

Lake Michigan/Green Bay Research Priorities - 2022

These priority research needs were developed by the WDNR Lake Michigan Fisheries Team to encourage progress towards meeting objectives in the Lake Michigan Integrated Fisheries Management Plan and, in some cases, Lake Michigan Fish Community Objectives (FCOs) and Environmental Priorities set forth by the Great Lakes Fishery Commission's Lake Michigan Committee. Interested researchers should review the [LMIFMP](#), [FCOs](#), [Environmental Priorities](#), as well as the latest version of the [State of Lake Michigan](#) documents for additional background information concerning these research priorities. The current list of priority research questions identified by the WDNR Lake Michigan Fisheries Team are listed in no particular order of importance, but any innovative research project that clearly advances the achievement of FCOs or objectives within the LMIFMP will be encouraged, even if not included in the specific list of priority research questions. Researchers are requested to discuss potential projects with Lake Michigan Fisheries Team members.

Species	Research Item	WDNR Contact
Walleye	<ul style="list-style-type: none"> Recruitment by location & habitat (year class structure) Is recruitment and year class strength the same across Green Bay or are there areas of Green Bay that contribute more to the overall abundance of walleye in the bay? What factors lead to successful recruitment? Annual recruitment estimate by river 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)
Walleye	<ul style="list-style-type: none"> What are the population characteristics of walleye in Green Bay? What are the adult population estimates for the Menominee, Peshtigo, Oconto, Fox rivers and Sturgeon Bay? 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)
Walleye	<ul style="list-style-type: none"> Identify critical juvenile habitat 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)
Walleye	<ul style="list-style-type: none"> Update walleye model to include spatial variation. 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)
Muskellunge	<ul style="list-style-type: none"> Develop spawning protocols to maintain genetic integrity for inland broodstock lakes. 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)
Muskellunge	<ul style="list-style-type: none"> What is the genetic structure/strain in Wisconsin waters of Lake Michigan (to lend support to our stocking strategy)? 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office)

	<ul style="list-style-type: none"> Define when there is sufficient genetic diversity in the Fox river and the inland lakes to use as broodstock? 	920-420-4619 (cell)
Muskellunge	<ul style="list-style-type: none"> Egg survival and larval recruitment - where is the bottleneck occurring? What factors are contributing to the lack of recruitment? Egg suffocation? Egg predation? Larval predation? Lack of adequate nursery habitat? What are the key habitat features in areas where successful recruitment has been observed (e.g., Menominee River and Sturgeon Bay)? 	Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)
Northern Pike	<ul style="list-style-type: none"> What are the adult population characteristics of northern pike in Green Bay (growth, age distribution, harvest), and how might they impact management/regulation changes? Identify and collect data from other Lake Michigan populations for comparison with Green Bay stocks. What is the status of populations along the Lake Michigan shoreline? 	Tammie Paoli Tammie.paoli@wisconsin.gov 715-582-5052 (office) Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell) Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)
Northern Pike	<ul style="list-style-type: none"> Spawning habitat (identifying locations in Lake Michigan tributaries). What streams & wetlands are northern pike utilizing for spawning in Lake MI tributaries? What are the movement patterns of northern pike from spawning areas to the open waters of Green Bay? 	Tammie Paoli Tammie.paoli@wisconsin.gov 715-582-5052 (office) Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell) Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)
Northern Pike	<ul style="list-style-type: none"> Are there significant contributions to the Green Bay and Lake Michigan populations from restored habitat and wetland projects? Need to evaluate restoration techniques and strategies. 	Tammie Paoli Tammie.paoli@wisconsin.gov 715-582-5052 (office)
Smallmouth Bass	<ul style="list-style-type: none"> Spawning site fidelity/homing, recruitment and general movement patterns. Potential impact of tournament relocation. What are the movement patterns of smallmouth bass in Green Bay? Are there homing tendencies? Does relocation of fish during tournaments have 	Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell) In progress

	the potential to impact smallmouth distribution?	
Smallmouth Bass	<ul style="list-style-type: none"> Population characteristics (P.E., growth, age distribution, harvest) What are the factors that affect recruitment in Door County waters? Are differences known about stocks in Green Bay and remainder of Lake Michigan? 	<p>Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)</p> <p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Smallmouth Bass	<ul style="list-style-type: none"> What is the cause/impacts/distribution of lesions on smallmouth bass? What is the impact of Largemouth Bass Virus and is it related to the lesions on smallmouth? 	<p>Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)</p> <p>Verify with Fish Health</p>
Yellow Perch	<ul style="list-style-type: none"> Research on habitat improvement in southern Lake Michigan harbors to benefit perch populations/population dynamics within harbors. 	<p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Lake Sturgeon	<ul style="list-style-type: none"> Utilize fish surveys (nets, seines, nighttime visual, PIT array) to assess survival and outmigration rates in the Milwaukee and Kewaunee Rivers. Develop survival rate for newly stocked fish into these systems. 	<p>Nick Legler Nicholas.legler@wisconsin.gov 920-559-0767 (cell)</p> <p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Lake Sturgeon	<ul style="list-style-type: none"> Analyze backlog of genetic samples. 	<p>Mike Donofrio Michael.donofrio@wisconsin.gov 715-923-1156 (cell)</p> <p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Lake Sturgeon	<ul style="list-style-type: none"> Are sturgeon passed around the Menominee and Park Mill dams successfully recruiting below Grand Rapids dam (conduct larval surveys)? Conduct genetic parentage study. 	<p>Mike Donofrio Michael.donofrio@wisconsin.gov 715-923-1156 (cell)</p> <p>In progress</p>
Lake Sturgeon	<ul style="list-style-type: none"> Larval and juvenile migration from feral populations. Determine movements of juvenile sturgeon at spawning rivers, Green Bay and Lake Michigan? 	<p>Mike Donofrio Michael.donofrio@wisconsin.gov 715-923-1156 (cell)</p> <p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Lake Sturgeon	<ul style="list-style-type: none"> Evaluate Fox river habitat and recruitment 	<p>Mike Donofrio Michael.donofrio@wisconsin.gov 715-923-1156 (cell)</p>

Lake Sturgeon	<ul style="list-style-type: none"> • Juvenile habitat use in GB tributaries, Milwaukee and Kewaunee Rivers. • What substrates and habitat types are juvenile sturgeon utilizing in the estuaries? • Are there seasonal changes in this habitat or residence in the estuaries? • What habitats are utilized outside of the estuaries? 	<p>Mike Donofrio Michael.donofrio@wisconsin.gov 715-923-1156 (cell)</p> <p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p> <p>Nick Legler Nicholas.legler@wisconsin.gov 920-559-0767 (cell)</p>
Rainbow Trout and Brook Trout	<ul style="list-style-type: none"> • Conduct habitat evaluations of all streams for comparison with other Great Lakes streams. • Identify priority areas for habitat improvement projects (for access, hold over areas for spawning adults, spawning, nursery areas, etc.) with reasonable expectations based on watershed scale factors limiting wild production. • Consider contributions of wild production to lake-wide predator/prey balance, and how this might be impacted by habitat improvements. 	<p>Nick Legler Nicholas.legler@wisconsin.gov 920-559-0767 (cell)</p> <p>Complete for rainbow trout in select streams but could be expanded to others</p>
Rainbow Trout	<ul style="list-style-type: none"> • CWT use to determine survival by location stocked, wild production, and to evaluate strains • Which steelhead stocking locations are most effective (i.e., is survival better at certain locations; which locations contribute the most to the fishery; north vs. south; big vs. small rivers; what factors may be limiting survival)? • Evaluate different genetic strains of stocked steelhead (i.e., when and where are different strains being caught; which strains provide the best fishery, etc.) 	<p>Nick Legler Nicholas.legler@wisconsin.gov 920-559-0767 (cell)</p> <p>Laura Schmidt Laura.Schmidt@wisconsin.gov 414-416-0591 (cell)</p> <p>In progress - this work is ongoing with the mass marking program</p>
Rainbow Trout	<ul style="list-style-type: none"> • More closely evaluate the difference between strains, specifically for run timing and how this timing differs now compared to traditionally (e.g., Chambers vs. Ganaraska vs. Skamania) • Have different genetic strains been maintained and does timing of spawning runs differ per strain? 	<p>Nick Legler Nicholas.legler@wisconsin.gov 920-559-0767 (cell)</p> <p>Laura Schmidt Laura.Schmidt@wisconsin.gov 414-416-0591 (cell)</p> <p>In progress</p>
Chinook	<ul style="list-style-type: none"> • Complete additional analysis of CWT 	<p>Nick Legler</p>

Salmon	return data.	Nicholas.legler@wisconsin.gov 920-559-0767 (cell) In progress - this work is ongoing with the mass marking program
Coho Salmon	<ul style="list-style-type: none"> • CWT use to determine contribution to fishery by north versus south stocking locations • Fingerlings vs. yearlings survival/contribution to harvest 	Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)
Brown Trout	<ul style="list-style-type: none"> • Is offshore stocking brown trout effective in increasing survival? • To what extent does post-stocking predation play a role in survival of brown trout? • Does prey availability and habitat influence movements from offshore stocking locations to nearshore? 	Tammie Paoli Tammie.paoli@wisconsin.gov 715-582-5052 (office)
Brown Trout	<ul style="list-style-type: none"> • Determine movement of brown trout after they are stocked offshore, nearshore, or through the ice? • What is the relative contribution for each port/county to overall brown trout harvest (CWT study)? 	Tammie Paoli Tammie.paoli@wisconsin.gov 715-582-5052 (office)
Lake Whitefish	<ul style="list-style-type: none"> • Recruitment in Green Bay tributaries – Peshtigo, Oconto, Fox and U.P. rivers. • Considering the success of the Menominee River whitefish recolonization, explore conditions that promoted recruitment there and in other Green Bay Rivers. (flows, habitat, etc.)? 	Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)
Lake Whitefish	<ul style="list-style-type: none"> • Green Bay spawning potential – determine presence and abundance of Green Bay (e.g. Sturgeon Bay) spawning population(s) 	Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)
Lake Whitefish	<ul style="list-style-type: none"> • Determine latent/immediate mortality in both sport and commercial fisheries 	Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)
Lake Trout	<ul style="list-style-type: none"> • Increased natural recruitment has been documented on offshore reefs – assess the genetics of wild recruits, especially as the recently-stocked Klondike strain reaches maturity 	Laura Schmidt Laura.Schmidt@wisconsin.gov 414-416-0591 (cell)
Lake Trout	<ul style="list-style-type: none"> • Assess juvenile lake trout habitat, particularly in nearshore Wisconsin waters. 	Laura Schmidt Laura.Schmidt@wisconsin.gov 414-416-0591 (cell)

Lake Trout	<ul style="list-style-type: none"> • What are the movement patterns of lake trout between the Mid-lake Refuge and nearshore Wisconsin waters? 	<p>Laura Schmidt Laura.Schmidt@wisconsin.gov 414-416-0591 (cell)</p>
Cisco, Chub and Round Whitefish	<ul style="list-style-type: none"> • Population characteristics & forage assessments (P.E., life history, age, recruitment, diet) • Can we gain adequate information on the adult population to inform management/regulation changes? • Develop a population model for bloater chub 	<p>Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)</p> <p>Laura Schmidt Laura.Schmidt@wisconsin.gov 414-416-0591 (cell)</p> <p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p> <p>Kari Fenske Kari.fenske@wisconsin.gov 608-590-5285 (cell)</p>
Burbot	<ul style="list-style-type: none"> • Population characteristics (P.E., life history, age, recruitment, diet) • Can we gain adequate information on the adult population to inform management/regulation changes? 	<p>Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)</p>
Habitat (general)	<ul style="list-style-type: none"> • Evaluate habitat and identify enhancement opportunities • Define habitat for larger harbors (including Kewaunee, Sturgeon Bay, Manitowoc, City of Green Bay, Sheboygan, and Milwaukee) and offshore reefs • Continue development of habitat protection, restoration, and rehabilitation priorities through Environmental Principles. 	<p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p> <p>Kari Fenske Kari.fenske@wisconsin.gov 608-590-5285 (cell)</p> <p>Habitat mapping in progress in Two Rivers, Manitowoc, Sheboygan, Port Washington; complete in Milwaukee.</p>
Miscellaneous	<ul style="list-style-type: none"> • Develop an economic evaluation for the sport and commercial fisheries in Lake Michigan. 	<p>Cheryl Masterson Cheryl.Masterson@wisconsin.gov 414-550-1831 (cell)</p> <p>Al Blizel Allen.Blizel@wisconsin.gov 920-493-8701 (cell)</p>
Miscellaneous	<ul style="list-style-type: none"> • What is the diet composition of the cormorant population in northern Door County compared to cormorant colonies in southern Green Bay? • How do cormorant and pelican diets differ 	<p>Tammie Paoli Tammie.paoli@wisconsin.gov 715-582-5052 (office)</p>

	in southern Green Bay where both species are present?	
Miscellaneous	<ul style="list-style-type: none"> • What are the effects of tournaments on populations of smallmouth bass and walleye, including movement of fish, temperature issues, and barotrauma? 	<p>Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)</p> <p>Jason Breeggemann Jason.breeggemann@wisconsin.gov 920-662-5480 (office) 920-420-4619 (cell)</p>
Miscellaneous	<ul style="list-style-type: none"> • What is the bycatch from each commercial gear and in each area of Lake Michigan? • What is the barotrauma and/or handling mortality of walleye and sturgeon in the commercial fishery? 	<p>Al Blizel Allen.Blizel@wisconsin.gov 920-493-8701 (cell)</p>
Prey fish	<ul style="list-style-type: none"> • Assess potential contributions of alewife and smelt from nearshore habitats (<15 m) to lake-wide population. 	<p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Miscellaneous	<ul style="list-style-type: none"> • Winter harbor and stream fishing in Lake Michigan has never been surveyed by creel, but there is strong interest by stakeholders to enhance our knowledge of these fisheries • Explore alternatives to traditional creel which might include mail surveys or GLAD app from MI Sea Grant or other methods • Explore other methods to collect angler data such as live cameras, drones and related applications to northern Wisconsin student research project focused on options for collecting creel data • Can changes be implemented to the existing Green Bay ice creel to improve estimates? 	<p>Laura Schmidt Laura.schmidt@wisconsin.gov 414-416-0591 (cell)</p>
Miscellaneous	<ul style="list-style-type: none"> • Otolith microchemistry – build a library of water chemistry for all Lake Michigan tributaries and hatcheries where it does not already exist 	<p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p>
Miscellaneous	<ul style="list-style-type: none"> • Cumulative or direct impacts of hardened and/or dredged shorelines – look at relationship between shoreline hardening and affects to recruitment. 	<p>Aaron Schiller Aaron.Schiller@wisconsin.gov 414-852-5488 (cell)</p> <p>Scott Hansen Scott.hansen@wisconsin.gov 920-559-3474 (cell)</p>