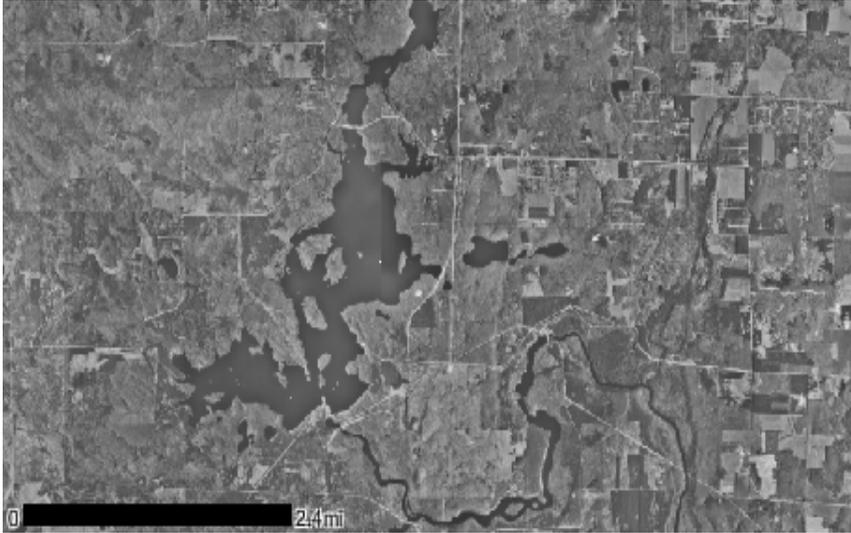


**Comprehensive Fisheries Survey of High Falls Reservoir, Marinette County
Wisconsin during 2004 and 2005**

Waterbody Identification Code 540600



Justine Hasz
Senior Fisheries Biologist
Wisconsin Department of Natural Resources
Peshtigo
January, 2007

**Comprehensive Fisheries Survey of High Falls Reservoir,
Marinette County, Wisconsin during 2004 and 2005**

Report Approval signatures

Justine Hasz, Senior Fisheries Biologist, Date

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Executive Summary

A basic fisheries survey of High Falls Reservoir was conducted during the 2004 field season and was followed up with a more comprehensive fisheries survey that was implemented during the 2005 field season. The dominant game fish species in the reservoir are walleye (population estimate = 1,769), smallmouth bass (population estimate = 1,666), northern pike (population estimate = 1,463), and largemouth bass (population estimate = 1,134). There is also a less abundant muskellunge population in the reservoir. Yellow perch are the most abundant panfish species with good numbers of blue gill, black crappie, rock bass, and pumpkinseed also being found in the reservoir. I recommend managing High Falls Reservoir for walleye, smallmouth bass, largemouth bass, northern pike, and panfish.

Lake and Location:

High Falls Reservoir, Marinette County, T32N R18E Sec1.
Located in west central Marinette County, 9 miles northwest of Crivitz

Physical / Chemical attributes (Wisconsin DNR, 1975):

Morphometry: 1,498 acres, maximum depth 54 feet, mean depth 12 feet, shoreline 22.3 miles

Lake type: Impoundment on the Peshtigo River

Watershed: 551 square miles with 189 acres of adjoining wetlands.

Basic Water Chemistry: hard water drainage lake having a neutral, light brown water of high transparency. Secchi disc - 12 feet (summer), PH 7.0. Conductance 265umhos.

Littoral Substrate: 50% sand, 40% muck, 5% gravel and 5% rock.

Aquatic Vegetation: Dense aquatic vegetation is found in several areas of the Reservoir, including the exotic species Eurasian watermilfoil.

Other Features: High Falls is an impoundment with an earthen dam and hydroelectric plant. Caldron Falls is the impoundment approximately 2 miles upstream from High Falls reservoir. The majority of the shoreline is owned by the State of Wisconsin and forms part of the Peshtigo River State Forest. The shoreline is primarily upland with vegetation consisting of upland hardwoods and conifers.

Purpose of Survey: Assess the fishery status

Dates of fieldwork:

Mini-fyke netting (juvenile fish) – June 20 and 21, 2004

Electroshocking – May 15, 24 and September 27, 2000, September 23, 28 and 29, 2004
and April 25, June 1 and 6, 2005

Fyke netting (all species and ages) – March 28 – April 21 and June 13, 14, 2000 and April
12 – 26, 2005

BACKGROUND

High Falls Reservoir has a moderately developed shoreline with the majority of the shoreline being recently purchased by the State of Wisconsin from Wisconsin Public Service. This purchase created the Peshtigo River State Forest. There are currently less than 100 private dwellings along 22 miles of shoreline; however some additional housing development is expected over the next few years. A county park and several resorts are also located around the reservoir. There are eight public boat accesses on the Reservoir and all are owned and operated by the State of Wisconsin. The good access, relatively, undeveloped shoreline, and excellent fishery of High Falls Reservoir make it a popular destination water. The number of people recreating on the reservoir is high and it is a multiple use water with anglers, water skiers, personal watercraft and pleasure boaters.

Since 1985, the portion of High Falls Reservoir up to the riverine section has been eligible for tribal off reservation spearing harvest. Between 1991 and 1997, a total of 47 walleye were harvested under that activity. No walleye have been harvested in that manner since 1997. Previous fisheries surveys have documented fluctuating natural reproduction of walleye that have been attributed to the variation in spring spawning conditions.

Previous fisheries surveys were conducted on High Falls Reservoir in 1963, 1965, 1971, 1985-1993 and 2000. For this report, comparisons have been made only with the information collected from the 1991 and 2000 survey (Heizer and Kornely, 1995, Unpublished DNR data). The previous surveys showed the fishery to consist of walleye, largemouth bass, northern pike, smallmouth bass, muskellunge, yellow perch, bluegill, black crappie, rock bass, and bullheads along with several forage fish species.

Wisconsin Public Service (WPS) still owns and operates the Caldron Falls, next dam upstream, and High Falls dams. High Falls Reservoir is commonly drawn down each winter between 2 and 10 feet to accommodate for snow melt in the watershed, but more infrequently larger drawdowns have been required for repairs to the dam. The two more recent larger drawdown events were during the fall and over the winter of 1983 (15 feet) and the fall and winter of 2005 (12 Feet). During both of these larger events, WPS located isolated pools that contained stranded fish. These waters were either seined or shocked and any fish captured were removed and placed back into the main body of water. During both of these events, sportfishing remained open on High Falls Reservoir.

The fish stocking history for High Falls Reservoir is varied. Walleyes were stocked on a regular basis in the 1930's, 1940's and 1950's, 1990's and 2000's (Table 1). Largemouth bass were also stocked on a regular basis in the 1940's and 1960's. Northern pike were stocked less frequently during the 1940's and 1950's.

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Table1. DNR COOP and privately funded walleye stocking 1991 through 2005 in High Falls Reservoir, Marinette County, Wisconsin.

Year	Species	Size (average)	Number
1991	Walleye	Fingerling (5 inches)	1,010 (Private)
1992	Walleye	Fingerling (3 inches)	5,000 (Private)
2001	Walleye	Fry	350,000 (DNR COOP)
2002	Walleye	Fry	750,000 (DNR COOP)
2003	Walleye	Fry	800,000 (DNR COOP)
2004	Walleye	Fry	1,000,000 (DNR COOP)
2005	Walleye	Fry	1,000,000 (DNR COOP)

METHODS

Twelve mini-fyke nets (1/4" stretch mesh with turtle exclusion targeting young-of-the-year fish) were set on July 19th, 2004 and lifted on July 20th and 21st, 2004 (Appendix Figure 1). A Wisconsin DNR standard direct current full size electrofishing boat was used on September 23rd, 28th, and 29th, 2004 along a total of 5.5 miles of shoreline (Appendix Figure 2) and on April 25th, June 1st, and June 9th, 2005 along a total of 15.7 miles of shoreline (Appendix Figure 3). Fourteen standard fyke nets (3/4" stretch mesh) were set on April 12th 2005 and lifted daily from April 13 -26, 2005 (Appendix Figure 4). In the mini fyke netting survey, data collected included measuring the first 30 fish of each species and then a total count for each species. In the electroshocking run during September 2004, all species were collected in a 1/2 mile index station of shocking and game fish only were collected for an additional 1.5 mile station. Up to a total of 250 individuals of each species were randomly selected and measured to the nearest 0.1 of an inch and a total count of all fish was made.

In the fyke netting survey during April 2005, all game fish were given a top caudal fin clip (for mark recapture population estimate). An ageing structure was collected from 5 fish per 0.5 inch group per sex with a length to the nearest 0.1 inch and weight in grams. An additional 250 individuals per species had length taken to the nearest 0.1 inch and all other were counted. An ageing structure was collected from 10 pan fish per 0.5 inch group per species with a length to the nearest 0.1 inch and a weight in grams. An additional 250 lengths per species measured to the nearest 0.1 inch were collected and all additional fish were counted. The Schnabel population estimation technique was used for gamefish and was calculated using only the fyke net caught fish from spring 2005.

In the electroshocking run during April and June 2005, only game fish were sampled along a total of 15.7 miles of shoreline. All game fish were measured to the nearest 0.1 inch, sex determined (where possible) and checked for a fin clip. Length at age comparisons are for all lakes sampled for relevant species in northeast (NER) Wisconsin and were last updated in 2003 and serve as comparisons for growth rates in this report.

RESULTS AND DISCUSSION

Catch per unit effort results for all survey methods used in 2004 and 2005, and spring fyke net surveys from 1991 and 2000 are shown in Table 2. with respective analysis for each major species written below. All length frequency comparisons use fyke net only fish data.

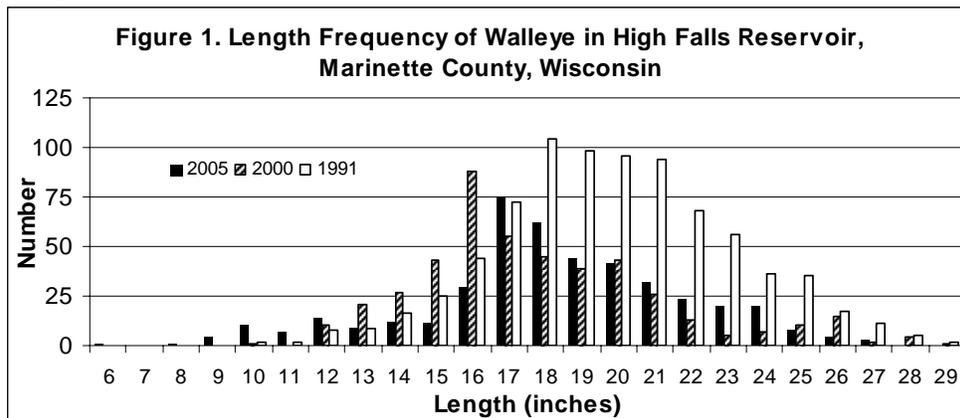
Table 2. Catch per unit effort of game fish and panfish species during fishery surveys in 1991, 2004 and 2005 on High Falls Reservoir, Marinette County, Wisconsin. Panfish were not collected during April / June 2005 electroshocking or April 2000 fyke net surveys, only a sub sample of pan fish were counted in the 1991 and 2005 fyke net survey.

Species	April 1991 Fyke net (#/net night)	April 2000 Fyke net (# / net night)	August 2004 Mini-fyke (#/net night)	September 2004 Boomshock (# / mile)	April 2005 Fyke net (#/net night)	April / June 2005 Boomshock (#/mile)
Black crappie	2.0	5.5	0.08	88.7	8.6	-
Bluegill	13.6	23.9	2.4	112	12.5	-
Largemouth bass	0.5	0.3	2.3	12.9	0.7	2.1
Muskellunge	0.06	0.03	-	-	0.18	-
Northern pike	4.6	4.8	-	2.7	2.8	0.96
Pumpkinseed	2.3	8.0	0.5	2.6	1.1	-
Rock bass	6.7	2.9	0.5	9.5	3.4	-
Smallmouth bass	0.2	0.01	0.13	5.5	0.6	4.8
Walleye	2.1	1.3	-	3.6	2.5	3.6
Yellow perch	20.5	-	0.6	82.7	28.6	-
Effort	374	400 / 11	24	5.5 miles	165/ 14	15.7 miles

Game Fish

Walleye

During the summer 2004 mini fyke netting survey, no juvenile walleye were captured at High Falls Reservoir. Electroshocking during the fall of 2004, produced 3.6 walleye per mile and during the spring 2005, 3.6 fish per mile. During the spring 2005 fyke netting survey, we captured three hundred and seventy four walleyes ranging in size from 9.2 to 27.5 inches in length (Figure 1) not counting the recaptured fish (35). The catch per effort of 2.5 walleye per net night. The population estimate was 1,937 adult walleye with a 95% confidence interval of 1,403 to 2,666 fish (Figure 2) for a density of 1.3 fish per acre. In 2000, a total of four hundred and fifty five walleye were captured ranging in size from 10.7 to 29.5 inches (Figure 1) for a catch per effort of 1.3 walleye per net night. The population estimate was 1,769 adult walleye with a 95% confidence interval of 1,518 – 2,119 fish (Figure 2). The walleye density in 2000 was 1.2 fish per acre. In 1991 a total of eight hundred walleye were captured ranging in size from 10.0 to 29.7 inches (Figure 1) for a catch per effort of 2.1 walleye per net night. The population estimate was 2,279 adult walleye with a 95% confidence interval of 1,906 – 2,834 fish (Figure 2) for a density of 1.5 fish per acre. The length at age of walleye sampled in 2005 showed slower growth in all ages of walleye when compared to the NER average and the 1991 survey (Table 3). However, the length at age of older ages (7 and above), grew faster in 2005 than from the 2000 survey. In all three survey years, there was a good representation across many year classes of walleye.



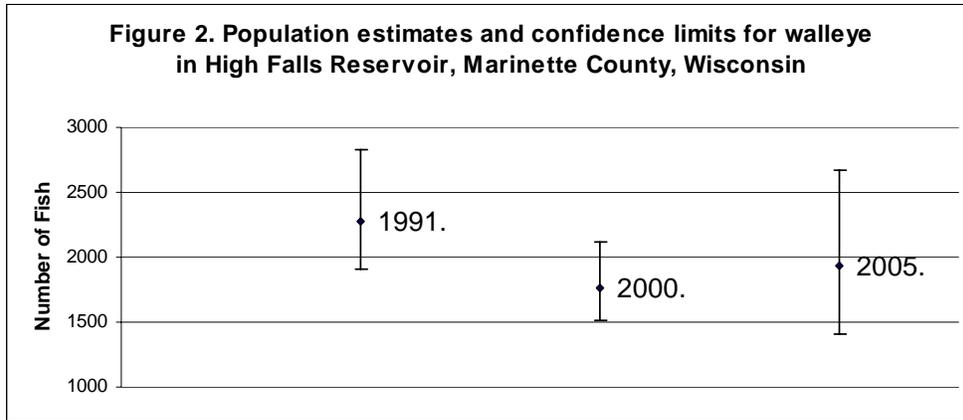


Table 3. 2005 Age- length distribution of walleye from High Falls Reservoir, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age data and 1991 survey information. N equals sample size.

Age	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NER Average	13.6	16.0	17.7	19.0	21.5	22.6	24.1	26.7	26.3	27.0	25.5	27.9	-	28.7
2005 Survey	11.7	15.3	16.9	16.8	19.0	20.1	20.0	21.1	22.5	23.3	25.5	-	-	-
2005 (N)	11	13	14	8	24	23	23	19	26	5	4	-	-	-
2000 Survey	13.9	13.5	16.3	17.9	17.8	19.9	20.4	20.5	-	21.4	23.9	23.2	23.2	26.4
2000 (N)	6	4	14	48	43	3	1	1	-	2	5	2	2	1
1991 Survey	12.5	15.9	17.9	19.5	20.9	21.8	24.6	25.0	26.0	27.0	25.7	26.0	27.7	25.5
1991 (N)	4	19	31	46	74	34	9	8	3	1	2	7	2	1

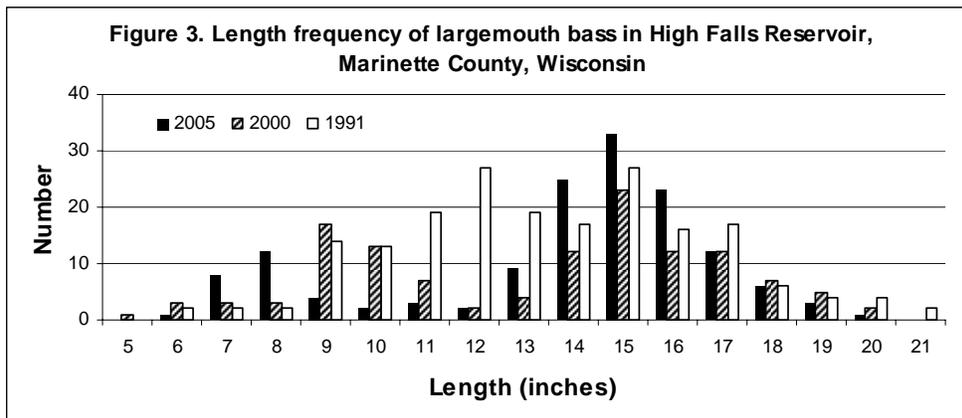
Largemouth bass

During the summer 2004 mini fyke netting survey, 0.3 juvenile largemouth bass per net night were captured at this reservoir. Electroshocking during the fall of 2004 produced 112 largemouth bass per mile and 2.1 per mile during the spring 2005 survey. In the spring 2005 fyke netting survey, we captured one hundred and forty four largemouth bass ranging in size from 6.9 to 20.6 inches in length (Figure 3), not counting the recaptured fish (7). The catch per effort was 0.7 largemouth bass per net night. The population estimate was 996 adult largemouth bass with a 95% confidence interval of 470 – 1,916 fish (Figure 4) for a density of 0.7 fish per acre.

In 2000, a total of one hundred and twenty two largemouth bass were captured ranging in size from 5.0 to 20.2 inches (Figure 3) not counting the recaptured fish (4). The catch per effort was 0.3 largemouth bass per net night. The population estimate was 1,134 adult largemouth bass with a 95% confidence interval of 502 – 2,236 fish (Figure 4) for a density of 0.76 fish per acre.

In 1991 a total of one hundred and ninety one largemouth bass were captured ranging in size from 6.0 to 21.9 inches (Figure 3), for a catch per effort of 0.5 largemouth bass per net night. The population estimate was 2,207 adult largemouth bass with a 95% confidence interval of 1,142 – 4,035 fish (Figure 4) for a density of 1.5 largemouth bass per acre.

The length at age of largemouth bass sampled in 2005 showed slower growth at most ages of largemouth bass when compared to the NER average, the 2000 and the 1991 surveys (Table 4). In all three survey years, there was a good representation across many year classes of largemouth bass.



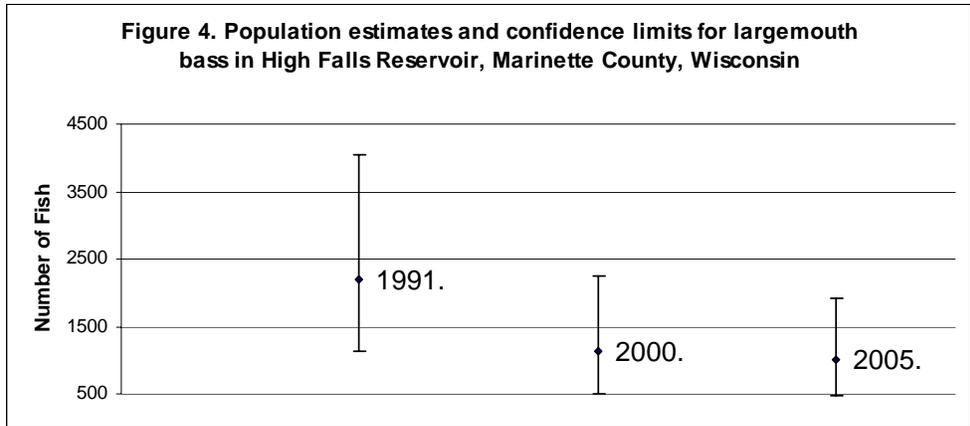


Table 4. 2005 Age- length distribution of largemouth bass from High Falls Reservoir, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age and 1991 survey information. N equals sample size.

Age	2	3	4	5	6	7	8	9	10	11
NER Average	7.2	9.5	11.3	13.3	15.0	16.6	18.0	17.8	18.7	19.6
2005 Survey	-	7.7	9.2	12.8	14.2	15.5	16.7	18.2	16.7	18.6
2005 (N)	-	4	10	8	8	9	15	4	1	1
2000 Survey	7.2	9.9	10.6	15.1	15.2	16.4	16.9	16.8	-	18.3
2000 (N)	7	37	20	12	19	11	9	5	-	6
1991 Survey	6.2	8.4	10.3	12.5	13.9	15.3	16.7	18.1	19.3	21.0
1991 (N)	3	5	23	20	10	17	15	7	9	1

Northern Pike

Juvenile northern pike were not captured during the summer 2004 mini fyke netting survey. Electroshocking during the fall of 2004, produced 2.7 northern pike per mile and during the spring 2005, 0.96 fish per mile. During the spring 2005 fyke netting survey, we captured three hundred and ninety five northern pike ranging in size from 10.1 to 33.0 inches in length (Figure 5) not counting the recaptured fish (58). The catch per effort was 2.75 northern pike per net night. The population estimate was 1,463 adult northern pike with a 95% confidence interval of 1,134 to 1,887 fish (Figure 6). The northern pike density was 0.98 fish per acre.

In 2000, a total of one thousand five hundred and ninety one northern pike were captured ranging in size from 7.5 – 35.6 inches (Figure 5) for a catch per effort of 4.8 northern pike per net night. The population estimate was 4,646 adult northern pike with a 95%

confidence interval of 4,110 – 5,342 fish (Figure 6). That calculated density was 3.1 fish per acre.

In 1991, a total of one thousand seven hundred and thirty three northern pike were captured ranging in size from 7.0 – 31.4 inches (Figure 5). The catch per effort was 4.6 northern pike per net night. The population estimate was 3,952 adult northern pike with a 95% confidence interval of 3,624 – 4,346 fish (Figure 6) and a density of 2.6 fish per acre.

The length at age of northern pike sampled in the 2005 survey showed slower growth when compared to the NER average, and mixed growth rates when compared to the 1991 and 2000 surveys (Table 5). In all three survey years, there was a good representation across many year classes of northern pike.

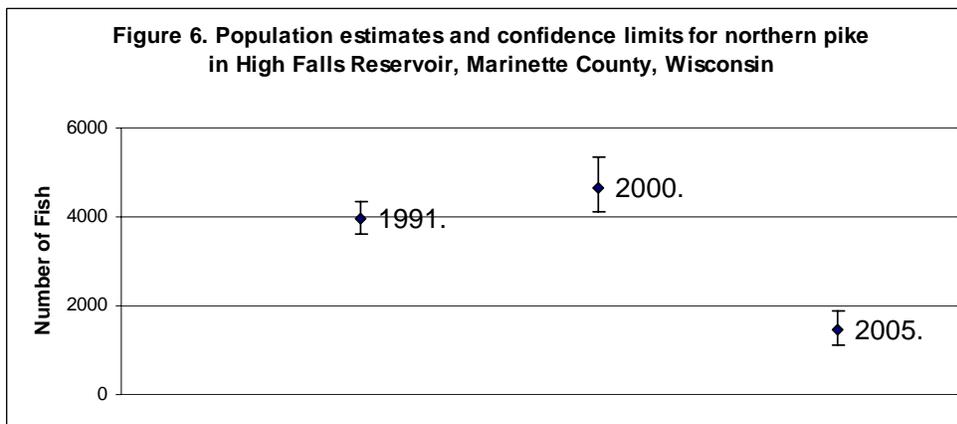
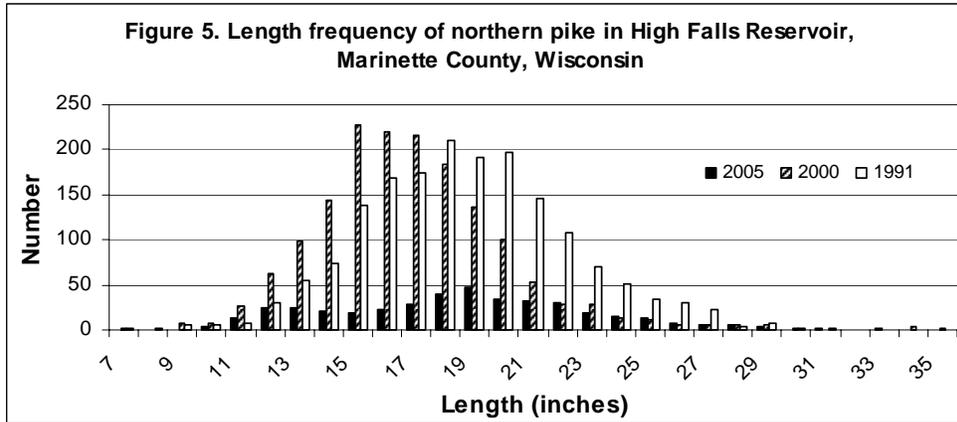


Table 5. 2005 Age- length distribution of northern pike from High Falls Reservoir, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age and 1991 survey information. N equals sample size.

Age	1	2	3	4	5	6	7	8	9
NER Average	11.4	15.3	18.4	21.5	24.4	27.4	30.0	30.9	32.4
2005 Survey	11.5	14.8	17.9	21.4	22.9	23.1	22.4	22.8	27.4
2005 (N)	1	58	61	53	29	17	1	1	1
2000 Survey	11.3	15.5	18.0	20.6	22.1	28.2	34.8	-	-
2000 (N)	8	222	124	47	9	2	3	-	-
1991 Survey	9.9	15.1	18.4	20.5	21.9	25.3	25.7	25.6	-
1991 (N)	6	20	95	112	45	11	2	2	-

Smallmouth bass

During the summer 2004 mini fyke netting survey, we captured 0.13 smallmouth bass per net night of which none were considered juveniles under 3 inches. Electroshocking during the fall of 2004 produced 5.5 smallmouth bass per mile and 4.8 per mile during the spring 2005 survey. In the spring 2005 fyke netting survey, we captured one hundred and thirty eight smallmouth bass ranging in size from 5.2 to 20.4 inches in length (Figure 7), not counting the recaptured fish (9). The catch per effort was 0.6 smallmouth bass per net night. The population estimate was 1,666 adult smallmouth bass with a 95% confidence interval of 341 – 1,735 fish (Figure 8). The calculated density was 1.1 smallmouth bass per acre.

In 2000, a total of four smallmouth bass were captured ranging in size from 17.0 to 20.0 inches (Figure 7). The catch per effort was 0.01 smallmouth bass per net night. A population estimate was not calculated due to the low number of smallmouth bass recaptured during the 2000 survey.

In 1991, a total of ninety smallmouth bass were captured ranging in size from 10.5 to 21.2 inches (Figure 7). The catch per effort was 0.2 smallmouth bass per net night. The population estimate was 3,370 adult smallmouth bass with a 95% confidence interval of 691 – 3,510 fish (Figure 8) and a population density of 2.2 smallmouth bass per acre. The length at age of smallmouth bass sampled in 2005 showed overall good growth rates when compared to the NER average, but slightly slower rates than were observed in the 1991 survey (Table 6). In the 2005 and 1991 surveys, there was a good representation across many year classes of smallmouth bass, however there was not a good sample size in 2000 to determine year class distribution.

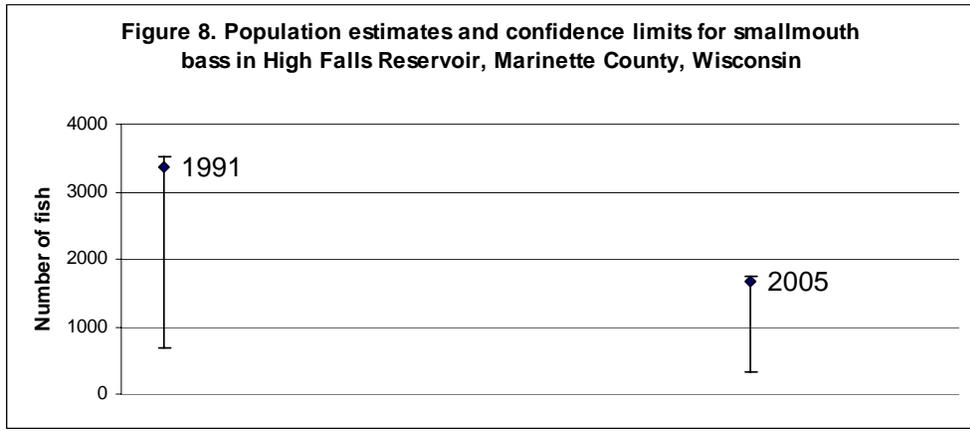
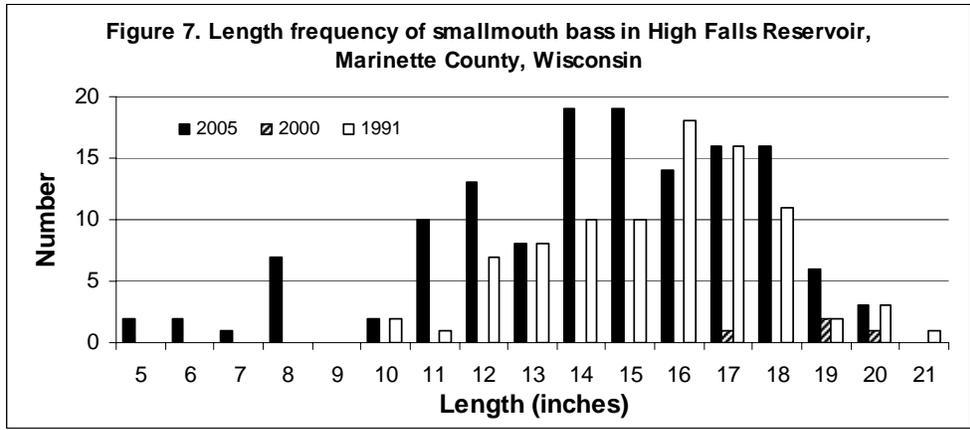


Table 6. 2005 Age-length distribution of smallmouth bass from High Falls Reservoir, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age and 1991 survey information. N equals sample size.

Age	3	4	5	6	7	8	9	10	11
NER Average	9.9	12.3	14.2	15.8	17.1	18.5	18.6	19.9	-
2005 Survey	-	13.5	14.4	16.1	16.6	16.9	19.0	-	17.4
2005 (N)	-	7	3	6	12	6	2	-	1
2000 Survey	-	-	-	-	17.0	-	19.8	20.0	-
2000 (N)	-	-	-	-	1	-	1	1	-
1991 Survey	10.1	12.7	14.6	16.7	17.6	19.1	20.7	-	-
1991 (N)	4	13	21	16	12	7	3	-	-

Muskellunge

During the summer 2004 mini fyke netting survey, no juvenile muskellunge were captured at this reservoir. Electroshocking during the fall of 2004 and the spring of 2005 also produced no muskellunge. During the spring 2005 fyke netting survey, a total of twenty one muskellunge were captured ranging in size from 26.7 to 51.5 inches (Figure 9). The catch per effort was 0.18 muskellunge per net night. No population estimate was calculated due to the low number of muskellunge captured during the netting period. In 2000, a total of fourteen muskellunge were captured ranging in size from 16.0 to 50.0 inches (Figure 9) and a catch per effort of 0.03 muskellunge per net night. In 1991, a total of twenty one muskellunge were captured ranging in size from 16.5 to 50.2 inches (Figure 9), for a catch per effort of 0.06 muskellunge per net night. The length at age of muskellunge sampled from the 2005 survey showed good growth above the NER average, 2000 and 1991 surveys for ages 6 and older fish (Table 7). In all three surveys, several year classes of muskellunge were represented.

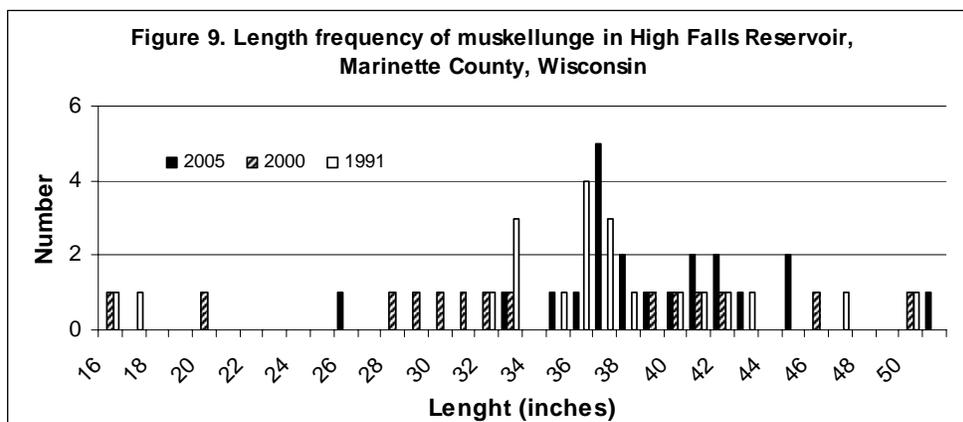


Table 7. Age-length distribution of muskellunge from High Falls Reservoir, Marinette County Wisconsin compared to the Northeast (NER) Wisconsin average length at age and 1991 survey information. N equals sample size.

Age	2	3	4	5	6	7	8	9	10	11	12	13	14
NER Average	19.5	24.0	27.7	31.3	33.9	37.6	36.7	41.2	40.4	42.8	46.1	45.8	-
2005 Survey	-	-	26.7	-	37.3	38.8	43.1	-	-	51.5	-	-	-
2005 (N)	-	-	1	-	2	14	4	-	-	1	-	-	-
2000 Survey	18.4	-	-	28.9	33.4	-	42.2	-	46.0	-	45.8	-	-
2000 (N)	2	-	-	2	5	-	1	-	1	-	2	-	-
1991 Survey	16.8	-	-	31.7	35.0	37.9	39.2	38	43.7	40.0	47.0	-	50.2
1991 (N)	2	-	-	2	3	2	3	1	1	1	1	-	1

Pan Fish

Yellow Perch

During the summer 2004 mini fyke netting survey, 0.6 yellow perch per net night were captured of which 0.08 fish per night were juveniles under 3 inches. Electroshocking during the fall of 2004 produced 82.7 yellow perch per mile ranging in size from 2.3 to 9.4 inches. During the spring 2005 fyke netting survey, we captured a total of four thousand and fifty seven yellow perch ranging in size from 5.0 to 10.2 inches (Figure 10). The catch per effort was 28.6 yellow perch per net night. No yellow perch were sampled in the 2000 survey. In 1991, a sub sample of yellow perch were collected for a total of six hundred and fifteen ranging in size from 4.8 to 12.0 inches (Figure 10) and a catch per effort of 20.5 yellow perch per net night.

The length at age of yellow perch sampled from the 2005 survey showed overall slower growth when compared to the NER average and the 1991 survey (Table 8). In both the 2005 and 1991 surveys, several year classes of yellow perch were represented.

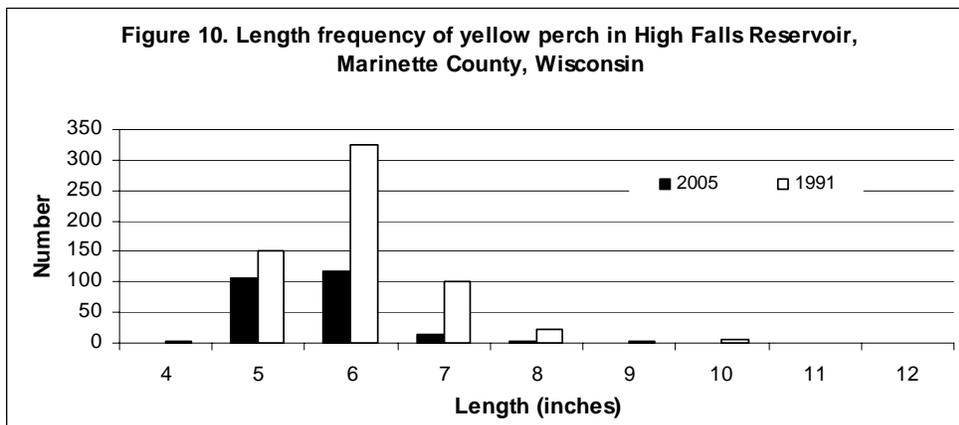


Table 8. 2005 Age- length distribution of yellow perch from High Falls Reservoir, Marinette County Wisconsin compared to the Northeast (NER) Wisconsin average length at age data. N equals sample size.

Age	2	3	4	5	6	7	8	9	10
NER Average	5.5	6.7	7.6	8.4	8.9	10.2	10.4	-	-
2005 Survey	6.0	6.2	6.4	7.4	7.0	-	-	-	8.1
2005 (N)	1	31	14	6	1	-	-	-	1
1991 Survey	5.9	5.8	6.9	8.0	8.6	9.9	12.2	-	-
1991 (N)	5	18	38	17	15	7	2	-	-

Bluegill

During the summer 2004 mini fyke netting survey, 2.4 bluegill per net night were captured of which 2.0 fish per net night were juveniles under 3 inches. Electroshocking during the Fall of 2004 produced 112 bluegill per mile ranging in size from 1.6 to 8.5 inches. During the Spring 2005 fyke netting survey, we captured a total of one thousand seven hundred and seventy eight bluegill ranging in size from 3.4 to 9.2 inches (Figure 11). The catch rate was 12.5 bluegill per net night. In 2000, bluegill were sampled during a two day fyke netting survey in June, a total of one hundred and ninety one bluegill were captured ranging in size from 2.2 to 8.9 inches (Figure 11). The catch per effort was 23.9 bluegill per net night. In 1991, a sub sample of bluegill were collected for a total of four hundred and eight ranging in size from 3.7 to 7.5 inches (Figure 11). The catch per effort was 13.6 bluegill per net night.

The length at age of bluegill sampled from the 2005 survey showed good growth rates when compared to the 1991 survey and normal overall growth rates when compared to the NER average and the 2000 survey (Table 9). In all three survey years, there was a good representation of year classes of bluegill present.

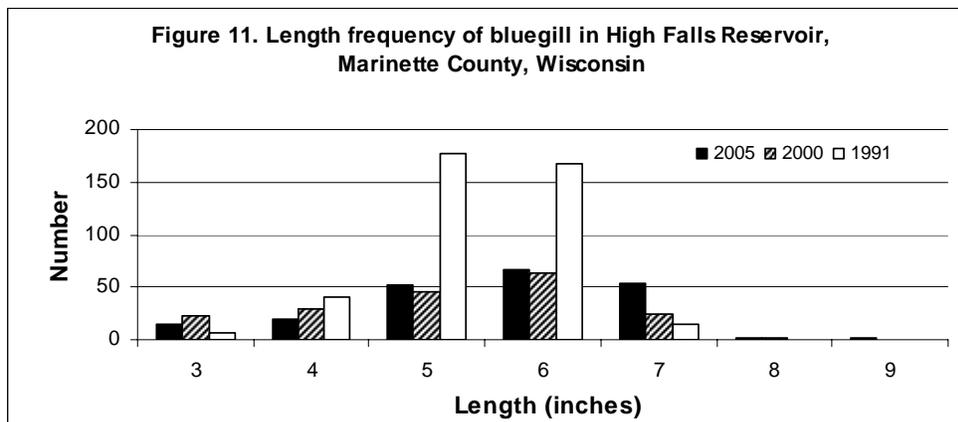


Table 9. 2005 Age- length distribution of bluegill from High Falls Reservoir, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age data, 1991 spring survey data and June 2000 survey data. N equals sample size.

Age	1	2	3	4	5	6	7	8	9
NER Average		4.0	4.8	5.8	6.6	7.2	7.9	8.3	
2005 Survey	-	3.9	5.0	5.6	6.7	6.9	7.4	6.9	-
2005 (N)	-	14	26	10	17	24	17	1	-
2000 Survey	2.7	3.3	4.9	6.0	6.7	6.8	-	7.9	8.9
2000 (N)	2	13	39	33	39	6	-	3	1
1991 Survey	-	-	4.1	5.5	6.4	6.8	-	-	-
1991 (N)	-	-	12	13	8	10	-	-	-

Black crappie

During the summer of 2004 mini fyke netting survey, 0.08 black crappie per net night were captured of which all were juveniles under 3 inches. Electroshocking during the fall of 2004 produced 88.7 black crappie per mile ranging in size from 1.6 to 10.6 inches. During the spring 2005 fyke netting survey, we captured a total of one thousand two hundred and twenty four black crappie ranging in size from 4.7 to 13.8 inches (Figure 12). The catch per effort was 8.6 black crappie per net night. In 2000, black crappie were sampled during a two day fyke netting survey in June, a total of forty four black crappie were captured ranging in size from 3.6 to 13.2 inches (Figure 12). The catch rate was 5.5 fish per net night. In 1991, a sub sample of black crappie were collected for a total of fifty eight ranging in size from 5.3 to 14.0 inches (Figure 12). The catch per effort was 2.0 black crappie per net night.

The length at age of black crappie sampled from the 2005 survey showed overall normal to good growth rates for all ages of black crappie when compared to the NER average, and better growth rates of fish older than 4 when compared to the 1991 survey (Table 10). In all three survey years, there was a good representation of year classes of black crappie present.

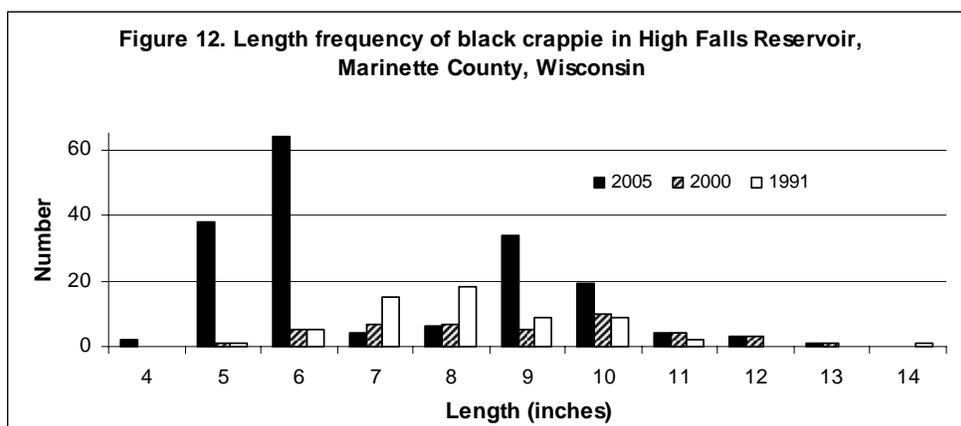


Table 10. 2005 Age- length distribution of black crappie from High Falls Reservoir, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age data, 1991 spring survey data and June 2000 survey data. N equals sample size.

Age	2	3	4	5	6	7	8	9	10
NER Average	5.4	7.2	8.6	9.6	10.4	11.2	12.2	13.0	14.0
2005 Survey	5.1	6.0	9.1	9.8	10.3	12.1	-	-	13.8
2005 (N)	2	49	9	25	8	2	-	-	1
2000 Survey	5.8	7.3	8.6	10.5	12.3	13.2	-	-	-
2000 (N)	2	8	13	18	1	1	-	-	-
1991 Survey	5.3	6.9	8	9.5	10.3	11.8	12.8	13.9	-
1991 (N)	1	10	13	15	7	1	2	1	-

Rock bass

During the Summer 2004 mini fyke netting survey, 0.5 rock bass per net night were captured of which 0.3 fish per net night were juveniles under 3 inches. Electroshocking during the fall of 2004 produced 9.5 rock bass per mile ranging in size from 2.7 to 10.3 inches. During the Spring 2005 fyke netting survey, we captured a total of four hundred and eighty three rock bass ranging in size from 3.5 to 10.1 inches (Figure 13). The catch per effort was 3.4 rock bass per net night. In 2000, rock bass were sampled during a two day fyke netting survey in June. A total of twenty three rock bass were captured ranging in size from 3.2 to 9.8 inches (Figure 13) for a catch per effort of 2.9 rock bass per net night. In 1991, a sub sample of rock bass were collected for a total of two hundred and six ranging in size from 3.9 to 10.2 inches (Figure 13). The catch rate was 6.7 rock bass per net night.

The length at age of rock bass was not collected from the 2005 survey. However, length at age data was collected in 2000 and 1991. Growth rate in 2000 showed slower growth for younger ages 2 and 3 when compared to the statewide average and the 1991 survey and good growth rates for ages 4 and older (Table 11). The three surveys showed several year classes of rock bass were represented.

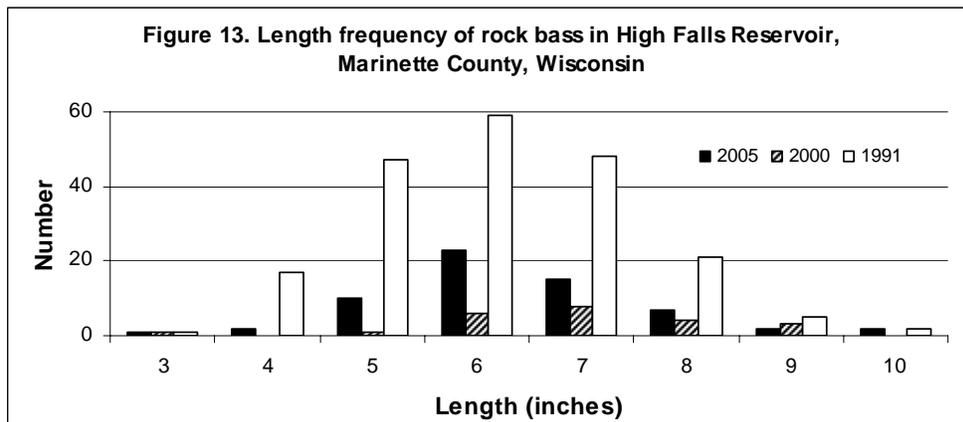


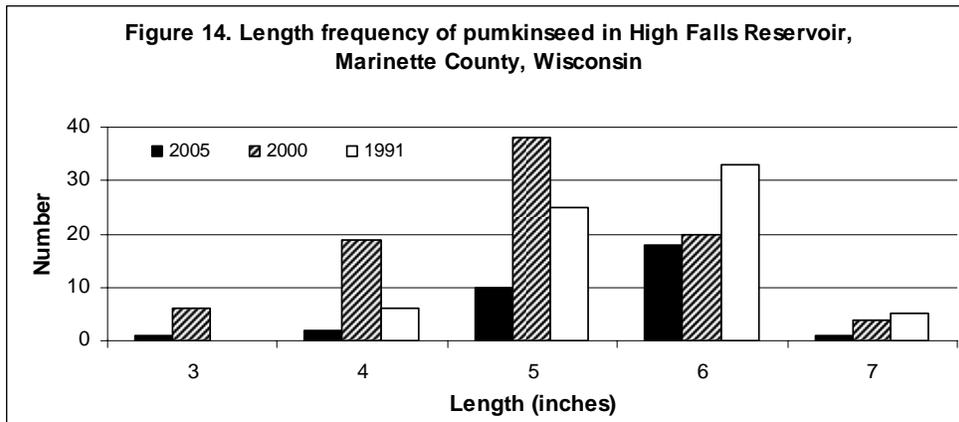
Table 11. Age- length distribution of rock bass from High Falls Reservoir, Marinette County Wisconsin compared to the Wisconsin State average length at age data, 1991 spring survey data and June 2000 survey data. N equals sample size. There were no age samples for the 2005 data.

Age	2	3	4	5	6	7	8
State Average	4.2	5.3	6.3	7.1	8.0	8.5	9.0
2000 Survey	3.2	5.0	6.7	7.7	8.2	-	9.5
2000 (N)	1	1	7	7	4	-	2
1991 Survey	4.8	6.0	6.8	8.2	-	-	-
1991 (N)	8	14	11	2	-	-	-

Pumpkinseed

During the summer 2004 mini fyke netting survey, 0.5 pumpkinseed per net night were captured of which 0.3 fish per net night were juveniles under 3 inches. Electroshocking during the fall of 2004 produced 2.6 pumpkinseed per mile ranging in size from 3.0 to 6.8 inches. During the spring 2005 fyke netting survey, we captured a total of one hundred and fifty three pumpkinseed ranging in size from 3.9 to 7.4 inches (Figure 14), for a catch per effort of 1.1 pumpkinseed per net night. In 2000, pumpkinseed were sampled during a two day fyke netting survey in June. A total of eighty eight pumpkinseed were captured ranging in size from 2.1 to 7.6 inches (Figure 14) and a catch per effort of 8.0 pumpkinseed per net night. In 1991, a sub sample of pumpkinseed were collected for a total of sixty eight ranging in size from 4.2 to 7.6 inches (Figure 14) and a catch per effort of 2.3 pumpkinseed per net night.

No length at age data was available from any of the three survey years.



Other fish species

Other species caught during the 2004 and 2005 surveys included black, brown and yellow bullhead, brook trout, creek chub, and white suckers.

CONCLUSIONS AND RECOMMENDATIONS

High Falls Reservoir supports a robust and diverse fishery with natural reproduction of all the major species present. The walleye population is more likely stronger than observed in our surveys due to the nature of the spawning run. Walleye have been documented to run into the more riverine section of High Falls Reservoir during the spawning period and spawn in the rocky areas below the Caldron Falls dam. The use of the river by walleye for spawning appears to have increased over the past two decades; reducing the number of spawning walleye in the reservoir proper. Due to the nature of the gear that we use for sampling, we are limited from accessing these upstream sites.

Walleye recruitment in the past had been shown to be highly variable and linked with the operation of the Caldron Falls Dam (Heizer and Kornely, 1995). Since the re-license of the Caldron Falls dam in 1997, dam operations have changed to run of the river operation during the walleye spawning time period. Between 1991 and 1997, by agreement with the Wisconsin DNR, Wisconsin Public Service modified dam operations in the spring to benefit walleye spawning below the Caldron Falls dam. These efforts appear to have helped reduce some of the variation in the success of natural reproduction with many year classes being well represented in the 2005 survey when compared to the 1991 survey. Despite improved flows below Caldron Falls dam, walleye population estimates from the three survey years show no significant changes in the total number of walleye in High Falls Reservoir. The number of fish surveyed over 15 inches (the minimum size limit) showed a slight decline between the 1991 (95.4%), 2000 (87%) and 2005 (86.5%) surveys. However, the number of age classes observed were greater in 2005 than in 1991 with more younger fish observed showing a better recruitment pattern. In addition, the apparent walleye spawning run increase in the riverine section of the river (since 1991 survey); may be causing a shift in the size structure of the walleye that remain in the reservoir section to spawn. Limited walleye stocking occurs at High Falls through a cooperative walleye wagon with a local sportsmen's club. The impact of this stocking is likely limited, but should be evaluated in the future.

The other major game fish species smallmouth bass, northern pike and largemouth bass also show healthy populations within the reservoir. The population estimates of largemouth bass and smallmouth bass from the three survey years represent no significant difference between the estimates. The largemouth bass regulation was changed between the 1991 survey and the 2000 survey from a minimum length limit of 12 inches to a minimum length limit of 14 inches. The percent of fish surveyed over the minimum length limit of 14 inches progressively increased from the 1991 survey (48.7%) to the 2000 survey (58%) and the 2005 survey (71.5%). The northern pike population estimates show no significant difference between the 1991 and 2000 surveys. However, there was a significant difference in the northern pike population between the 1991 and 2000 surveys when compared to the 2005 survey. During that period, the northern pike population showed a decline in abundance. This change was also evident in the dramatic decrease of the catch rate of northern pike between the 1991 / 2000 fyke netting surveys and the 2005 fyke netting survey. The percent of northern pike surveyed over the quality size of 21 inches increased from the 1991 (27.3%) and 2000 (10.1%) surveys when compared to the 2005 (32.7%) survey. The northern pike population may be being affected by changes to

spawning habitat availability around the reservoir. A low density muskellunge population continues to be present with apparent signs of limited natural reproduction in High Falls Reservoir. Muskellunge were never stocked into the reservoir, but have moved downstream from Caldron Falls where stocking does occur along with good natural reproduction. I do not recommend stocking muskellunge into this reservoir. Even with a decrease in the northern pike population, no stocking is necessary at this time to supplement these native populations.

The panfish fishery is also in excellent health with the major species yellow perch, black crappie and bluegill contributing greatly to the fishery of the reservoir. The yellow perch population appears to have a smaller size structure in 2005 when compared to 1991. This trend might be attributed to fishing pressure with anglers harvesting fish at a preferred size of 7 inches. The overall abundance of yellow perch does not seem to be impacted by this difference in length frequency. The bluegill population showed a greater variety of ages represented in the 2005 and 2000 survey when compared to the 1991 survey which is shown in the size structure of the population in 2005. The black crappie population also showed a better size structure when compared to the 1991 survey with a good representation of age classes. All species of panfish surveyed in the reservoir are supported through natural reproduction. No stocking is necessary at this time to supplement these native populations.

High Falls Reservoir is a moderately fertile reservoir that has the capability of sustaining a quality size fishery as seen in these survey results. Although growth rates for some species were slightly below the average for the region; the overall health of the fishery is very good. Some areas of the reservoir are lacking in good habitat for fish and other areas are becoming choked with weeds. These problems could be leading to the slower growth rate in some of the species. The addition of woody debris around the shoreline as well as more structured habitat such as fish cribs along the 15 foot contour could help improve the growth rates of many of the species present. The control of the invasive plant Eurasian Water Milfoil in areas of the lake is needed to help prevent areas of the lake from becoming choked which isn't suitable for most fish. I do not recommend any fisheries regulation changes at this time as the fishery is supporting a good size and age range of all species surveyed.

Public access to High Falls Reservoir is excellent with 8 boat landings available around the reservoir for access. However, on busy summer weekends, these access points can be very crowded as most people using the lake have to bring a boat or personal watercraft with them as there are a limited number of dwellings around the reservoir. There is also a County Park located along the reservoir that provides boating, swimming and camping opportunities. I would recommend updating and repairing some of the current access sites providing for better parking and more stable ramp access as well as adding additional disabled access fishing areas.

ACKNOWLEDGEMENTS

Russ Heizer, Greg Kornely, Richard Rost and Ron Rhode who completed the field work, age analysis and data entry. Lee Meyers, Mike Donofrio, and George Boronow for editorial comments.

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Cover image and Appendix maps courtesy of WebView and the Wisconsin Department of Natural Resources.

Heizer, Russ and Greg Kornely 1995. Fisheries Evaluation Survey of High Falls Flowage (T33N, R18E, Sec. 36), Marinette County. Wisconsin DNR Memo.

APPENDIX

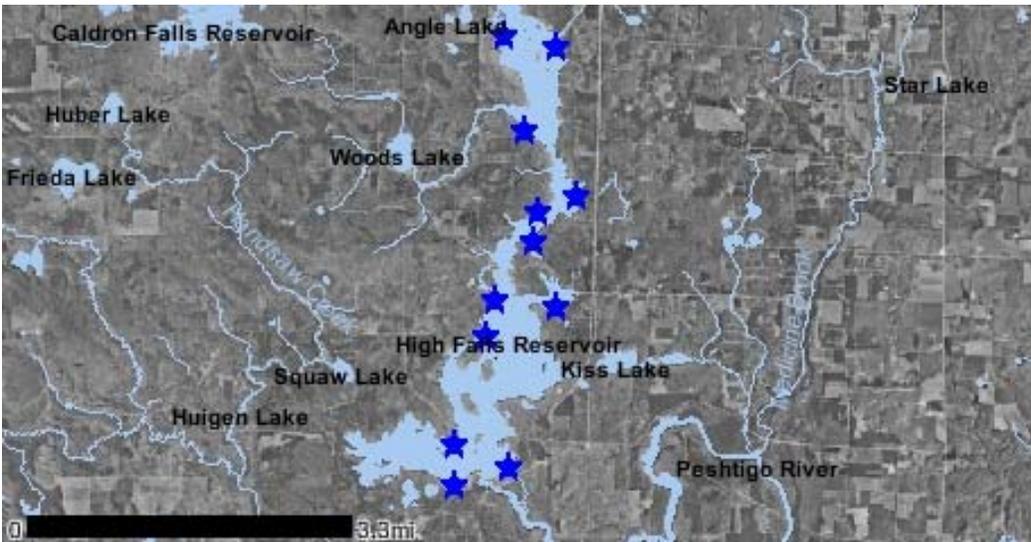


Figure 1. Location of 12 mini fyke nets for the baseline monitoring survey July 19th – 21st, 2004.

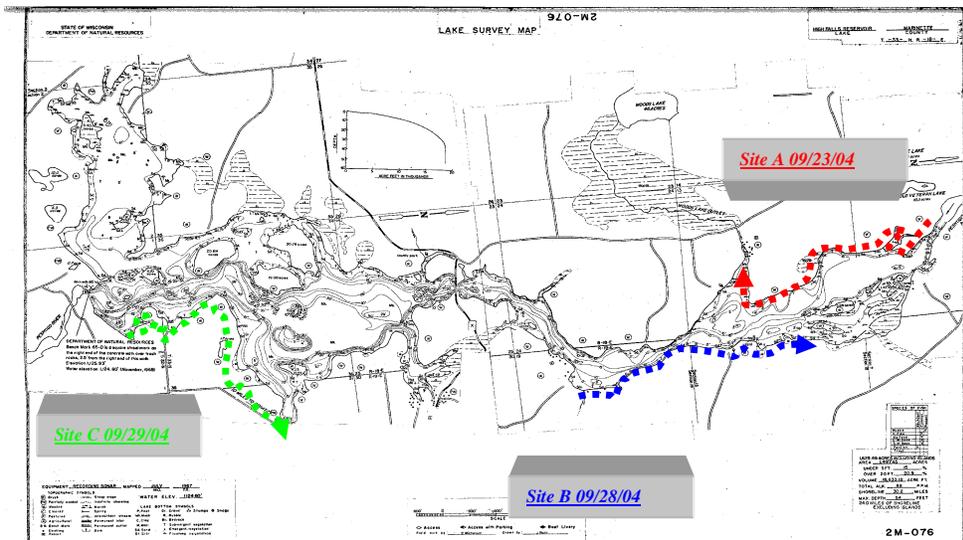


Figure 2. Location of the 5.5 mile baseline monitoring electroshocking survey on September 23rd, 28th, and 29th, 2004.

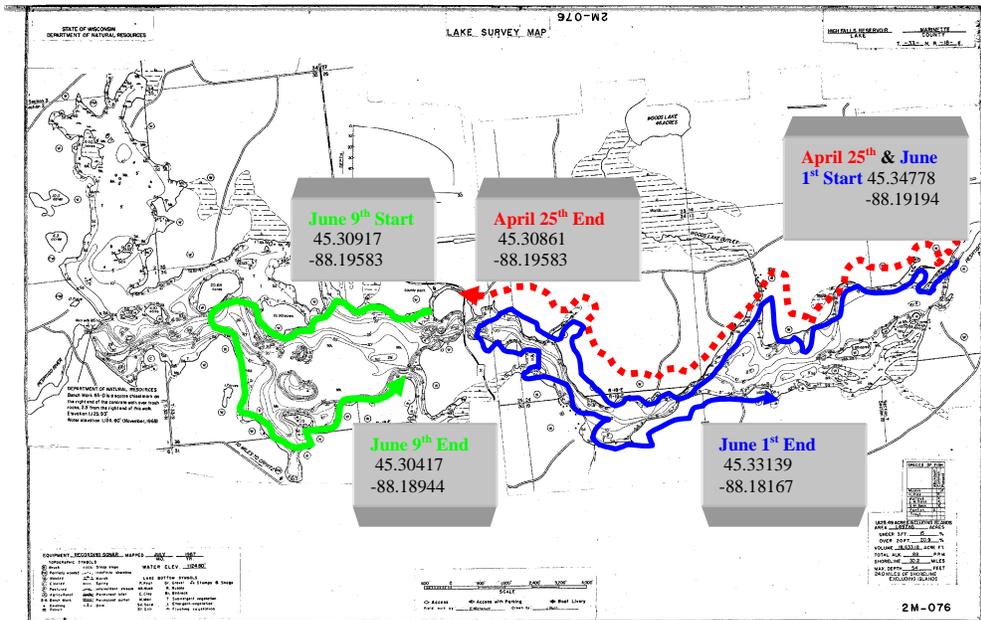


Figure 3. Location of the 15.7 mile comprehensive electroshocking survey on April 25th, June 1st and 9th, 2005.

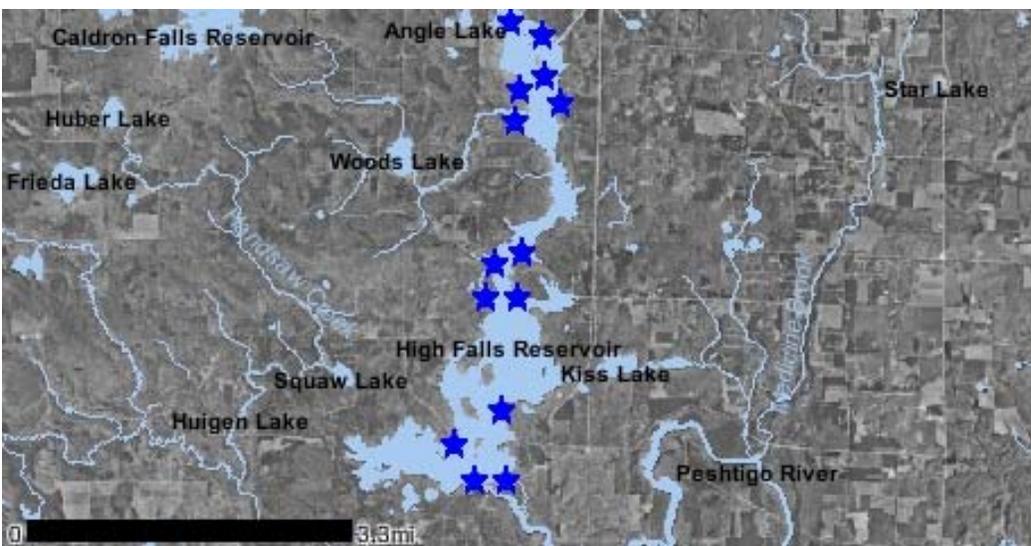


Figure 4. Location of 14 standard fyke nets for the comprehensive fishery survey April 12th – 26th, 2005.