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TO: George Boronow, Regional Fisheries Supervisor

FROM: Michael Donofrio, Peshtigo Fisheries Supervisor

SUBJECT: Fishery Report: Adult Spotted Muskellunge Survey- Menominee River, WI

- A. Title: 2006 Spring Spotted Muskellunge Survey- Menominee River, Marinette, WI
- B. Author: Michael Donofrio and Tammie Paoli
- C. Date of Report: 4 January 2007 (revised 14 March 2007)
- D. Dates of Field Work: May 2006
- E. Work Purpose: Assess the spotted muskellunge population as well as other species in the lower Menominee River.
- F. Findings: Limited fyke net surveys produced 21 spotted muskellunge. All muskellunge were from stocked source. Survival of stocked yearlings was 20 times higher than fingerlings. Most of the muskellunge were paired and ripe condition. Fish health samples were negative for known pathogens.
- G. Conclusions: This Spotted Muskellunge population indicates no evidence of natural recruitment which is comparable with the Fox River population (Green Bay, WI). The Menominee River could serve as an alternate source for feral broodstock program. Future emphasis should include continued stocking and periodic assessments.

## 2006 Spring Spotted Muskellunge Survey- Menominee River, WI

The Great Lakes strain of muskellunge is a native species/ strain in Wisconsin waters of Green Bay, Lake Michigan. This strain has also been referred to as spotted muskellunge. This species was extirpated from Wisconsin water of Lake Michigan. Wisconsin Department of Natural Resources obtained gametes from the Michigan Department of Natural Resources. A captive broodstock was created in Long Lake of Waushara County. WDNR has stocked various waters in the Green Bay watershed since 1989 including the Menominee River (Marinette County). Spotted musky were stocked into the lower Menominee River (Marinette County) over the previous 18 years (Table 1). The average number of fingerlings was 1,440 and yearlings 92 over this period. All stocked fish were finclipped with a left maxillary clip for fingerlings and right ventral for yearlings. All yearlings also received a T-bar type anchor tag. The next closest stocking site was the Peshtigo River, approximately 10 water miles from the Menominee River.

Table 1. Number and average length of spotted muskellunge stocked into the Menominee River, 1989-2006.

YEAR				STOCKING			
CLASS	SIZE	NUMBER	INCHES	YEAR	SIZE	NUMBER	INCHES
1989	FINGERLING	1,350	9.0	1990	YEARLING	374	11.0
1991	FINGERLING	668	9.6	1993	YEARLING	65	17.7
1992	FINGERLING	526	8.6	1994	YEARLING	57	18.8
1993	FINGERLING	334	9.5	1996	YEARLING	194	18.9
1995	FINGERLING	487	12.1	1997	YEARLING	50	18.9
1996	FINGERLING	809	10.5	1998	YEARLING	70	20.4
1997	FINGERLING	461	10.2	1999	YEARLING	83	20.9
1998	FINGERLING	951	11.5	2000	YEARLING	96	21.5
1999	FINGERLING	800	11.0	2001	YEARLING	55	14.9
2000	FINGERLING	993	12.0	2002	YEARLING	20	21.4
2001	FINGERLING	574	10.9	2004	YEARLING	25	17.5
2002	FINGERLING	2,384	10.6	2005	YEARLING	54	13.5
2003	FINGERLING	5,033	11.1	2006	YEARLING	50	13.5
2004	FINGERLING	2,353	9.5				
2005	FINGERLING	3,871	11.2				
TOTAL		21,594				1,193	

WDNR staff successfully assessed the spotted muskellunge population in the lower Fox River (Brown County) with five foot diameter fyke nets in 2005-06. In May of 2006, we set similar fyke nets at three locations (Turning Basin, Strawberry Island, and Interstate tower) in the lower Menominee River to obtain additional information on the number and condition of this population. We also wanted to determine if this river could be a gamete source for WDNR hatcheries (Figure). We lifted those nets daily on May 2-5 and 8-12. We collected length, girth and clip/tagging information from each muskellunge. We also collected lengths and/ or counts from other species in each net. We obtained tissue samples from the muskellunge for later genetic analysis. We also collected information to conduct a fish health assessment of this muskellunge fishery. Fish health samples collected were milt/ ovarian fluid and blood. The fish health samples were shipped by Fed Ex to USFWS Lab in LaCrosse, WI. We also collected daily surface water temperatures.

Surface water temperature ranged from 51-58 and averaged 56 F. We captured 21 spotted muskellunge in survey nets during 27 net lift days (Table 2). 13 muskellunge were netted at the Turning Basin fyke net and 8 at the Interstate tower. No muskellunge were captured at the first Strawberry Island net location, so we moved that net to a second location (2A) on May 9th. However, we didn't catch any muskellunge at the second Strawberry Island location.

All of the musky were finclipped, indicating a stocked fish, and eleven had floy tags. None of these musky had PIT tags, so PIT tags were inserted near the base of the dorsal fin of each fish before release. One female had a left maxillary clip which implied it was stocked as a fall fingerling and 6 males had a left maxillary clip indicating they were fall fingerlings. The other 14 musky had a right ventral clip and were assumed to be stocked as yearlings. Based on a sample of 20 adult fish from the 1997-99 year classes, yearlings exhibited twenty times the survival rate of fingerlings.

The muskellunge ranged in length from 16 to 47 inches (Figure 2). We assumed the 16 inch fish was stocked into the river in April of 2006. Of the remaining 20 fish, the average length was 42.2 inches and average girth was 17.7 inches. Only 2 fish could not be sexed, the 16 inch stocked fish and a 42.5 inch fish. Of the remaining 19 fish, 8 were males and 11 females with a sex ratio of 1:1.4. The average length and girth of the females was 44.6 and 18.9 inches, respectively. The average length and girth of the males was 42.7 and 17.8 inches, respectively.

The numbered floy tags indicated the age and growth of 9 of the musky as 7-9 years. The known age males were all 7 years old while the females were 7-9 years old. The 4 known age males grew 17.7 to 21.3 inches in 7 years with an average 7 year growth of 19.5 or 2.8 inches/ year. The 5 known age females grew an average of 21.1 in 7 years, 23.4 inches in 8 years (N=2) and 24.6 inches in 9 years (N=2).

The musky appeared to be in good condition. Only 2 musky were not in spawning condition, while the other fish readily produced eggs or milt. The fish health assessment was good with no detected disease pathogens present in the samples. Genetic tissue samples were delivered to Dr Brian Sloss at UWSP for later analysis.

## Other Species

This survey yielded 16 other species of fish with a total sample size of 172 fish (Table 3). The most abundant species caught was rock bass composing nearly one third of all fish sampled in May of 2006. Their size range was 3.8 to 8.4 inches with an average of 5.4 inches. Bluegill were 16% of the fish sampled, ranged in size from 4.1 to 7.4 and an averaged 5.2 inches. The most abundant game fish species were smallmouth bass, northern pike and walleye. The smallmouth bass composed 10% of the fish caught, ranged in size from 10.2 to 19.1 inches and averaged 14.3. The average length at age exceeded the averages for other smallmouth bass populations in Northeast Wisconsin for ages 2-7 (Table 4). The northern pike were 6% of the total sample, ranged from 16.8 to 32.9 inches with an average of 25.1 inches. The average length at age exceeded the averages for other northern pike populations in Northeast Wisconsin for ages 2-7 (Table 5). Walleye composed 5.7% of the samples with an average length of 12.8 inches. The size range for walleye was 8.7 to 20.2 inches. The average length at age did not exceed the

averages for other walleye populations in Northeast Wisconsin for ages 2-4 (Table 6). Other species yielding less than 2% of the total catch by species included (in descending numbers): pumpkinseed, bowfin, splake, yellow perch, white sucker, rainbow trout, common carp, redhorse species, brown bullhead and gizzard shad.

## Summary

Limited effort of 3 fyke nets set in the lower Menominee River produced 21 spotted muskellunge over a 2 week period. These muskellunge were paired in most nets and easily expressed gametes. Fish health samples were negative for known pathogens. All of the muskellunge were of hatchery origin with twenty times as many originating as yearlings vs. fingerlings based on the number stocked for those year classes. The lower Menominee River should continue to be stocked with muskellunge to restore this once native fishery. It appears, the Menominee River could serve as a supplemental feral brood source. Further muskellunge studies are also needed to evaluate habitat utilization and movements in the lower river and Green Bay.

Several other fish species were sampled in the lower river with species composition and abundance similar to other fish populations in similar Lake Michigan tributaries. These surveys provide an indication of the fishery in the lower Menominee River. Data from non-target species should be collected to better understand this fish community. The lower Menominee River is an “area of concern” in the Great Lakes because of past industrial practices. Periodic surveys should be conducted to monitor the status of this fishery.



Larry Vanderkelen, WDNR Fisheries Technician, with spotted muskellunge at Menominee River, May, 2006.

Data collected by: Donofrio, Tammie Paoli, Rod Lange, Michael Hawley, Richard Rost, and Larry Vander Kelen

# Lower Menominee River Spotted Musky Fyke Net Locations - 2006



Nets 1 & 3 set from 5/1/06 to 5/12/06  
Net 2 set from 5/1/06 to 5/9/06  
Net 2A set from 5/10/06 to 5/12/06

All nets left open for 5/5 and 5/6/06

Total net nights = 27



Table 2. Summary of catch and biological information collected from muskellunge in the Menominee River, May 3-10, 2006.

DATE	NET #	LENGTH (in.)	GIRTH (in.)	SEX	CONDITION	FIN CLIP	PIT TAG #	PIT TAG RECAP	FLOY #	FLOY RECAP	Year Class
5/3/06	1	45.75	19	F	RIPE	RV	430E60131F	N			*
5/3/06	1	42	17.25	M	RIPE	LMAX	4315435109	N			*
5/3/06	1	41	16	M	RIPE	LMAX	43105B6C08	N			*
5/3/06	3	47	22.5	F	RIPE	RV	430E681D20	N	B04544	Y	*
5/3/06	3	43	16.5	F	RIPE	RV	4311163D66	N	141228	Y	1999
5/3/06	3	43.5	18	M	RIPE	RV	431560516D	N			*
5/3/06	3	40	16.5	M	RIPE	RV	4315660022	N	141207	Y	1999
5/4/06	1	44	18	F	RIPE	RV	430E542A70	N	F24780	Y	1998
5/4/06	1	42	17	M	RIPE	LMAX	435F697E42	N			*
5/4/06	1	47	19	F	RIPE	RV	43105E4F04	N	F84106	Y	1997
5/4/06	1	41	17	M	RIPE	LMAX	43105B6C08	Y			*
5/4/06	1	39	16	M	RIPE	LMAX	4315570D32	N			*
5/5/06	1	43	16.5	F	RIPE	LMAX	4549475673	N			*
5/5/06	1	41	17.5	M	RIPE	LMAX	4549706862	N			*
5/5/06	3	44	19	F	RIPE	RV	454B361D22	N	F24749	Y	1998
5/5/06	3	42	19	M	RIPE	RV	4232294D31	N	E05428	Y	*
5/8/06	1	16		Unk	GREEN	RV LV		N			*
5/9/06	1	43	21	F	RIPE	RV	454B421746	N	F84120	Y	1997
5/9/06	1	41.5	16.5	M	RIPE	RV	454A204D46	N	141266	Y	1999
5/10/06	3	42.5	17	Unk	GREEN	RV	454B55417C	N	141221	Y	1999
5/10/06	3	40.5	15.5	M	RIPE	RV	45494E5630	N	141233	Y	1999

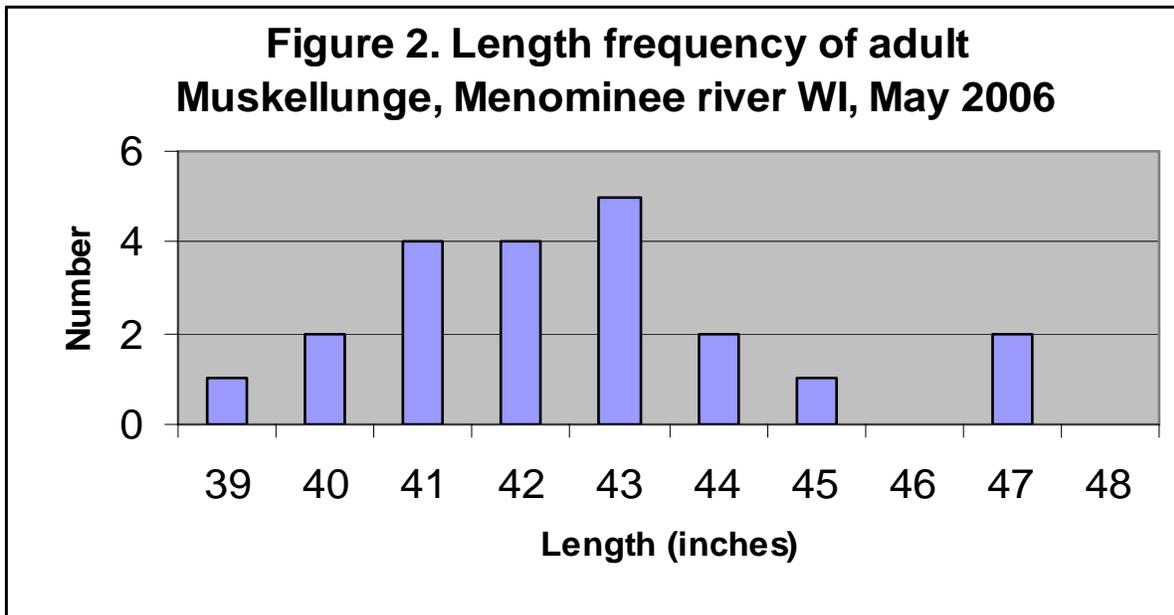


Table 3. Catch summaries from fyke net lifted in Menominee River from May 2-12, 2006.

Species	Size range	Average Length	Total number	Catch/ net nights	% of total
Rock bass	3.8-8.4	5.4	64	2.4	33.1
Bluegill	4.1-7.4	5.2	31	1.1	16.0
Muskellunge	16-47	42.6	21	0.8	11.0
Smallmouth Bass	10.2-19.1	14.3	19	0.7	10.0
Northern Pike	16.8-32.9	25.1	12	0.4	6.0
Walleye	8.7-20.2	12.8	11	0.4	5.7
Black crappie	4.9-8.3	7.0	10	0.4	5.2
Pumpkinseed	4.2-5.0	4.6	4	0.1	2.1
Bowfin	23.2-27.6	25.7	4	0.1	2.1
Splake	23.1-26.9	25.3	3	0.1	1.6
Yellow Perch	6.5-6.7	6.6	3	0.1	1.6
White sucker	*	*	3	0.1	1.6
Rainbow trout	6.0-17.3	11.7	2	0.07	1.0
Common Carp	*	*	2	0.07	1.0
Redhorse spp	*	*	2	0.07	1.0
Brown bullhead	*	*	1	0.04	0.5
Gizzard Shad	18.8	18.8	1	0.04	0.5
Total			193	6.4	100

Note: \* indicates no data collected for this field

Table 4. 2006 Age- average length distribution of smallmouth bass from Menominee River, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age. N equals the sample size.

Age	2	3	4	5	6	7	8
NER Average	193	251	312	361	401	434	470
Menominee River	258	298	330	379	434	462	458
N	1	3	6	4	1	3	1

Table 5. 2006 Age- length distribution of northern pike from Menominee River, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age information.

Age	2	3	4	5	6	7
NER Average	389	467	546	620	696	762
Menominee River	446	482	573	661	691	835
N	1	2	2	2	2	1

Table 6. 2006 Age- length distribution of walleye from Menominee River, Marinette County Wisconsin compared to Northeast (NER) Wisconsin average length at age data.

Age	2	3	4	5
NER Average	274	345	406	450
Menominee River	256	308	360	512
N	3	1	4	1