

JOHNSON FALLS FLOWAGE
Marinette County
2015 Fish Management Report

Christopher C. Long – Senior Fisheries Biologist



Wisconsin Department of Natural Resources
101 N. Ogden Rd.
Suite A
Peshtigo, Wisconsin 54157



Johnson Falls Flowage - Marinette County, Wisconsin
2015 Fish Management Report

Christopher C. Long, Fisheries Biologist, Date

Michael Donofrio, Fisheries Supervisor, Date

Steve Hewett, Bureau of Fisheries Management, Date

SUMMARY

Lake and location:

Johnson Falls Flowage, Marinette County, T33N R19E Sec 32

Physical / chemical attributes (Wisconsin DNR, 1977):

Surface acres: 158

Maximum depth (ft): 37

Average depth (ft): 9

Shoreline length (mi): 8.9

Lake type: Drainage

Basic water chemistry: Hard water, slightly alkaline, light brown/stained water with moderate transparency, Secchi = 9 ft. (summer).

Littoral substrate: 70% sand, 10% gravel, 10% boulder

Aquatic vegetation: Moderate

Other features: The shoreline of this flowage lies mostly within the Peshtigo River State Forest. Remote campsites (accessible only by boat) can be reserved on the flowage by contacting WDNR State Forest staff at Governor Thompson State Park.

Purpose of survey:

Determine the current status of fishery.

Surveys:

WDNR Survey ID: 515077822 – Spring fyke netting: April 8 – April 13, 2015

WDNR Survey ID: 515078207 – Gamefish/Panfish electrofishing (SEII): June 8, 2015

Fishery:

The fishery of Johnson Falls is comprised of panfish species (bluegill, black crappie, pumpkinseed, yellow perch and rock bass) and gamefish species (walleye, smallmouth bass, largemouth bass, muskellunge and northern pike).

EXECUTIVE SUMMARY

- Johnson Falls Flowage is a 158-acre impoundment on the Peshtigo River located 10 miles west of Crivitz. Most of the shoreline lies within the Peshtigo River State Forest and therefore is undeveloped with only a few homes on the flowage. A single boat landing is located on State Forest property off Parkway Road.
- The Wisconsin Department of Natural Resources (WDNR) has intermittently stocked walleye since 2003 and rainbow trout since the early 1990's (Table 1). Beginning in 2013, large fingerling walleye were stocked under the Wisconsin Walleye Initiative (Table 1).
- The last fisheries survey of Johnson Falls was conducted in 2005 however, no formal report was prepared. A 1990 survey report of Johnson Falls indicated abundant populations of bullhead, rock bass, northern pike and yellow perch. After that survey, it was recommended to stock rainbow trout (Kornely, 1991) but this stocking has not been evaluated.
- Overall, 218 fish representing 13 species were collected during the 2015 survey (Table 4). The five most abundant species collected by number were white sucker (22%), northern pike (14%), rock bass (13%), walleye (12%), and yellow perch (11%) (Table 4).
- A total of 30 northern pike was collected and accounted for 14% of the fish collected (Table 4). Pike ranged in length from 9.6 to 28.4 inches and averaged 18.7 inches. Pike PSD was 26 (below the desirable range of 30 to 60; Table 3) and RSD^P was 4. Due to the lack of recaptures during the fyke netting survey, a population estimate was not calculated.
- During the survey, 25 walleye were collected which accounted for 12% of the fish. Walleye ranged in length from 7.0 to 29.7 in and averaged 14.6 inches. Walleye were reaching legal size (15 inches) by age 5.
- Yellow perch made up 11% of the fish collected totaling 23 fish (Table 4). Perch ranged in length from 3.1 to 9.0 in and averaged 5.9 inches.
- Only sixteen bluegill were collected during both the spring fyke netting and SEII electrofishing (Table 4). Bluegill ranged in length from 4.0 to 6.8 inches.
- Additionally, smallmouth bass, black bullhead, black crappie, shorthead redhorse, white sucker, golden shiner, brown trout and muskellunge were also collected in small numbers during the 2015 (Table 4).
- The current fishing regulations (Table 7) are adequate and should continue to provide quality fishing opportunities.
- Future surveys should not utilize spring fyke netting to characterize gamefish and/or panfish populations.
- Future fisheries surveys of Johnson Falls should include a combination of summer (SEII) electrofishing and fall electrofishing. Electrofishing samples should be conducted both during the day and at night. Because Johnson Falls is riverine, the non-wadable sampling protocol (daytime electrofishing) may be more applicable.
- New walleye fishing regulations were implemented in 2015; the minimum length limit is 15 inches but a 20 to 24-inch protected slot was implemented. The daily bag is now 3 fish/angler/day with only 1 fish over 24 inches allowed. Alternate-year stockings of large fingerling walleye should continue at the rate of 5 fish/acre.
- Rainbow trout have been stocked in Johnson Falls on a regular basis since the early 1990's (Table 1). Very little is known about the survival or carryover of this stocking effort. It is recommended that WDNR fisheries staff develop a project to better understand the contribution of this stocking effort to the fishery or discontinue the stocking of rainbow trout.

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	i
INTRODUCTION	3
METHODS	3
DISCUSSION.....	5
CONCLUSIONS & RECOMMENDATIONS.....	6
LITERATURE CITED.....	8
APPENDIX I – TABLES	9
APPENDIX II – FIGURES	14
APPENDIX III – SAMPLING LOCATIONS.....	16

INTRODUCTION

Johnson Falls Flowage is a 158-acre impoundment on the Peshtigo River located 10 miles west of Crivitz. It is the 3rd flowage on the Peshtigo River below Caldron Falls Flowage & High Falls Flowage. Johnson Falls is mostly riverine meaning that there is a lot of current and not much stagnant or still water. Most of the shoreline lies within the Peshtigo River State Forest and therefore is undeveloped with only a few homes on the flowage. A single boat landing is located on State Forest property off Parkway Road just north of where the Thunder River enters the flowage.

The Wisconsin Department of Natural Resources (WDNR) has intermittently stocked walleye since 2003 and rainbow trout since the early 1990's (Table 1). Beginning in 2013, large fingerling walleye were stocked under the Wisconsin Walleye Initiative (Table 1).

The last fisheries survey of Johnson Falls was conducted in 2005 however, no formal report was prepared. The 2005 survey consisted of one night of mini-fyke netting in July and one night of electrofishing in September. A 1990 survey report of Johnson Falls indicated abundant populations of bullhead, rock bass, northern pike and yellow perch. Several other gamefish and panfish species were also collected. After the 1990 survey, it was recommended to stock rainbow trout (Kornely, 1991). However, the survival and contribution of rainbow trout to the fishery has not been documented or evaluated.

The goal of the 2015 fisheries survey was to assess the status of the fishery by characterizing gamefish populations based on relative abundance, proportional stock density (PSD), relative stock density (RSD), catch per unit effort (CPUE) and mean length at capture (age and growth).

METHODS

Data collection:

Standard fyke nets (3-foot hoop, $\frac{3}{4}$ -bar, 1.5-inch stretch), mini-fyke nets ($\frac{1}{4}$ -inch stretch with turtle exclusion) and a standard WDNR electrofishing boat were used to collect fish on Johnson Falls Flowage. Sampling gear, effort, date, and target species for the survey are listed in Table 2. All gamefish fish collected were measured to the nearest 0.1 inch total length (TL) and separated into half-inch groups (X.0-X.4 for inch group and X.5-X.9 for half-inch group). Not all panfish were measured; representative samples were taken to reduce handling mortality from a net or electrofishing run when the sample size was large. A sub-sample of scales or dorsal spines was collected for age and growth analysis from all gamefish. Aging structures (scales or

spines) were collected from 5 non young-of-the-year (YOY) fish per half inch group. If gender could be determined, structures from 5 fish per sex were collected per half inch group. Aging structures for panfish and nongame fish consisted of 5 samples per half inch group when gender could not be established. Ages were assigned to each fish using standard WDNR procedures.

Data analysis:

Relative abundance was calculated as the percentage each species represented from the total sample (i.e. 22 fish of a single species from a sample of 100 total fish = 22% relative abundance). Catch per unit effort (CPUE) was calculated as catch by gear divided by sampling effort for each species collected. Length frequency distributions were tabulated for dominant gamefish and consisted of combined electrofishing samples as well as fyke net data. Proportional stock density (PSD) and relative stock density for preferred length fish (RSD^P) were calculated for dominant gamefish (Table 3; Anderson and Neumann 1996). Preferred lengths of various gamefish have a minimum length between 45 and 55% of the world record length for that species (Anderson and Neumann 1996). Stock, quality, and preferred lengths were used as proposed by Gabelhouse (1984). Mean length at age data was calculated for dominant gamefish and compared to the average of mean length at age for northern Wisconsin.

RESULTS

Overall, 218 fish representing 13 species were collected during the 2015 survey (Table 4). The five most abundant species collected by number were white sucker (22%), northern pike (14%), rock bass (13%), walleye (12%), and yellow perch (11%) (Table 4).

A total of 30 northern pike was collected during the 2015 fisheries survey and accounted for 14% of the fish collected (Table 4). Pike ranged in length from 9.6 to 28.4 inches and averaged 18.7 inches. Pike PSD was 26 (below the desirable range of 30 to 60; Table 3) and RSD^P was 4. No northern pike were aged from this survey. Due to the lack of recaptures during the fyke netting survey, a population estimate was not calculated.

Twenty-nine rock bass were collected during the 2015 survey (Table 4). Rock bass ranged in length from 3.2 to 8.1 in and averaged 5.5 inches. Overall, the rock bass population is well balanced in terms of size structure.

During the survey, 25 walleye were collected which accounted for 12% of the fish collected in 2015 survey (Table 4). Walleye ranged in length from 7.0 to 29.7 in and averaged 14.6 inches. Walleye PSD and RSD^P from the spring fyke net sample was 67 and 11,

respectively. Walleye PSD was slightly above the desirable range of 30 to 60 (Table 3). Due to the lack of recaptures during the fyke netting survey, a population estimate was not calculated. A subsample of 15 walleye was aged from 1 to 17 years old. Walleye were reaching legal size (15 inches) by age 5. Compared to the mean length at age for northern Wisconsin, walleye growth was average until age 6 and slightly above average at older ages (Figure 1).

Yellow perch made up 11% of the fish collected totaling 23 fish (Table 4). Perch ranged in length from 3.1 to 9.0 in and averaged 5.9 inches. No yellow perch were aged from this survey but successful reproduction and recruitment appear to be consistent.

Only sixteen bluegill were collected during both the spring fyke netting and SEII electrofishing (Table 4). Bluegill ranged in length from 4.0 to 6.8 inches. Due to the small sample size, no bluegill were aged from this survey.

Additionally, smallmouth bass, black bullhead, black crappie, shorthead redhorse, white sucker, golden shiner, brown trout and muskellunge were also collected in small numbers during the 2015 (Table 4).

DISCUSSION

Johnson Falls is relatively infertile because it has a low retention time, a forested watershed, and soil types void of nutrients that stimulate primary production. The low retention time of 1.1 days (reported by Kornely, 1991) is dependent on flow. This estimate seems reasonable considering the flowage is mostly riverine.

The fishery of Johnson Falls is heavily influenced by the upstream flowages of Caldron Falls and High Falls. Migration of fish downstream into Johnson Falls is evident due to the presence of muskellunge. Therefore, it is likely that other species of fish are also migrating downstream into Johnson Falls.

Most panfish species do not prefer riverine-type habitat (i.e. bluegill and black crappie). As a result, bluegill and crappie were not as abundant as panfish species such as rock bass and yellow perch that are more suited (or prefer) for waterbodies that are riverine. Additionally, gamefish such as walleye and smallmouth bass were more abundant due to their suitability to flowing water unlike largemouth bass, which were not collected during the 2015 survey. Northern pike and muskellunge are suited for both flowing and stagnant water habitats (i.e. river and lake). Overall, Johnson Falls Flowage offers anglers a variety of respectable fishing opportunities.

Since the previous fisheries survey in 1990 and 2005, fish sampling protocols were evaluated and changed; specifically the timing of gamefish/panfish electrofishing (SEII). In both 1990 and 2005, SEII sampling was conducted in the fall (i.e. September) whereas in 2015, SEII electrofishing was conducted in June. Therefore, it's difficult to detect changes in gamefish and panfish populations between surveys because of the timing that each sample occurred. Also, the amount of sampling effort for each gear type varied considerably between years. For example, 200 net nights of fyke netting effort were expended in 1990 whereas only 50 net nights of sample effort occurred in 2015 (Table 2). Electrofishing effort for both gamefish and panfish was 2.5 hours/4.0 miles in 2005 but only 0.6 hours (1.0 mile) was exerted collecting panfish in 2015. This alone could explain some of the differences seen in the number of panfish collected between 2005 and 2015 (Table 6). The difference in sampling protocol, in addition to the riverine nature of the flowage, made it difficult to detect changes in the fishery.

CONCLUSIONS & RECOMMENDATIONS

The current fishing regulations (Table 7) are adequate and should continue to provide quality fishing opportunities. Panfish abundance is negligible as was depicted by the consistently low catch between surveys (Table 6). Gamefish abundance was not much better however; sampling efficiency was greatly diminished due to the fast flowing water and steep shorelines; neither of which lends themselves to collecting a representative sample of fish.

Future surveys should not utilize spring fyke netting to characterize gamefish and/or panfish populations. Spring fyke netting is not efficient or effective due to the heavy, fast current during the spring which causes the nets to roll and accumulate debris. Additionally, even though Johnson Falls is ice free relatively early each spring, High Falls (the flowage immediately upstream) remains ice covered for a longer period of time. This leads to relatively colder water temperatures downstream in Johnson Falls even though it is ice free. As a result, fyke netting CPUE for all species combined has routinely been less extremely low (Table 5). Therefore, it is not worth the time and effort to continue this sampling regime because it is not producing any tangible results.

Electrofishing, while producing somewhat better results than fyke netting (Table 6), was difficult because the shoreline drops off into deep water relatively quickly in most of the flowage because it is so riverine. This is compounded by the numerous overhanging trees and tree limbs which prevents the electrofishing boat from being able to stay close to shore in shallow water

where its most effective. Therefore, electrofishing wasn't overly effective at collecting a representative sample of fish. Nonetheless, future fisheries surveys of Johnson Falls should include a combination of summer (SEII) electrofishing and fall electrofishing. Electrofishing samples should be conducted both during the day and at night. Because Johnson Falls is riverine, the non-wadable sampling protocol (daytime electrofishing) may be more applicable in this instance.

New walleye fishing regulations were implemented in 2015. The previous regulation consisted of a 15-inch minimum length limit and the daily bag limit fluctuated based on tribal harvest declarations. In 2015, the minimum length limit remains 15 inches but a 20 to 24-inch protected slot was implemented. The daily bag is now 3 fish/angler/day with only 1 fish over 24 inches allowed. Alternate-year stockings of large fingerling walleye should continue at the rate of 5 fish/acre.

Rainbow trout have been stocked in Johnson Falls on a regular basis since the early 1990's (Table 1). Very little is known about the survival or carryover of this stocking effort. Rainbow trout are also stocked below the Johnson Falls dam in the Peshtigo River Fly Fishing Area. It is probable that the rainbows stocked in the flowage wind up downstream. It is recommended that WDNR fisheries staff develop a project to better understand the contribution of this stocking effort to the fishery or discontinue the stocking of rainbow trout.

The next fisheries survey of Johnson Falls is scheduled for 2023 and will focus on the age, growth, abundance, and recruitment of the dominant gamefish. Boat access to Johnson Falls is adequate. Plans to renovate the landing and parking area are scheduled for 2016 or 2017. Shore fishing opportunities are good at the landing and along Parkway Road but otherwise limited for the public. Boaters are reminded to remove all vegetation from their boat and trailer before leaving to limit the spread of invasive species. A map of Johnson Falls Flowage can be found at the following internet address; <http://dnr.wi.gov/lakes/maps/DNR/0533300a.pdf>

LITERATURE CITED

- Anderson, R. O. and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-481 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Gabelhouse, D.W. Jr. 1984. A length-categorization system to assess fish stocks. *North American Journal of Fisheries Management*4: 273-285.
- Kornely, G.W. 1991. Fishery Investigation of Johnson Falls Flowage; Marinette County Wisconsin. Wisconsin Department of Natural Resources. Peshtigo, Wisconsin.
- Willis, D.W., B.R. Murphy, and C.S. Guy. 1993. Stock density indices: development, use, and limitations. *Reviews in Fisheries Science* 1:203-222.

APPENDIX I – TABLES

Table 1. Stocking history of Johnson Falls Flowage; Marinette County, WI.

Year	Species	Age Class	Number Stocked	Average Length
1995	BROWN TROUT	YEARLING	1000	7.2
1997	BROWN TROUT	YEARLING	307	7.1
1993	RAINBOW TROUT	YEARLING	1000	9.0
1994	RAINBOW TROUT	YEARLING	1000	8.1
1995	RAINBOW TROUT	YEARLING	2000	6.8
1995	RAINBOW TROUT	FINGERLING	2000	7.9
1996	RAINBOW TROUT	YEARLING	1050	7.5
1997	RAINBOW TROUT	YEARLING	300	9.0
1998	RAINBOW TROUT	YEARLING	1648	8.0
1999	RAINBOW TROUT	YEARLING	2000	7.8
2000	RAINBOW TROUT	YEARLING	2000	7.4
2001	RAINBOW TROUT	YEARLING	1000	7.9
2002	RAINBOW TROUT	YEARLING	1000	8.5
2003	RAINBOW TROUT	YEARLING	2000	7.8
2008	RAINBOW TROUT	LARGE FINGERLING	2000	6.7
2013	RAINBOW TROUT	YEARLING	1000	9.2
2013	RAINBOW TROUT	LARGE FINGERLING	1999	6.4
2014	RAINBOW TROUT	LARGE FINGERLING	2000	6.4
2015	RAINBOW TROUT	LARGE FINGERLING	2665	5.8
2003	WALLEYE	SMALL FINGERLING	5995	1.3
2011	WALLEYE	SMALL FINGERLING	3900	1.8
2011	WALLEYE	SMALL FINGERLING	1820	1.8
2013	WALLEYE	LARGE FINGERLING	1074	7.6
2013	WALLEYE	LARGE FINGERLING	1294	6.9

Table 2. Sampling gear, date, target species, sampling effort, and location (distance) for fisheries surveys on Johnson Falls; Marinette County, WI.

Gear	Year			Target Species	Sampling Effort hours (h) or net night (NN)	Shoreline Distance (mi)
	1990	2005	2015			
Fyke net			April 8 to April 13	All fish	50	
	April 4 to April 24			All fish	200	
Electrofishing	21-May			Panfish	unknown	
				Gamefish	unknown	
			08-Jun	Panfish	0.6 h	1.0
				Gamefish	2.0 h	4.0
		07-Sep		Panfish	2.5 h	4.0
				Gamefish	2.5 h	4.0
	17-Sep			Panfish	unknown	
				Gamefish	unknown	

Table 3. Proposed length categories for various fish species. Measurements are total lengths for each category in inches. Updated from Anderson and Neumann (1996), Bister et al. (2000), Hyatt and Hubert (2001).

Species	PSD	RSD-P	Stock	Quality	Preferred	Memorable	Trophy
Black crappie			5	8	10	12	15
Bluegill	20 - 40	5 - 20*	3	6	8	10	12
Brown bullhead			5	8	11	14	17
Largemouth bass	40 - 70	10 - 40*	8	12	15	20	25
Muskellunge	30 - 60		20	30	38	42	50
Northern pike	30 - 60		14	21	28	34	44
Pumpkinseed	20 - 40		3	6	8	10	12
Rock bass	20 - 60		4	7	9	11	13
Smallmouth bass	30 - 60		7	11	14	17	20
Walleye	30 - 60		10	15	20	25	30
Yellow perch	30 - 50		5	8	10	12	15
Yellow bullhead			4	7	9	11	14

*Range based on management strategy for balanced populations.

Table 4. Number, relative abundance (%), and length range (in) of fishes collected in 2015 from Johnson Falls; Marinette County, WI.

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER			
*Common Name of Fish	Number	Percent	Length Range (inches)
White sucker	47	21.6%	not measured
Northern pike**	30	13.8%	9.6 - 28.4
Rock bass	29	13.3%	3.2 - 8.1
Walleye**	25	11.5%	7.0 - 29.7
Yellow perch	23	10.6%	3.1 - 9.0
Bluegill	16	7.3%	4.0 - 6.8
Smallmouth bass**	13	6.0%	6.5 - 16.0
Black bullhead	10	4.6%	up to 11.0
Black crappie	10	4.6%	4.2 - 7.3
Shorthead redhorse	9	4.1%	not measured
Golden shiner	4	1.8%	not measured
Brown trout	1	0.5%	21.2
Muskellunge	1	0.5%	46.9
TOTAL	218		

* Common names of fishes recognized by the American Fisheries Society.

**Includes recaptures.

Table 5. Summary of spring fyke netting on Johnson Falls; Marinette County, WI.

1990 Fyke Netting (200*)		2015 Fyke Netting (50*)	
	Total		Total
Species	Catch	Species	Catch
Bullheads	357	Northern pike**	29
Rock bass	101	White sucker	26
Yellow perch	79	Walleye**	10
Northern pike	58	Black bullhead	9
Brown trout	17	Rock bass	4
Largemouth bass	16	Bluegill	2
Black crappie	15	Black crappie	2
Bluegill	12	Brown trout	1
Walleye	3	Shorthead redhorse	1
Smallmouth bass	2	Smallmouth bass	1
Pumpkinseed	2	Yellow perch	1
Muskellunge	1		
Brook trout	1		
TOTAL	664	TOTAL	86
*Sampling effort in net nights.			
**Includes recaptured fish.			

Table 6. Electrofishing summary: 1990, 2005 and 2015 at Johnson Falls; Marinette County, WI.

2015 SEII Electrofishing		2005 SEII Electrofishing		1990 SEII Electrofishing	
	Total		Total		Total
Species	Catch	Species	Catch	Species	Catch
Rock bass	25	White sucker	46	Yellow perch	123
Yellow perch	22	Smallmouth bass	41	Bluegill	43
Northern pike	21	Bluegill	39	Rock bass	41
Walleye	15	Yellow perch	32	Black crappie	33
Bluegill	14	Black crappie	11	Smallmouth bass	13
Smallmouth bass	12	Rock bass	6	Walleye	5
Black crappie	8	Shorthead redhorse	6	Muskellunge	5
Shorthead redhorse	8	Largemouth bass	5	Northern pike	2
Golden shiner	4	Northern pike	5	Brown trout	2
White sucker	1	Walleye	5	Largemouth bass	1
Black bullhead	1	Golden shiner	4		
Muskellunge	1	Muskellunge	3		
		Bullheads	2		
		Pumpkinseed	2		
TOTAL	132	TOTAL	207	TOTAL	268

Table 7. Current fishing regulations (2015 - 2016) for Johnson Falls; Marinette County, WI.

Species	Fishing Season	Daily Limit	Minimum Length
Largemouth bass	May 2- March 6	5	14 inches
Smallmouth bass	May 2- June 19 June 20- March 6	Catch and release 5 in total with LMB	14 inches
Northern pike	May 2 - March 6	5	None
Muskellunge	May 23 - November 30	1	40 inches
Walleye	May 2- March 6	3	18 inches
Panfish (bluegill, pumpkinseed, crappie, and yellow perch)	Open all year	25 in total	None
Bullheads	Open all year	None	None
Rock bass	Open all year	None	None

APPENDIX II – FIGURES

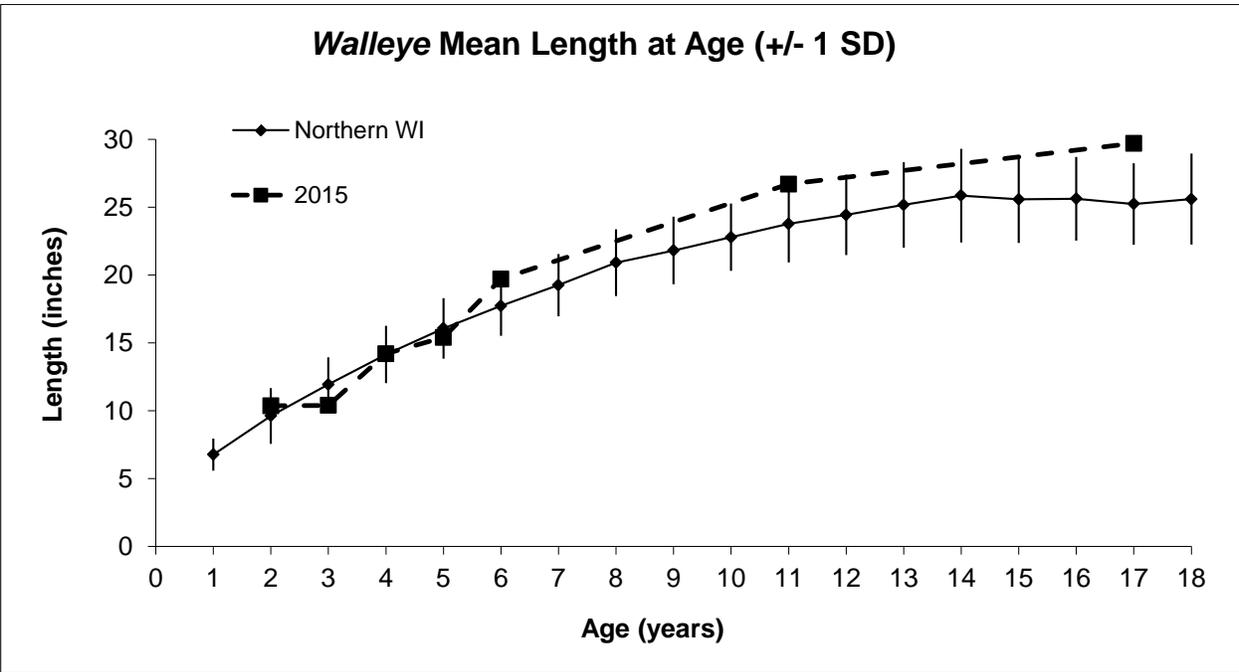


Figure 1. Walleye mean length at age comparison from Johnson Falls; Marinette County, WI.

APPENDIX III – SAMPLING LOCATIONS

