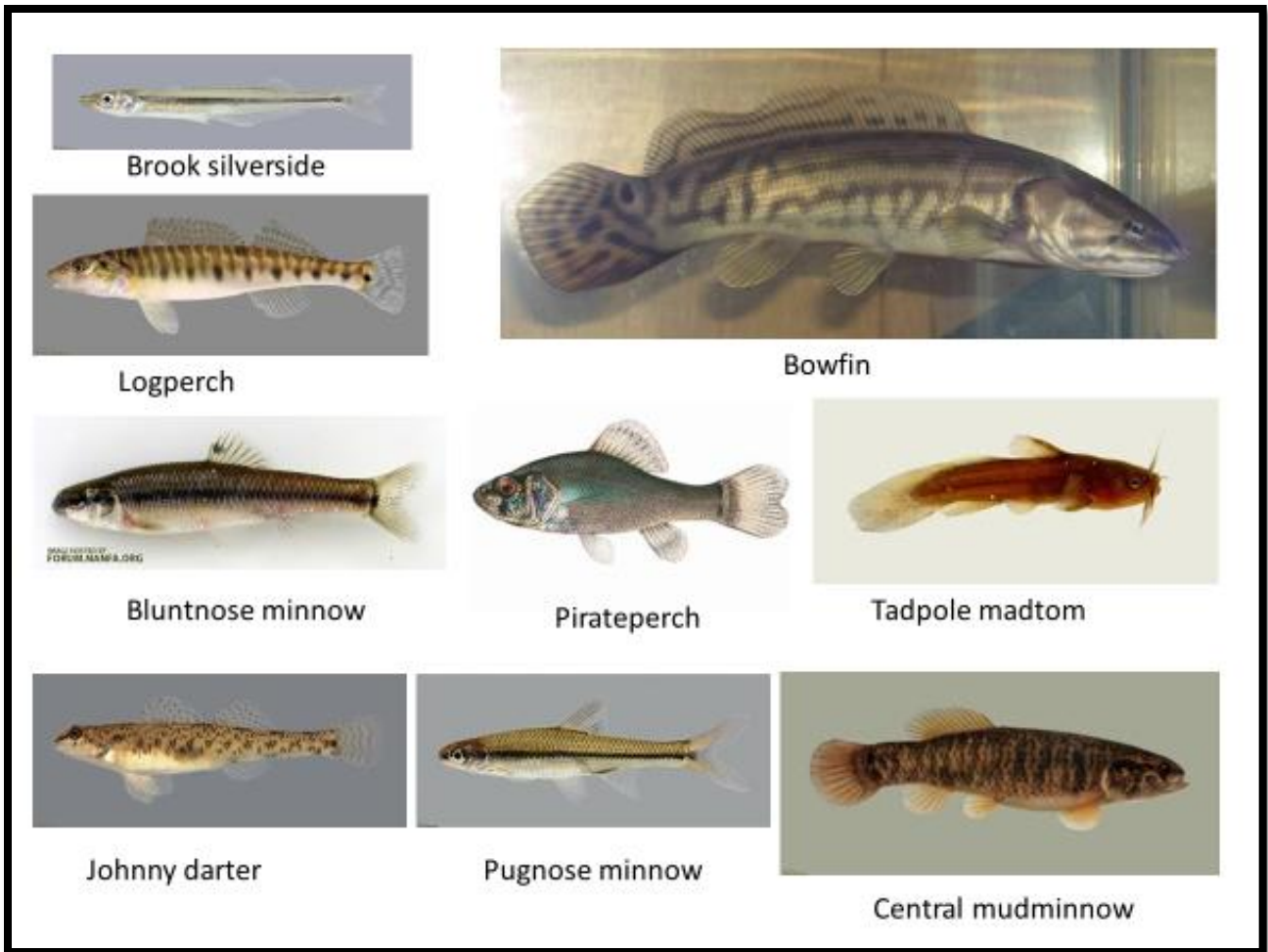


Nearshore Fishes of Kilbourn Flowage



Lake Wisconsin Alliance

Prairie du Sac Aquatic Resources Enhancement Grant Fund Project

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Summary

A DC towed electroshocker barge was used to sample nearshore fish in Kilbourn Flowage above Wisconsin Dells in 2018 and 2019. A total of 15 sites were electroshocked and we collected a total of 21 native species and a nonnative common carp (*Cyprinus carpio*). Compared with the 2015-16 Lake Wisconsin surveys, nineteen fewer fish were found in Kilbourn Flowage. The lower species richness may have reflected a number of factors including less sampling effort at Kilbourn Flowage, habitat differences and the more northerly location may be beyond the distribution range for some species. For example, the State Special Concern mud darter (*Etheostoma asprigene*) was routinely found in Lake Wisconsin but it has never been reported north of Columbia County in the Wisconsin River. Two rare species were found in Kilbourn Flowage, the State Special Concern pirate perch (*Aphrododerus sayanus*) and pugnose minnow (*Opsopoeodus emiliae*). However, as mentioned above the mud darter and State Special Concern banded killifish (*Fundulus diaphanus*) were previously collected in Lake Wisconsin but were not found in Kilbourn Flowage. A common aspect of both impoundments is that favorable habitats for many species includes rooted native aquatic plant beds, gently sloping rocky areas (as opposed to steep riprap shores) and sloughs located at the upper ends of the impoundments. For example, some species such as American grass pickerel, mudminnows, topminnows and tadpole madtoms are primarily found in the sloughs. Pirate perch are only found in the sloughs. Most darter species prefer gently sloping rocky shorelines at any location within the impoundments. Rock substrates were generally low in Kilbourn Flowage while sand was the dominant substrate type. This habitat feature may be a factor in the lower biodiversity in Kilbourn Flowage.

Introduction

Limnologists typically focus on traditional trophic status indicators (i.e., TSI secchi water clarity, TSI phosphorus and TSI chlorophyll), macrophyte surveys, plankton analysis, and sportfish inventories when assessing the environmental conditions in lakes. Important ecosystem indicators such as nearshore and nongame fish diversity are often overlooked. Some nearshore fish species are very sensitive to environmental degradation, and have been described as “canaries in the coal mine.” These fish provide important food chain linkages and population declines can reveal ecosystem stresses that traditional lake monitoring will overlook. Nongame fish species are rarely surveyed since they offer no perceived economic benefit compared to more familiar gamefish populations. Nearshore fish surveys are also useful since immature stages of more popular

sportfish occupy these areas and can yield information on recruitment. Periodic inventories of these biological indicators are useful in assessing individual population status, community diversity, and overall ecosystem stability.

The recent survey of Kilbourn Flowage was designed to determine how this and potentially other impoundment ecosystems compare to Lake Wisconsin. These types of surveys have potential to establish nearshore fish population baseline data that can be used for future ecosystems analysis.

Methods

The surveys were specifically designed to sample nearshore fishes, primarily nongame, juvenile panfishes and juvenile gamefish. The study was not designed as a tool for evaluating the growth rates and size distributions of gamefish populations that require boomshocking, fyke netting gear and other methods. Instead, a towed DC electro-shocker barge was used to sample 15 sites (Figures 1). Latitude and longitude locations were recorded at each site using a Garmin Model 76 GPS unit. Electroshocking distances at each site were approximately 300 feet long.

Nearshore electrofishing is typically more effective at sampling of fish species from habitats such as boulders, woody debris and artificial structures that are rarely sampled in most lakes.

General habitat features were noted for each site and were qualitatively rated (3=high, 2=moderate, 1=low, 0=absent). The ratings encompassed habitat features including rock, woody debris, emergent aquatic plants and Cyanobacteria blooms. Dissolved oxygen (d.o.) and temperature were measured at each site using a YSI ODO meter. Specific conductance was measured with an Extech ExStik II.

Findings (Species list in Table 1)

Amiidae: The bowfin is the lone survivor of a large family of fish only found as fossils. While often vilified by anglers, this primitive fish is an important predator that can reduce overpopulation and stunting of panfish. It was found at two sites in the sloughs at the upper end of Kilbourn Flowage and is considered Medium Tolerant.

Umbridae: The central mudminnow is the only species of this family found in Wisconsin. It was collected at two sites in Lake Wisconsin and is considered Environmentally Tolerant.

Pikes – Esocidae: Medium Tolerant northern pike was found at two sites and Medium Tolerant American grass pickerel at three sites. Grass pickerel was only collected at the north within the sloughs where aquatic plant habitat was more abundant.

Minnows – Cyprinidae: Minnow species were generally found in low abundance in Kilbourn Flowage. Environmentally Tolerant nonnative common carp was found at one site. Environmentally Tolerant golden shiner and bluntnose minnow were found at one site each. An emerald shiner was found at one site. State Special Concern pugnose minnows were collected at two sites within a wetland complex on the west side of Kilbourn Flowage.

Catfishes – Ictaluridae: Environmentally Tolerant yellow bullhead was found at one site and tadpole madtom (Medium Tolerant) were both found at Site 12 in slough habitat. No other catfish were found.

Aphredoderidae: The State Special Concern pirate perch is the only and last surviving member of this family. Like cavefishes, the pirate perch has its anus - urogenital vent migrate to the throat area as it matures. It is known as a transbranchial spawner where eggs pass into the females mouth and then she deposits them on tree roots and aquatic plants. Pirate perch were found at four sites within the sloughs at the north end of the impoundment.

Silversides – Atherinidae: The brook silverside is the only species of this family found in Wisconsin. It was found at two sites in Kilbourn Flowage and is considered Medium Tolerant.

Sunfishes – Centrarchidae: Largemouth bass was the most common species found across Kilbourn Flowage followed by bluegill sunfish (Figure 2). At some sites, young of year bluegills were the most abundant fish collected. In addition to these sunfishes, smallmouth bass, pumpkinseeds, and rock bass were collected. Rock bass and smallmouth bass are considered Environmentally Intolerant while the other sunfish species collected are classified Medium Tolerant.

Perches – Percidae: Three darter species were collected in Kilbourn Flowage; Medium Tolerant johnny darter (7 sites), Medium Tolerant logperch (1 site), and Environmentally Intolerant slenderhead darter (1 site). Medium Tolerant yellow perch was found at three sites.

Table 1: List of Fish Species Collected During the 2018-19 Nearshore Surveys

Common Name	Scientific Name	Environ. Tolerance
Bowfin	<i>Amia calva</i>	Medium
Mudminnow	<i>Umbra limi</i>	Tolerant
Grass pickerel	<i>Esox americanus</i>	Medium
Northern pike	<i>Esox lucius</i>	Medium
Common carp	<i>Cyprinus carpio</i>	Tolerant
Emerald shiner	<i>Notropis athrenoides</i>	NA
Golden shiner	<i>Notemegonus crysoleucas</i>	Tolerant
Pugnose minnow	<i>Opsopoeodus emiliae</i>	Special Concern
Bluntnose minnow	<i>Pimephales notatus</i>	Tolerant
Yellow bullhead	<i>Ameiurus natalis</i>	Tolerant
Tadpole madtom	<i>Noturus gyrinus</i>	Medium
Brook silverside	<i>Labidesthes sicculus</i>	Medium
Pirate perch	<i>Aphredoderus sayanus</i>	Special Concern
Bluegill	<i>Lepomis macrochirus</i>	Medium
Pumpkinseed	<i>Lepomis gibbosus</i>	Medium
Largemouth bass	<i>Micropterus salmoides</i>	Medium
Smallmouth bass	<i>Micropterus dolomieu</i>	Intolerant
Rock bass	<i>Ambloplites rupestris</i>	Intolerant
Johnny darter	<i>Etheostoma nigrum</i>	Medium
Logperch	<i>Percina caprodes</i>	Medium
Slenderhead darter	<i>Percina phoxocephala</i>	Intolerant
Yellow perch	<i>Perca flavescens</i>	Medium

Summary comparisons: 9 families found in Kilbourn versus 13 families in Lake Wisconsin. 21 native species found in Kilbourn versus 40 native species in Lake Wisconsin.

Summary

Both Kilbourn Flowage and especially Lake Wisconsin hold significant diversity of native fishes compared with most glacial lakes. Historically, biodiversity in the Wisconsin River impoundments was likely much lower prior to implementation of the Clean Water Act when the river was highly polluted. Once the river had been largely restored, fish migrations from the numerous tributaries and sloughs repopulated the impoundments. In glacial lakes, biodiversity has largely been lost due to a combination of habitat destruction and water quality declines (Figure 3).

Figure 1: Map of Kilbourn Flowage sampling sites



Figure 2: Frequency of occurrence for species found at three or more sites

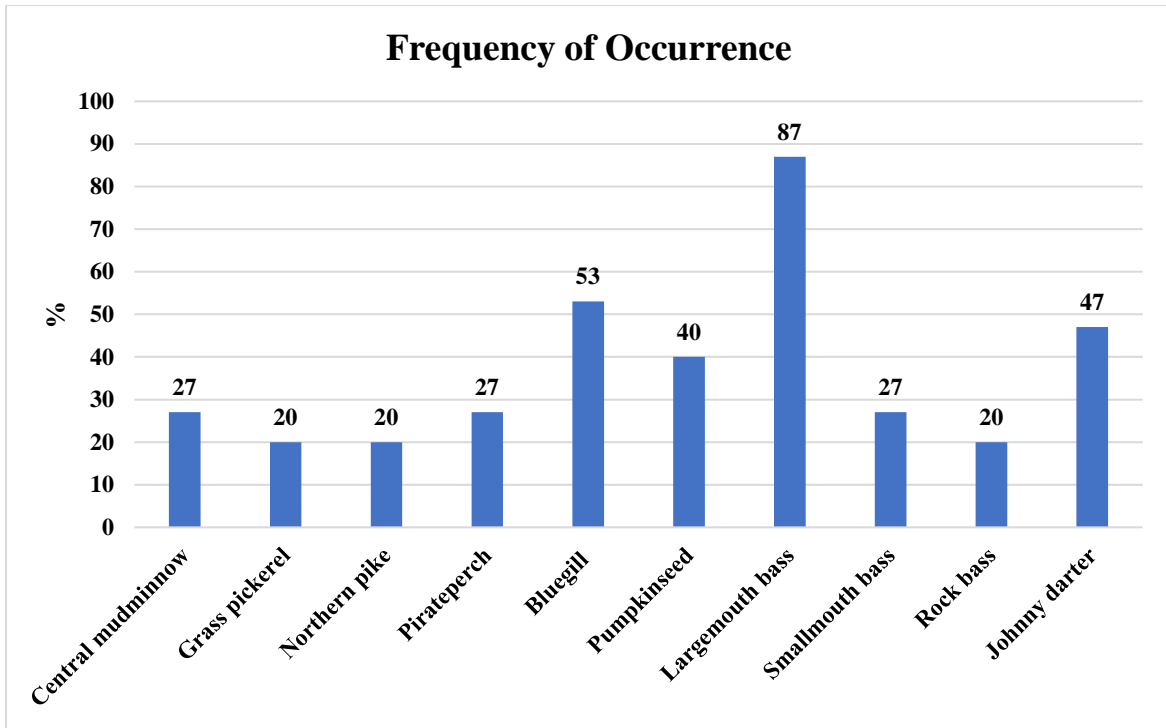
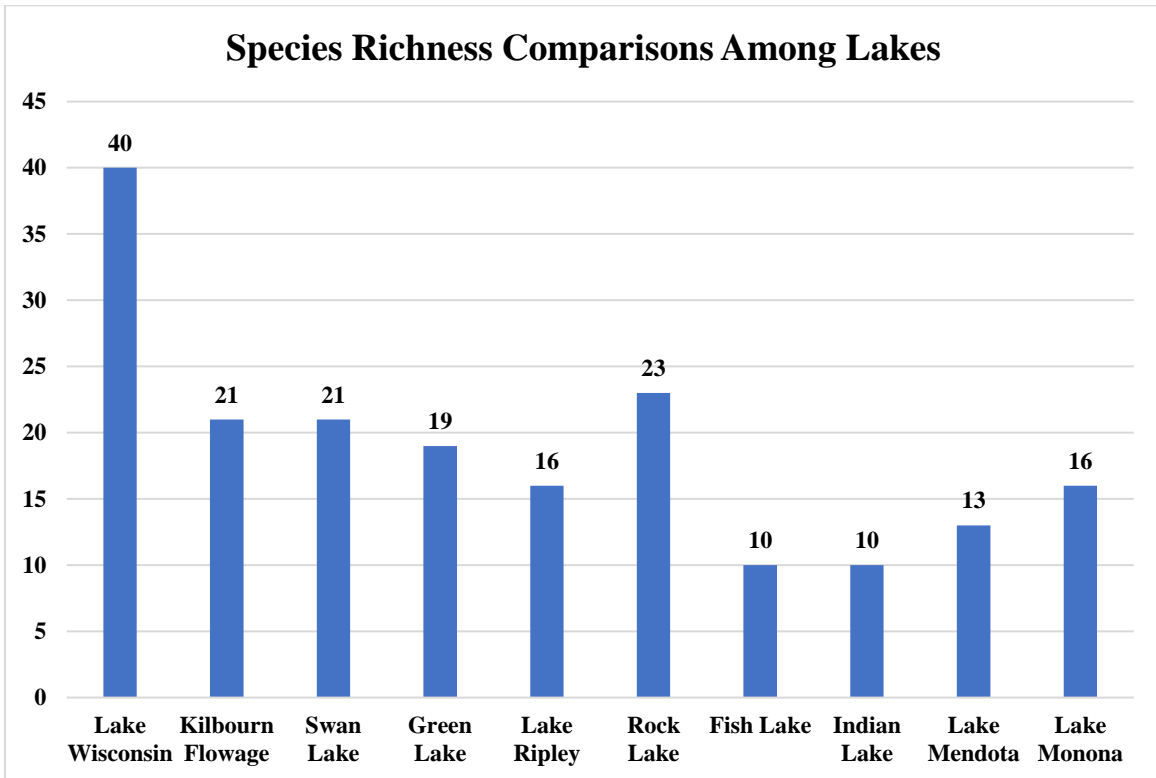


Figure 3: Species richness comparisons for southern Wisconsin lakes and impoundments





Pirateperch (*Aphrododerus sayanus*) collected at Site 12



Slough at north end of Kilbourn Flowage



Bowfin found in Kilbourn Flowage slough

References

- Becker, George C. 1983. Fishes of Wisconsin. University of Wisconsin Press.
- Lyons, J. 2012. Development and validation of two fish-based indices of biotic integrity for assessing perennial coolwater streams in Wisconsin, USA. *Ecological Indicators* 23:402-412.
- Lyons, J., P.A.Cochran and D. Fago. 2000. Wisconsin Fishes 2000: Status and Distribution. UW Sea Grant Publication No. WISCU-B-00-001.

Data Tables

Site Data

Site	1	2	3	4	5	6	7	8
Date	9/14/2018	9/14/2018	9/14/2018	9/14/2018	9/14/2018	8/19/2019	8/19/2019	8/19/2019
Temp C	21.1	22.6	21.6	24.1	22.3	26	22.2	23.6
D.O.	6.7	3.2	8.8	11.1	6.3	8.5	6.7	6.2
Sp. Cond.	146	138	186	180	141	173	186	165
Latitude	43.6722	43.68214	43.68859	43.69246	43.68213	43.68463	43.6971	43.694
Longitude	89.80426	89.8221	89.81041	89.81234	89.82211	89.82392	89.8143	89.83007
Overall Habitat	1	2	1	1	2	2	1	3
Plants	0	2	0	0	2	2	1	3
Wood	1	0	0	1	2	1	1	1
Rock	1	0	1	2	1	0	0	0
Site	9	10	11	12	13	14	15	
Date	8/19/2019	8/19/2019	8/19/2019	8/19/2019	8/19/2019	8/19/2019	8/19/2019	
Temp C	23.9	23.9	22.2	24.7	25	21.9	17.9	
D.O.	6.4	6.4	7.8	7.3	7.9	3.9	10.6	
Sp. Cond.	172	172	204	171	177	205	269	
Lat.	43.69703	43.7022	43.70701	43.69957	43.70483	43.70761	43.70807	
Long.	89.83266	89.81606	89.81898	89.82819	89.82293	89.81949	89.8194	
Overall Habitat	3	1	3	3	1	2	3	
Plants	3	1	3	3	1	2	3	
Wood	2	1	1	2	1	0	2	
Rock	0	0	0	0	0	0	0	

Fish Data

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Bowfin								
Central mudminnow								1
Grass pickerel								1
Northern pike							1	
Common carp								
Golden shiner					1			
Bluntnose minnow								
Pugnose minnow		2			1			
Emerald shiner				1				
Yellow bullhead								
Tadpole madtom								
Brook silverside				1	5			
Pirateperch								
Bluegill		43			14	100	1	
Pumpkinseed		1				2		4
Largemouth bass		5		1	9	6	3	1
Smallmouth bass	3	3	4		3			
Rock bass	1							
Johnny darter	1	1	16	19	1		3	
Slenderhead darter			1					
Logperch						1		
Yellow perch		2			4			

Species	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Bowfin						1	1
Central mudminnow				3		19	1
Grass pickerel						1	2
Northern pike			1				1
Common carp			1				
Golden shiner							
Bluntnose minnow			1				
Pugnose minnow							
Emerald shiner							
Yellow bullhead				1			
Tadpole madtom				1			
Brook silverside							
Pirateperch	1		2	2			2
Bluegill	2	1	2		100		
Pumpkinseed	1					1	1
Largemouth bass	1	3	20	1	100	2	2
Smallmouth bass							
Rock bass	1			1			
Johnny darter			4				
Slenderhead darter							
Logperch							
Yellow perch							1