth bass coming up from the lake. The stream is shallow with bedrock, gravel, and sand substrate. There were no deep pools or runs in the station above Ludden Lake. It may be possible to hold adult smallmouth bass year round upstream of the lake with the addition of deep pools and runs. The Mineral Point Branch and Ludden Lake together could provide a fishable population of smallmouth bass for the Ludden Lake, giving anglers the opportunity of a small lake fishery.

UNIVERSITY OF WISCONSIN – STEVENS POINT

HABITAT USE OF SUB-ADULT LAKE STURGEON IN THE LOWER WOLF RIVER, WISCONSIN

RESEARCH ASSISTANT: ZACH SNOBL, M.S
PRINCIPAL INVESTIGATOR: DAN ISERMANN
FUNDING SOURCE: WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Habitat use and movement of sub-adult Lake Sturgeon is largely unknown for most systems. Establishing patterns of habitat use and movement at this life stage could assist managers in capturing sub-adult fish, which would provide a better understanding of recruitment. Sampling sub-adult sturgeon can provide a more immediate and accurate method for assessing the effectiveness of management actions on Lake Sturgeon recruitment. This monitoring is especially important for exploited populations, where changes to harvest management could be implemented if recruitment declines and increases can be detected before cohorts reach adulthood.

The Lake Winnebago System Lake Sturgeon population supports an annual spear fishery with average annual harvests of approximately 1,400 fish from a population of adults that is estimated at approximately 42,000 fish. Little information on sub-adult Lake Sturgeon in the Lake Winnebago System is available and standardized sampling has not targeted these fish in the past. Fishery managers are interested in determining habitat use of sub-adult Lake Sturgeon to aid in developing recruitment surveys to better understand the population at this life stage.

While sub-adult Lake Sturgeon likely occupy multiple habitats in the Lake Winnebago System, the first phase of this research focused on sub-adult Lake Sturgeon in the lower Wolf River. The objectives of my study were to determine if: 1) numbers of sub-adult Lake Sturgeon in the lower Wolf River are sufficient to justify sampling this portion of the Lake Winnebago system as part of a basin-wide recruitment survey; 2) linear home range or movements of sub-adult Lake Sturgeon in the lower Wolf River varies in relation to season, sex, or total length (TL) category (small < 96.0 cm TL; large ≥ 96.0 cm TL) and 3) sub-adult Lake Sturgeon selectively occupy certain habitats in the lower Wolf River in terms of substrate and channel morphology.

A total of eighteen sub-adult Lake Sturgeon were captured on the lower Wolf River during fall 2013 and 2014 using various sampling techniques. A total of 618.5 hours were invested in attempting to capture these fish. Sub-

adult Lake Sturgeon were surgically implanted with radio-transmitters and released back into the river near capture locations. Relocation of fish was attempted every two weeks over the two years of the study, except for winter, when relocation attempts occurred once per month. Latitude, longitude, and substrate type were recorded at each relocation. Data collected were used to determine overall, annual, and seasonal linear home range sizes for each fish.

Side-scan sonar was used to collect images of the lower Wolf River that were uploaded into ArcGIS™. Substrates were identified with color-coded polygons that corresponded to different substrate types to create a substrate map of the entire study area. This map was used in conjunction with fish relocations to determine substrate use.

Linear home ranges did not differ in relation to sex or TL category, but did vary among seasons. The majority of movement for sub-adult Lake Sturgeon occurred in spring, which is similar to trends observed in previous studies of adult fish. Additionally, fish usually exhibited limited movement during winter (linear home range < 0.5 rkm). Selection ratios indicated that sub-adult Lake Sturgeon were not selecting for any substrate or channel morphology type.

Although some sub-adult Lake Sturgeon do occupy the lower Wolf River, I conclude that sufficient numbers of sub-adult Lake Sturgeon do not reside in the river to justify extensive sampling as part of a recruitment index survey. This information is important because sampling effort is typically limited by cost and logistics and my study suggests this effort may be better expended in other locations within the system. However, additional work is needed to determine where the largest concentration of sub-adult Lake Sturgeon reside within the Winnebago System, as there is still interest in developing a method for sampling sub-adult Lake Sturgeon to monitor recruitment trends before fish reach adulthood.

MOVEMENTS OF LAKE STURGEON AFTER UPSTREAM PASSAGE ABOVE TWO DAMS ON THE MENOMINEE RIVER

RESEARCH ASSISTANT: JOSH SCHULZE, M.S. CANDIDATE
PRINCIPAL INVESTIGATOR: DAN ISERMANN
FUNDING SOURCE: GREAT LAKES FISH AND WILDLIFE RESTORATION ACT, U.S. FISH AND WILDLIFE SERVICE
JULY 2014 - DECEMBER 2016

Currently, hydroelectric dams prevent lake sturgeon entering the lower Menominee River from Green Bay from reaching high-quality spawning

locations and juvenile fish habitat available upstream. Fish passage through the lower two dams on the Menominee River began in 2014 and fishery managers with the Wisconsin and Michigan Departments of Natural Resources (DNR) need to determine the numbers and characteristics of lake sturgeon that should be allowed to pass in order to maximize recruitment potential and the return of fish back downstream. Our proposed research will use acoustic telemetry to describe movement of lake sturgeon passed upstream in the Menominee River and will provide fishery managers around the Great Lakes with information that can be used to formulate passage strategies and possibly help design passage facilities for lake sturgeon. Our research objectives are to determine: 1) if adult lake sturgeon passed upstream return downstream to the lower Menominee River or Green Bay within 1 or 2 years of passage; 2) if adult lake sturgeon have the opportunity to spawn at least once above Park Mill Dam within 1-2 years after passage; 3) if spawning opportunity, downstream return rates, and use of the downstream fishway at Park Mill Dam are related to timing of passage, time elapsed since passage occurred, month of year, flow or temperature conditions, or in relation to fish attributes such as sex, length, and maturation status and 4) if the number, length, and sex of fish passed upstream and timing of passage can be manipulated to maximize the number of eggs deposited above Park Mill dam by fish that were passed upstream.

SALMONID ABUNDANCE AND OUTMIGRATION IN WISCONSIN TRIBUTARIES TO LAKE MICHIGAN
RESEARCH ASSISTANT: ERIC WEGLEITNER, M.S.
PRINCIPAL INVESTIGATOR: DAN ISERMANN
FUNDING SOURCE: WISCONSIN DEPARTMENT OF NATURAL RESOURCES
JANUARY 2016 - DECEMBER 2018

Introduced salmonids (i.e., chinook and Coho salmon, rainbow and brown trout) support important recreational fisheries within the Lake Michigan ecosystem. These fisheries are primarily supported by stocking. However, some natural reproduction is known to occur within some tributary systems. Specifically, anadromous rainbow trout (i.e., steelhead) stocked into Lake Michigan are known to exhibit an adfluvial life history, migrating up tributaries for spawning. Wild offspring have been encountered in some of these tributaries, but it is not known whether these fish successfully outmigrate from these streams into larger tributaries or Lake Michigan. The

primary objectives of our research are to determine if: 1) abundance of wild age-0 salmonids (primarily steelhead) varies among selected streams in relation to available habitat; 2) wild age-0 salmonids successfully outmigrate from Wisconsin tributaries into Lake Michigan or into larger tributaries and 3) potential bottlenecks related to stream temperature or annual flow regimes prevent successful outmigration from some streams. We will also compare mark-recapture methods used to estimate wild age-0 salmonid abundance to determine if a single sampling event following stocking of marked fish yields similar estimates to estimates derived from multiple sampling events.

GENETIC ASSESSMENT OF SEVEN FISH SPECIES ABOVE AND BELOW THE WISCONSIN RIVER DAM AT PRAIRIE DU SAC
RESEARCH ASSISTANT: JENNA RUZICH, M.S.
PRINCIPAL INVESTIGATOR: WES LARSON
FUNDING SOURCE: ALLIANT ENERGY
JULY 2016 - JUNE 2018

Downstream fish movement at Prairie du Sac is possible, and therefore some downstream transfer of genetic material from Lake Wisconsin to the lower Wisconsin River likely occurs. However, by blocking upstream migration of fish from the lower Wisconsin River into Lake Wisconsin, the dam prevents the transfer of genetic material from fish populations that reside below the dam to populations of the same species that reside above the dam. Therefore, conservation of genetic diversity is of great concern to species that remain present above and below Prairie du Sac Dam because a reduction in genetic diversity can lead to a reduction in the ability to adapt to selective pressures. Previous studies have examined genetic differences in various fish species across fragmented river systems. Typically, evidence of genetic differentiation in artificially fragmented populations with one-way gene flow has been detected in short lived species with short generation times. Fish with long generation times, on the other hand, often show few genetic differences across large areas (e.g. lake sturgeon). These results illustrate the importance of investigating genetic differentiation in multiple species with variable life histories and generation times to assess fragmentation and inform management.
Fish passage has been established as an acceptable form of management to maintain connectivity between populations of fish and ensure that the genetic structure and diversity present before dam construction is preserved. The goal of this project is to obtain baseline genetic data on

multiple species sampled above and below the Prairie du Sac Dam and use these data to inform passage strategies that will help to protect the genetic integrity of fish populations in this region. The specific objective of this project is to determine if the genetic diversity and structure of lake sturgeon (Acipenser fulvescens), quillback carpsucker (Carpiodes cyprinus), smallmouth bass (Micropterus dolomieu), shorthead redhorse (Moxostoma macrolepidotum), flathead catfish (Pylodictis olivaris), sauger (Sander canadensis), and walleye (Sander vitreus) populations are different above and below the Prairie du Sac Dam. The intended outcome of this project will be to provide data that will allow managers to make more informed decisions regarding passage of different species on the Wisconsin River.

WISCONSIN COOPERATIVE FISHERY RESEARCH UNIT— FISHERIES ANALYSIS CENTER

Assessment of walleye population characteristics in Stevens Point Flowage using passive integrated transponders

Principal Investigators: Daniel Isermann, Janice Kerns, Jacob Thompson, and Tom Meronek

Project Summary: The Wisconsin River supports some of Wisconsin's most prominent walleye fisheries, but information on these populations is often lacking because of other sampling responsibilities. Our objectives are to use mark-recapture of walleyes implanted with passive integrated transponders (PITs) to develop population models that will allow us to estimate abundance, growth, and mortality metrics for walleyes in Stevens Point Flowage. Our larger goal is to determine whether this approach will be useful for other populations where annual sampling does not occur and sacrifice of fish for otoliths is not desirable.

Comparison of lake sturgeon growth rates estimated from fin rays and mark-recapture

Principal Investigators: Janice Kerns, Daniel Dembkowski, Dan Isermann, Michael Donofrio, and Edward Baker

Project Summary: Pectoral fin rays are commonly used as a non-lethal method for estimating age of lake sturgeon Acipenser fulvescens. While fin rays generally underestimate age of older lake sturgeon, fin rays could

provide useful estimates of growth rate for younger fish within a population. Our objective was to determine if lake sturgeon growth rates estimated from fin rays were similar to growth rates observed from recaptures of lake sturgeon tagged with passive integrated transponders (PITs). Lake sturgeon were sampled in 2012-2013 via electrofishing on the Menominee River, where the Wisconsin and Michigan Departments of Natural Resources maintain a long-term PIT tagging program. Parameters from a von Bertalanffy growth model were used to describe growth rates estimated from fin rays (range of fin ray ages = 4 to 34). For recaptured fish, growth rates were quantified as change in length during time at large. Preliminary results suggest growth rates estimated from fin rays (mean = 1.18 in/yr) are substantially higher than rates observed from PIT tag recoveries (mean = 0.47 in/yr). This difference is consistent with underestimating lake sturgeon age from fin rays. Differences in growth rates between the two methods were inversely related to lake sturgeon total length, suggesting that fin ray growth estimates were more reliable for larger (≥ 50 in), older lake sturgeon, only because these fish were growing very slowly. Fin rays are probably not useful for estimating growth rates of lake sturgeon and we suggest that continued use of mark-recapture with PITs offers the best method for describing growth and survival in most lake sturgeon populations.

Population characteristics and movements of smallmouth bass in the Menominee River
Principal Investigators: Daniel Isermann, Michael Donofrio, and Joshua Raabe
Funding Source: WE Energies Mitigation and Enhancement Fund

Project Summary: Our primary goal is to use mark-recapture population assessments to describe population characteristics and movements of smallmouth bass in multiple segments of the Menominee River to determine if current harvest regulations are sufficient to maintain the quality of these fisheries. Our secondary goal is to use acoustic telemetry to determine if seasonal movements could result in increased vulnerability to angling or suggest that future fish passage is warranted. Specifically, our objectives are to determine if: 1) smallmouth bass population characteristics (i.e., abundance, size and age structure, growth, mortality) vary among impoundments; 2) current harvest regulations are sufficient to maintain or maximize opportunities to catch trophy smallmouth bass (≥ 18 inches total length); 3) the majority of smallmouth bass make fall

movements to deeper, slower habitats more prevalent in the lower portions of an impoundment and 4) the majority of smallmouth bass make spring movements to the tailwater sections of specific impoundments. Additionally, our work will allow us to determine if smallmouth bass exhibit site fidelity for specific spawning areas within the Menominee River.

UWSP FISH ANALYSIS CENTER: SUBMITTED GRANTS TO SUPPORT WDNR RESEARCH

Evaluation of muskellunge habitat use and suitability in Green Bay and tributaries
Principal Investigators: Daniel Isermann
Funding Source: Fox River/Green Bay NRDA Trustee Council
Status: Proposal submitted

Brook trout movements in the west branch of the Wolf River, Wisconsin
Principal Investigators: Daniel Isermann
Funding Source: Menominee Indian Tribe of Wisconsin-Joshua Pyatskowit
Status: Selected for funding

UWSP FISH ANALYSIS CENTER: PRESENTATIONS

Schulze, J.C., D.A. Isermann, M. Donofrio, S. Cooke, R. Elliott, E. Baker, and B. Sloss. March 2016. Lake sturgeon movements after passage upstream of two hydroelectric dams on the Menominee River, Wisconsin-Michigan. Oregon Chapter of the American Fisheries Society Meeting. Seaside, Oregon.

Schulze, J.C., D.A. Isermann, M. Donofrio, S. Cooke, R. Elliott, E. Baker, and B. Sloss. February 2016. Lake sturgeon movements after passage upstream of two hydroelectric dams on the Menominee River, Wisconsin-Michigan. Wisconsin Chapter of the American Fisheries Society Annual Meeting. LaCrosse, Wisconsin.

Schulze, J. C., D. A. Isermann, and M. Donofrio. February 2016. Smallmouth bass population characteristics and movements in the Menominee River, Wisconsin. American Fisheries Society Annual Meeting – Minnesota Chapter. Duluth, Minnesota.

Kerns, J., D. Dembkowski, D. Isermann, M. Donofrio, and E. Baker. October 2015. Comparison of lake sturgeon growth rates estimated from fin rays and mark-recapture. North American Sturgeon and Paddlefish Society. Oshkosh, Wisconsin.

Schulze, J. C., D.A. Isermann, M. Donofrio, S. Cooke, R. Elliott, E. Baker, B. Sloss. October 2015. Lake sturgeon movements after passage upstream of two hydroelectric dams on the Menominee River, Wisconsin-Michigan. Oshkosh, Wisconsin.

Snobl, Z., R. Koenigs, D. Isermann, B. Sloss, and J. Raabe. Habitat use and movement of sub-adult lake sturgeon in the Lower Wolf River, Wisconsin. North American Sturgeon and Paddlefish Society. Oshkosh, Wisconsin.

UWSP FISH ANALYSIS CENTER: POSTERS

Schulze, J.C., D.A. Isermann, M. Donofrio, and A. Schiller. February 2016. Smallmouth bass movements in the Menominee River, Wisconsin-Michigan. Wisconsin Chapter of the American Fisheries Society Meeting. LaCrosse, Wisconsin.

Schulze, J. C., D. A. Isermann, M. Donofrio, S. Cooke, R. Elliot, E. Baker, and B. Sloss. February 2015. Lake sturgeon movements after passage upstream of two hydroelectric dams on the Menominee River, Wisconsin-Michigan. American Fisheries Society – Minnesota Chapter. Duluth, Minnesota.

WISCONSIN COOPERATIVE FISHERY RESEARCH UNIT— MOLECULAR CONSERVATION GENETICS LAB: PROJECTS

Investigating the relationship between gill lice prevalence and genetic diversity in brook trout across Wisconsin
Principal Investigator: Wes Larson
Funding: WDNR
Objective: Determine whether gill lice prevalence is correlated with genetic diversity at neutral markers and at a gene involved in immune response in populations of brook trout across Wisconsin.

Species identification of egg samples to investigate Asian carp reproduction
Principal Investigator: Mike Weber
Funding: Iowa State University
Objective: Use DNA barcoding to conduct species identification on egg samples taken from the Mississippi River to investigate Asian carp reproduction.

Development of eDNA Techniques for Detection of Endangered Purple Cat's Paw Pearlymussel and Snuffbox
Principal Investigator: Keith Turnquist, Brian Sloss, Tim Strakosh, and Darrin Simpkins
Funding: US Fish and Wildlife Service
Objective: The goal of this study is to initiate the development of eDNA techniques for detection of presence/absence of the endangered unionid mussels: purple cat's paw pearlymussel Epioblasma obliquata obliquata and snuffbox Epioblasma triquetra. Our specific objectives are to: 1) develop a set of species-specific PCR and qPCR markers for the two species and other extant species in Epioblasma (n = 11 total extant species per Musselp Database; http://mussel-project. uwsp.edu); 2) determine the critical threshold detection limit of qPCR for the developed markers using known amounts of DNA; and 3) determine the realized detection probabilities by testing water samples collected from known areas where the two target species occur and areas where they are not thought to occur using the developed qPCR molecular markers.

Genetic diversity of Wisconsin Spring Pond Brook Trout
Principal Investigator: Bob Tabbert and Brian Sloss
Funding: International Fly Fishing Federation
Objective: To determine if genetic differences exist between spring pond brook trout and other northern Wisconsin brook trout populations.

Origin assessment of Menominee River lake sturgeon
Principal Investigator: Dan Isermann and Mike Donofrio
Funding: WDNR
Objective: Determine the genetic stock origin of Lake Sturgeon (Acipenser fulvescens) collected from the mouth of the Menominee River.

Chippewa River Lake Sturgeon genetic analysis
Principal Investigator: Brian Sloss, Heath Benike, and Joseph Gerbyshak
Objective: Determine the genetic diversity and genetic structure of lake sturgeon in the Chippewa and Flambeau River systems.