

Green Bay Walleye Tagging Survey 2016

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WDNR-Green Bay

Large annual spring spawning migrations of Walleye have been documented by WDNR on major Green Bay tributaries for many years (Kapusinski et al. 2010). These rivers along with several other spawning locations scattered around Green Bay likely sustain the large Walleye population that is found in Green Bay. Some Walleye spawning populations have been studied intensively in the past such as those found in the Fox River, while Walleye that utilize the Menominee, Oconto or Peshtigo Rivers have had little evaluation.

In an effort to gain a more complete understanding of Walleye use of tributary streams and determine Walleye movement throughout Green Bay, daytime electroshocking surveys have been conducted annually since 2012 to assess spring spawning runs in major Green Bay tributaries. These surveys have been conducted just below dams in Marinette (Menominee River), Peshtigo (Peshtigo River), Stiles (Oconto River) and Green Bay (Fox River) to capture Walleye during the estimated peak of the spring spawning run (Figure 1).

This report updates previous Walleye tagging reports of Hogler et al. (2014, 2015, and 2017) that described results from previous years of this project.

Methods

The yearly goal for each river was to capture as many Walleye as possible over the course of 2 or 3 work days, to collect biological data on all captured Walleye and to tag 500 Walleye (250-male and 250 female) with individually numbered anchor tags.

To capture Walleye in the rivers, a standard electroshocking boat with two netters was utilized at each location. During each shocking event, captured Walleye were sexed and measured. A subsample of Walleye were tagged with an individually numbered anchor tag and had a dorsal spine removed for age analysis. We collected spines from up to five fish per centimeter (1/2") length interval for each sex. One fish per ten tagged was double tagged to estimate tag loss. To gain more insight on Walleye movement throughout the bay, along with an individual tag number, an address or telephone number was imprinted on the tag so anglers could report their capture of a marked fish.

Results

2016

Menominee River

Fisheries staff electroshocked for Walleye below the Hattie Street Dam on the Menominee River on March 31 and April 5 with a total effort of 3.2 hours. A total of 470 Walleye (346 male and 124 female) were captured with a CPE of 146.9 Walleye per hour shocked (Table 1). Water temperature throughout the period ranged from 36°F to 42°F.

A total of 346 male Walleye were captured during electroshocking. These Walleye ranged in length from 368 mm to 714 mm (14.5" to 28.1") and had an average length of 511 mm (20.1") (Table 2).

124 female Walleye from the Menominee River were captured during electroshocking (Table 1). Female Walleye ranged in length from 486 mm to 719 mm (19.1" to 28.3") and had an average length of 598 mm (23.59") (Table 2).

Peshtigo River

Walleye were shocked and tagged below the Peshtigo Dam on March 20, 29 and April 5. Water temperatures varied between 44°F on March 20 to 38°F on April 5. During this period, we captured 465 Walleye (299 males and 165 female and 1 unknown sex) in 2.8 hours of electroshocking (Table 1). Total CPE was 166.1 Walleye per hour shocked.

Male Walleye ranged in length from 362 mm to 671 mm (14.3" to 26.4") and had an average length of 493 mm (19.4") (Table 3).

The 165 female Walleye that were captured ranged in length from 479 mm to 772 mm (18.9" to 30.4") and had an average length of 634 mm (25") (Table 3).

Oconto River

Walleye were sampled below the Stiles Dam on the Oconto River on March 29 and April 4. The water temperature ranged from 42°F on March 29 to 38°F on April 4. Over the course of the two sampling days, 459 Walleye (342 male, 116 female and 1 unknown sex) were captured in 3.4 hours of shocking (Table 1). CPE was 135.0 Walleye captured per hour shocked.

The 342 male Walleye we captured ranged in length from 278 mm to 735 mm (11" to 28.9") and had an average length of 467 mm (18.4") (Table 4).

A total of 116 female Walleye were captured during electroshocking (Table 1). These Walleye ranged in length from 492 mm to 735 mm (19.4" to 28.9") and had an average length of 580 mm (22.8") (Table 4).

Fox River

The Fox River below the DePere Dam was electroshocked to capture Walleye on April 5, 7 and 12. A total of 413 Walleye (199 male, 213 female and 1 unknown sex) were captured during sampling (Table 1). Water temperatures on all days were 36°F. Total shocking effort was 4.8 hours for a CPE of 86.5 Walleye per hour shocked.

The 199 male Walleye captured ranged in length from 381 mm to 612 mm (15" to 24.1") and had an average length of 496 mm (19.5") (Table 5). A spine was collected for aging from 191 male Walleye. Within the collected sample, age ranged from age 3 through age 9, though one age 12 was captured (Table 6). Age 5 was the most common aged male Walleye, but age 6 fish were also very common. Length at age was above state averages at all ages (Table 7).

A total of 213 female Walleye were captured during shocking. Female Walleye ranged in length from 464 mm to 774 mm (18.3” to 30.5”) and had an average length of 632 mm (24.9”) (Table 5). Age was determined for 210 female Walleye by sectioning a dorsal spine. Ages ranged from age 4 through age 13 with age 6 the most common. Other ages (excluding age 4 and age 13) were less frequent, but occurred in similar number. Similar to male Walleye, length at age for female walleye was above state averages (Table 7).

Tagging Summary 2016

During spring electroshocking Walleye were tagged in all four river locations. We tagged 459 Walleye (337 male and 122 female) from the Menominee River, 459 Walleye (287 male, 162 female and 1 unknown sex) from the Peshtigo River, 452 Walleye (335 male, 116 female and 1 unknown sex) from the Oconto River and 402 Walleye (191 male, 210 female, and 1 unknown sex) from the Fox River (Table 1).

Tag Returns 2016

Angler Returns

Over course of calendar year 2016, we received tag return information from anglers for 214 Walleye that were tagged as part of this study from 2012 through 2016 (Table 9). Of these returns, 112 were from fish tagged in 2016, 44 were from Walleye tagged in 2015, 38 from 2013 tagging and 5 were from Walleye tagged in 2012.

Of the tag returns received in 2016, 54 were Walleye that were tagged from the Menominee River from 2013 through 2016 (Table 9). Five returns were from Walleye tagged in 2013, 14 from 2014, 16 from 2015 and 19 were from 2016 tagging efforts. Of these Walleye, 30 were male and 24 were female. The year of tagging return rate for Walleye tagged in 2016 was 4.1%. All Walleye that were double tagged were returned with both tags present. Return information indicates that the average time from the tagging date to angler capture date for Walleye tagged in 2016 was 65 days for males and 61 days for female Walleye (Table 9). For Menominee River tagged fish, the time at large in 2016 before angler capture was the longest noted since the beginning of this project. Anglers returned tags from throughout Green Bay, with the majority of tags from Walleye caught in the Menominee River or off the river mouth (Figures 4, 8, 12, and 16).

Of the tag returns received in 2016, 72 were Walleye that were tagged from the Peshtigo River as part of this project. All double tagged fish had both tags returned by anglers. Forty-one tag returns were from Walleye tagged in 2016, 11 from fish tagged in 2015, 11 from 2014 tagging, 5 from 2013 and 4 from Walleye tagged in 2012 (Table 9). Of this total, 39 were male and 33 were female Walleye. Based on 2016 returns of 2016 tagged Walleye, we had a return rate of 9.1%. The days at large for Walleye tagged in 2016 was 99 days and 76 days for male and female Walleye, respectively (Table 9). Time at large for Walleye tagged in 2016 was longer than time at large from other initial years of tagging. Anglers sent in tag return information from throughout Green Bay (Figures 2, 5, 9, 13 and 17). Most of the returns came from anglers fishing the Peshtigo River or from along the west shore of Green Bay north of the Pensaukee River although a few returns from each year were from the east shore of Green Bay.

Anglers sent in information regarding 57 Walleye that were tagged from the Oconto River from 2012 through 2016. All double tagged fish had both tags returned by anglers. Thirty-

seven of these returns were from fish tagged in 2016, 7 from Walleye tagged in 2015, 9 from 2014, 3 from 2013 and 1 from a Walleye tagged in 2012 (Table 9). Of this total, 42 were male and 15 were female Walleye. Based on 2016 returns of 2016 tagged Walleye, we had a return rate of 8.2%. The days at large for Walleye tagged in 2016 was 65 days and 61 days for male and female Walleye respectively (Table 9). Time at large for Walleye tagged in 2016 was longer than time at large from other initial years of tagging. Anglers sent in tag return information from throughout Green Bay (Figures 3, 6, 10, 14 and 18). Most of the returns came from anglers fishing the Oconto River or from along the west shore of Green Bay north of the Pensaukee River. However, from each year of tagging, anglers returned 3 to 5 tags from Walleye caught in southern Green Bay near the Fox River.

Of the tag returns received in 2016, 31 were Walleye that were tagged from the Fox River as part of this project. All but one double tagged fish had both tags returned by anglers. Fifteen tag returns were from Walleye tagged in 2016, 10 from fish tagged in 2015, 4 from 2014 tagging and 2 from Walleye tagged in 2013 (Table 9). Of this total, 15 were male and 16 were female Walleye. Based on 2016 returns of 2016 tagged Walleye, we had a return rate of 3.7%. The days at large for Walleye tagged in 2016 was 77 days and 75 days for male and female Walleye respectively (Table 9). Time at large for Walleye tagged in 2016 was much longer than time at large from other initial years of tagging. Anglers sent in tag return information from throughout Green Bay (Figures 7, 11, 15 and 19). Most of the returns came from anglers fishing in southern Green Bay south of a line from Pensaukee to Chaudoirs Dock. Less than 5 returns each year were from other locations throughout Green Bay.

DNR Survey Returns

During spring Walleye tagging surveys or during fall young of year Walleye assessment surveys in 2016, DNR staff recaptured 36 Walleye that were tagged as part of this project (Table 10). During 2016 surveys, eight recaptured Walleye were recaptured on the Menominee River, 12 from the Peshtigo River, seven from the Oconto River and nine were captured from surveys on the Fox River.

Of these 36 Walleye, most (34 of 36 fish) were recaptured in the rivers that they were tagged in. The two exceptions were Walleye tagged in the Oconto or Peshtigo River that were recaptured in the Menominee River.

Tags were recovered from all years of tagging including those tagged in 2016. Two tags were encountered from 2012, six from 2013, eight from 2014, fourteen from 2015 and six from fish tagged in 2016. During these surveys, we recaptured six Walleye tagged from the Menominee River, thirteen Walleye that were tagged from the Peshtigo River, eight from the Oconto River and nine from the Fox River that were tagged from 2012 through 2016. All fish tagged and recaptured in 2016 were recaptured in the river that they were originally tagged, just during a later sampling period.

Discussion

Electroshocking in 2016 was conducted later in the year than in past survey years because water temperatures were slow to warm following a late ice-out. In addition, water

temperatures fell during the survey likely reducing our catch. Crews were able to tag between 400 and 475 fish in each river in 2016 although in the Menominee, Peshtigo and Oconto Rivers crews tagged twice as many male Walleye as female Walleye. Despite difficult conditions, 1763 Walleye were tagged. 1167 of the tagged fish were males and 596 were females (Table 1). One-third of the tagged female Walleye were tagged on the Fox River.

Results from the five years of surveys indicate that adult Walleye utilize the large west shore rivers and the Fox River in spring for spawning (Hogler et al 2017) as well as large bays on the east side of Green Bay (Hansen and Royseck 2016). Walleye runs into Green Bay tributaries are like spring runs seen in other Great Lakes tributaries that are similar in size (Roseman et al 2010). Young of year surveys conducted in fall on the Fox River and along the far southern Green Bay shoreline have documented strong Walleye recruitment many times over the past 20 years (Figure 20). The strongest year classes were produced in 2013, 2003, 1993 with 2012 being the weakest year class noted since 2005. It is likely that Walleye runs in all the surveyed areas contribute to the overall Green Bay Walleye population. YOY assessments are also conducted on the Menominee, Peshtigo and Oconto Rivers in fall to assess year class strength trends. However few YOY Walleye are captured during these surveys. It is not clear why shocking of the Oconto and Peshtigo Rivers in fall suggests no evidence of recruitment and only modest evidence of recruitment in the Menominee River when we have documented strong spring Walleye runs in these rivers and available evidence suggests fairly strong site fidelity and limited straying. It is likely the lack of YOY in our catch in these rivers is due to the size of the rivers and limited survey coverage (1 to 2 miles) that reduces our effectiveness in capturing YOY Walleye. It is especially unclear why this occurs on the Menominee River as it is the most similar to the Fox River of the west shore tributaries. Based on evidence from other Great Lakes streams it is likely that despite low YOY numbers captured during surveys, that these three rivers likely have substantial recruitment and contribute to the overall Green Bay Walleye population

Comparing biological data between rivers indicates that Walleye returning to these rivers are fairly similar. Average length and return size range by sex are consistent between rivers although the two more northern rivers have average sizes and maximum sizes slightly larger than the two more southern rivers in most years (Table 1). The age of return is also similar with males beginning to return at age 3 and females at age 4. Analysis of year class strength for these rivers indicate that younger fish generally dominate the spring run with age 6 (year class 2010), age 5 (YC 2011) and age 7 (YC 2009) the most common ages. When compared to long term YOY index data from the Fox River and lower Green Bay, it is not surprising that ages 4 through 8 are common because these years had good YOY production based on fall surveys (Figure 20). Angler harvest and high natural mortality may be responsible for the lack of older Walleye in the population or we could be underestimating ages for older Walleyes because spines have been shown to underestimate age. Otoliths could be used to age Walleye to achieve better age estimates, but their use would require that these Walleye be sacrificed. As was found in past surveys, length at age at all ages for Green Bay Walleye was greater than state wide averages for inland waters.

Tag return information has been gathered from anglers during the first five years of this project. In 2016, anglers returned information from 214 tagged Walleye. This total was the second highest (262 in 2015) during this project (Hogler et al 2017). Despite the high number of returns for the past two years, the low number of tag returns each year has

hampered our ability to track large scale movements around Green Bay with clarity. To improve our understanding of Walleye movement throughout Green Bay, additional Walleye from each location would need to be tagged or other methods used to better define these movements. However, despite the lack of clarity, some general trends in Walleye movement can be noted. Walleye movement throughout Green Bay during non-spawning periods does occur, but the amount and direction of movement appears to be dependent on the river and year. In some years, it appears that most tagged fish stayed near their tagging river (2012 through 2014), however, in other years (2015 and 2016) Walleye quickly spread throughout Green Bay. However, since tag return numbers have been low; these results should be viewed with caution. In addition, DNR survey recaptures also show that in general fish tagged in a river will be most likely be recaptured from that river in following years. Subsequent annual spring movement patterns will likely provide the greatest amount of information about site fidelity.

Many questions remain regarding the Walleye population in Green Bay including those regarding tributary use, site fidelity, contributions to the sport fishery from unique spawning locations and the need for supplemental stocking in some locations. Further detailed survey work and cooperative studies will be necessary to answer these and other questions regarding Walleye management in Wisconsin waters of Green Bay.

References

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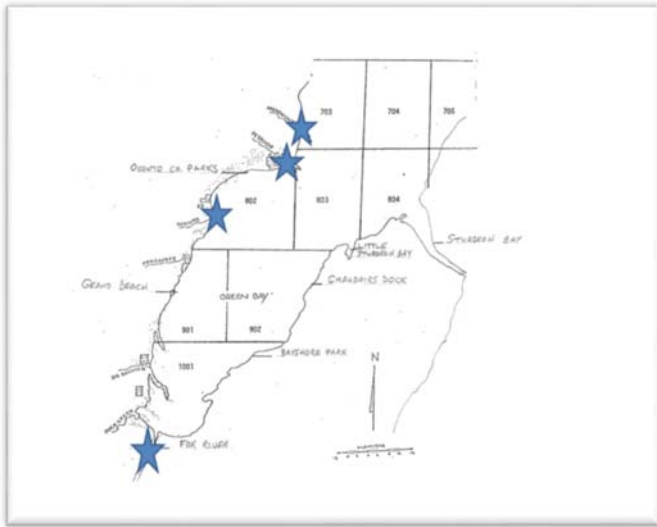


Figure 1. The tagging locations for Walleye in Green Bay and the Fox River, 2012-2016. Walleye from the Oconto and Peshtigo Rivers were tagged in 2012 through 2016, while walleye from the Fox River, Menominee River were tagged in 2013-2016.

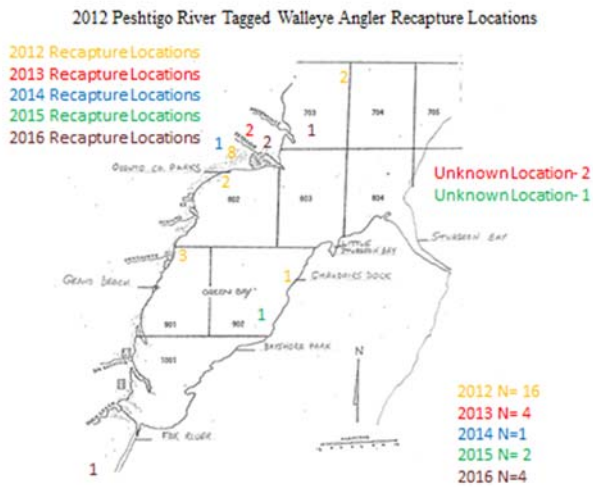


Figure 2. Angler recapture location of Walleye tagged in the Peshtigo River in 2012. Returns from calendar year 2012 are in gold, returns from 2012 tagged fish from 2013 are in red, 2014 returns are in blue, 2015 returns are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

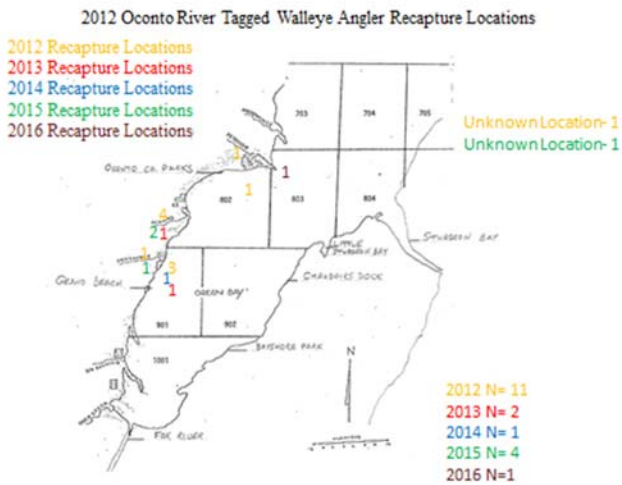


Figure 3. Angler recapture location of Walleye tagged in the Oconto River in 2012. Returns from calendar year 2012 are in gold, returns from 2012 tagged fish from 2013 are in red, 2014 returns are in blue, 2015 returns are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

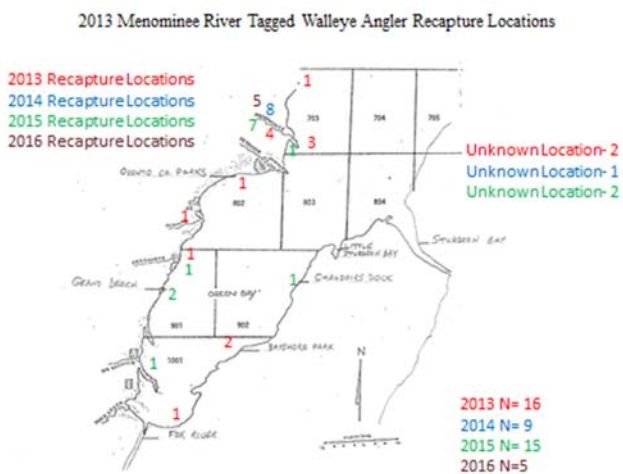


Figure 4. Angler recapture location of Walleye tagged in the Menominee River in 2013. Returns from calendar year 2013 are in red, returns from 2014 are in blue, 2015 returns are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2013 Peshtigo River Tagged Walleye Angler Recapture Locations

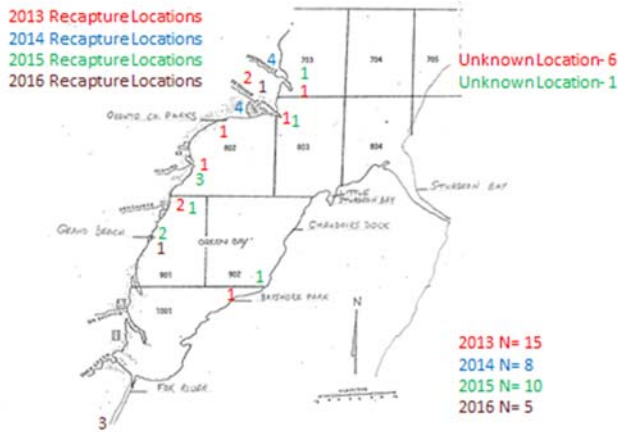


Figure 5. Angler recapture location of Walleye tagged in the Peshtigo River in 2013. Returns from calendar year 2013 are in red, returns from 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2013 Oconto River Tagged Walleye Angler Recapture Locations

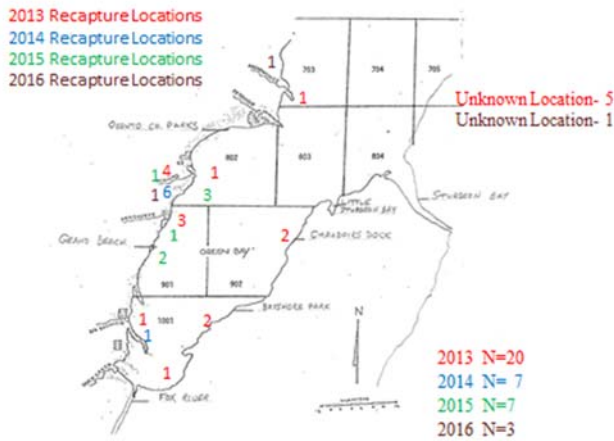


Figure 6. Angler recapture location of Walleye tagged in the Oconto River in 2013. Returns from calendar year 2013 are in red, returns from 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2013 Fox River Tagged Walleye Angler Recapture Locations

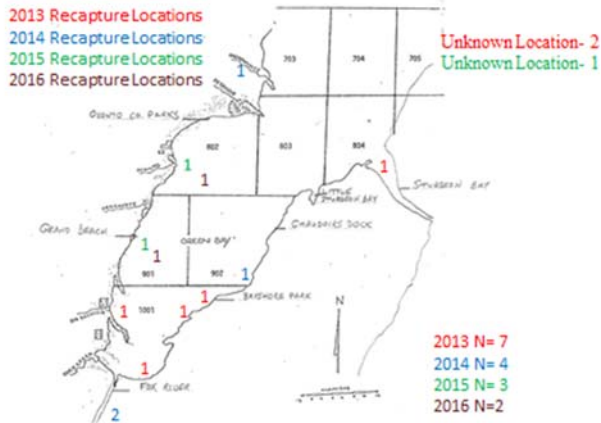


Figure 7. Angler recapture location of Walleye tagged in the Fox River in 2013. Returns from calendar year 2013 are in red, returns from 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2014 Menominee River Tagged Walleye Angler Recapture Locations

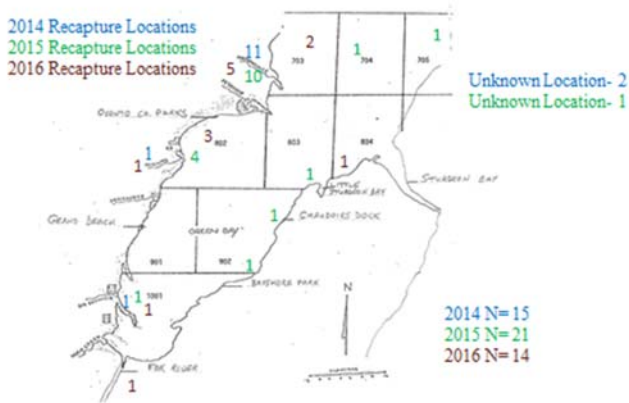


Figure 8. Angler recapture location of Walleye tagged in the Menominee River in 2014. Returns from calendar year 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2014 Peshtigo River Tagged Walleye Recapture Locations

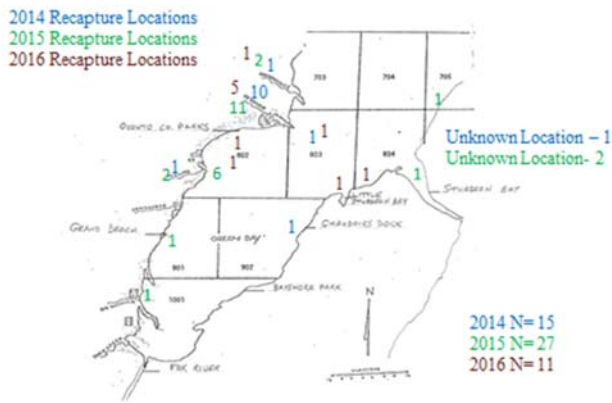


Figure 9. Angler recapture location of Walleye tagged in the Peshtigo River in 2014. Returns from calendar year 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2014 Oconto River Tagged Walleye Angler Recapture Locations

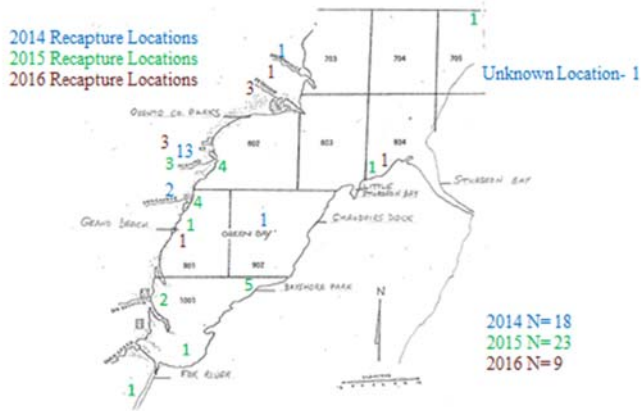


Figure 10. Angler recapture location of Walleye tagged in the Oconto River in 2014. Returns from calendar year 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2014 Fox River Tagged Walleye Angler Recapture Locations

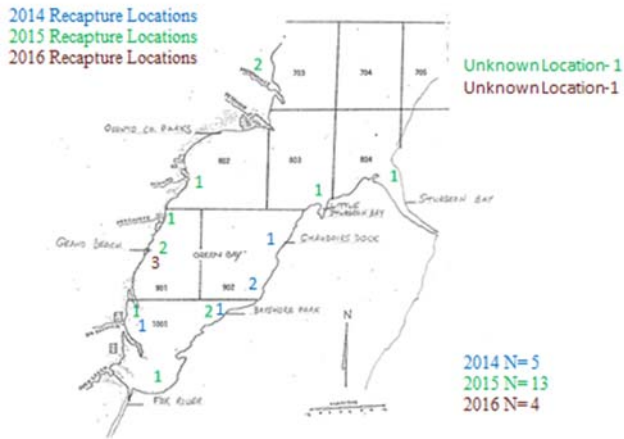


Figure 11. Angler recapture location of Walleye tagged in the Fox River in 2014. Returns from calendar year 2014 are in blue, returns from 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2015 Menominee River Tagged Walleye Angler Recapture Locations

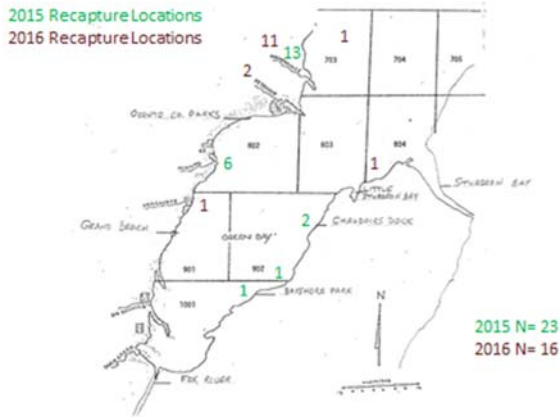


Figure 12. Angler recapture location of Walleye tagged in the Menominee River in 2015. Returns from calendar year 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2015 Peshtigo River Tagged Walleye Angler Recapture Locations

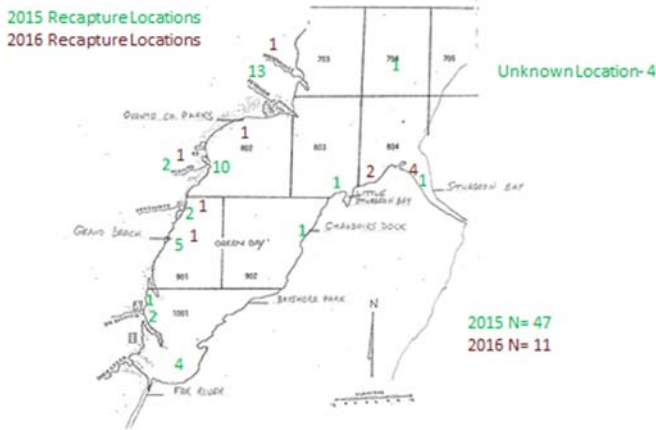


Figure 13. Angler recapture location of Walleye tagged in the Peshtigo River in 2015. Returns from calendar year 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

2015 Oconto River Tagged Walleye Angler Recapture Locations

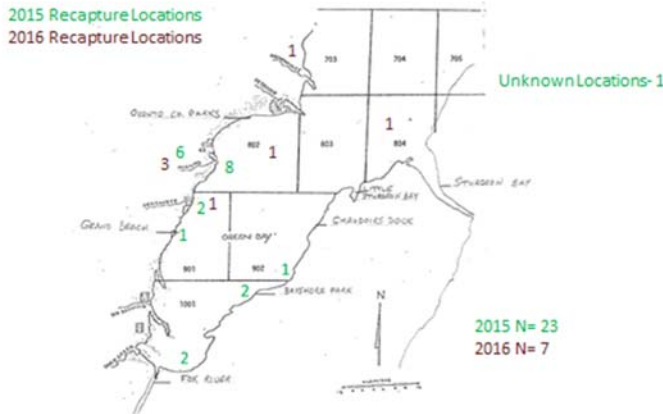


Figure 14. Angler recapture location of Walleye tagged in the Oconto River in 2015. Returns from calendar year 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

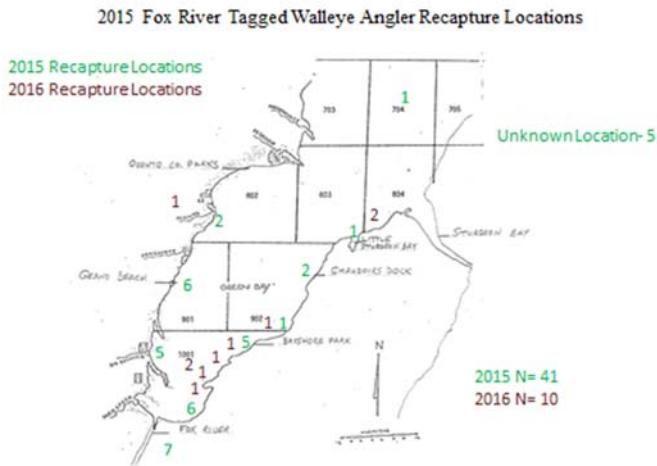


Figure 15. Angler recapture location of Walleye tagged in the Fox River in 2015. Returns from calendar year 2015 are in green and 2016 returns are in brown. The number indicates how many recaptures were from that location.

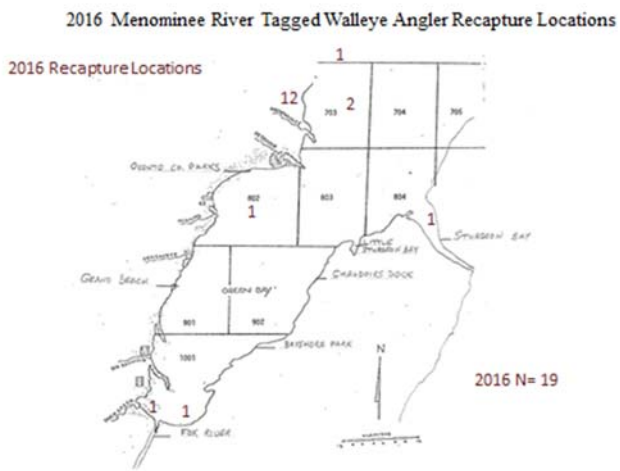


Figure 16. Angler recapture location of Walleye tagged in the Menominee River in 2016. Returns from calendar year 2016 are in brown. The number indicates how many recaptures were from that location.

2016 Peshtigo River Tagged Walleye Angler Recapture Locations

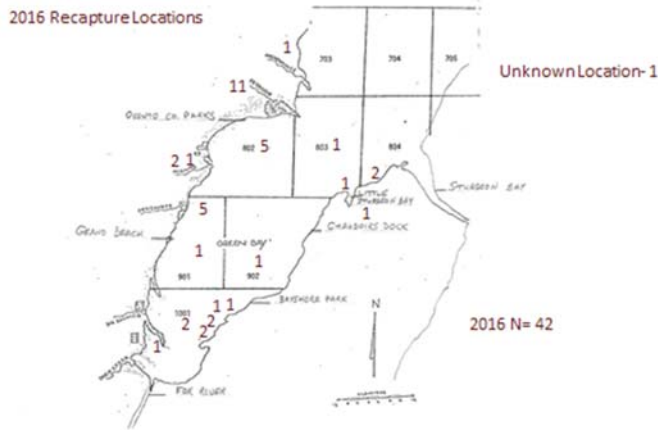


Figure 17. Angler recapture location of Walleye tagged in the Peshtigo River in 2016. Returns from calendar year 2016 are in brown. The number indicates how many recaptures were from that location.

2016 Oconto River Tagged Walleye Angler Recapture Locations

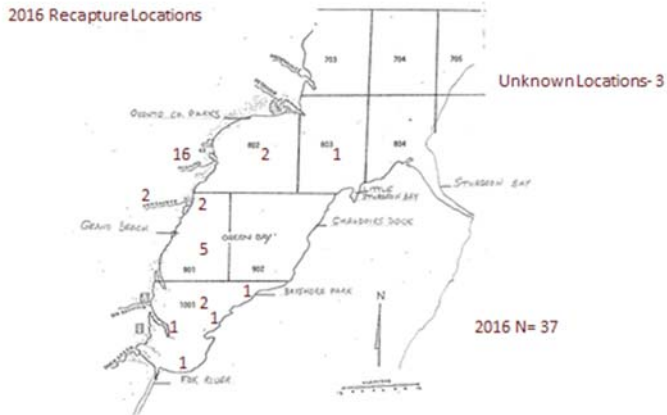


Figure 18. Angler recapture location of Walleye tagged in the Oconto River in 2016. Returns from calendar year 2016 are in brown. The number indicates how many recaptures were from that location.

2016 Fox River Tagged Walleye Angler Recapture Locations

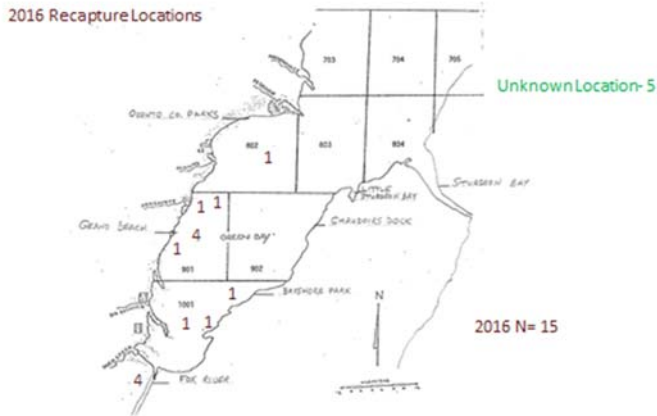


Figure 19. Angler recapture location of Walleye tagged in the Fox River in 2016. Returns from calendar year 2016 are in brown. The number indicates how many recaptures were from that location.

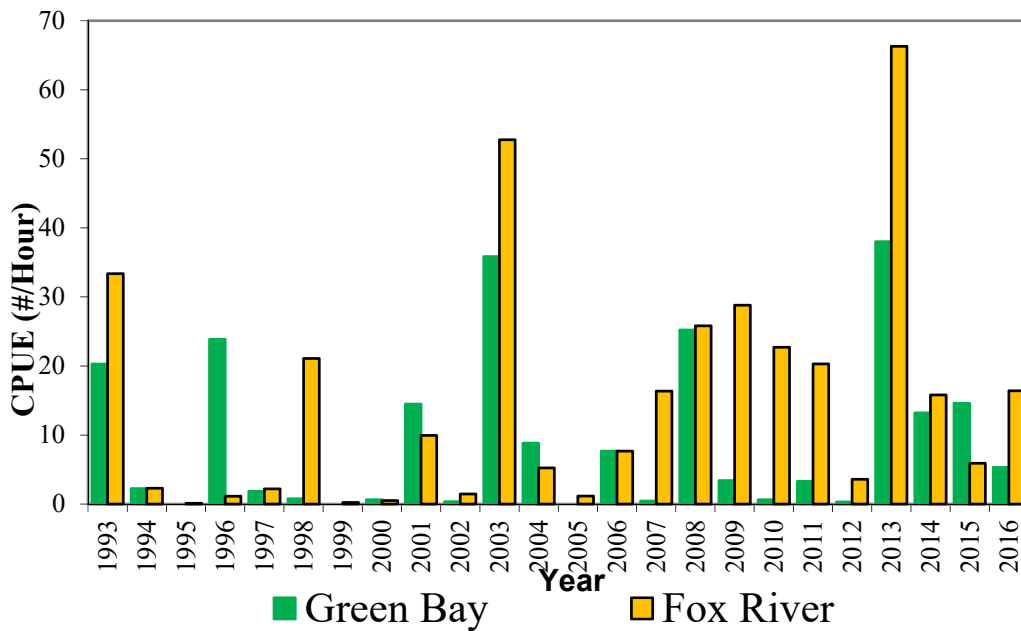


Figure 20. Walleye young of year CPUE from the Fox River and lower Green Bay from 1993 through 2016. YOY data is collected during annual fall index surveys conducted during nighttime hours. The average YOY CPE from 1993 through 2016 is 11 YOY per hour shocked.

Table 1. Spring Walleye capture summary from electroshocking surveys below Hattie Street Dam, Menominee River, Marinette County, Peshtigo Dam, Peshtigo River, Marinette County, Wisconsin, below Stiles Dam, Oconto River, Oconto County Wisconsin, and the DePere Dam, Fox River, Brown County from 2012 to 2016.

Year	Menominee River			Peshtigo River			Oconto River			Fox River			
	Captured	Tagged	Ave. Length	Captured	Tagged	Ave. Length	Captured	Tagged	Ave. Length	Captured	Tagged	Ave. Length	
2012													
	Male			428	289	537 mm (21.1")	114	112	459 mm (18.1")				
	Female			71	71	593 mm (23.3")	90	90	580 mm (22.8")				
	Unknown			0	0		8	7	472 mm (18.6")				
	Total			499	360		212	209					
2013													
	Male	205	204	507 mm (20")	305	305	519 mm (20.4")	401	401	478 mm (18.8")	422	422	472 mm (18.6")
	Female	250	250	606 mm (23.9")	148	148	606 mm (23.9")	131	131	579 mm (22.8")	62	62	613 mm (24.1")
	Unknown	0	0		0	0		0	0		0	0	
	Total	455	454		453	453		532	532		484	484	
2014													
	Male	258	258	507 mm (20")	295	295	527 mm (20.7")	272	272	477 mm (18.8")	201	201	480 mm (18.9")
	Female	236	236	589 mm (23.2")	133	133	592 mm (23.3")	177	177	551 mm (21.7")	315	315	591 mm
	Unknown	1	1		0	0		0	0		0	0	(23.3")
	Total	495	495		428	428		449	449		516	516	
2015													
	Male	339	339	521 mm (20.5")	310	310	515 mm (20.3")	210	201	497 mm (19.6")	179	179	477 mm (18.8")
	Female	95	95	577 mm (22.7")	154	154	595 mm (23.4")	60	60	565 mm (22.2")	379	379	589 mm (23.2")
	Unknown	0	0		0	0		0	0		0	0	
	Total	434	434		464	464		270	270		558	558	
2016													
	Male	346	337	511 mm (20.1")	299	287	493 mm (19.4")	342	335	467 mm (18.4")	199	191	496 mm (19.2")
	Female	124	122	598 mm (23.5")	165	162	634 mm (25")	116	116	580 mm (22.8")	213	210	632 mm (24.9")
	Unknown	0	0		1	1	391 mm (15.4")	1	1	345 mm (13.6")	1	1	517 mm (20.4")
	Total	470	459		465	450		459	452		413	402	

Table 2. The length frequency of Walleye captured from the Menominee River during spring electroshocking in 2016.

Length (in)	mm	Male	Female	Unknown
	360	1		
	370	1		
	380	7		
	390	6		
(16")	400	4		
	410	9		
	420	4		
	430	10		
	440	4		
(18")	450	9		
	460	15		
	470	16		
	480	28	1	
	490	24		
(20")	500	25	5	
	510	24	4	
	520	29	4	
	530	29	7	
	540	17	11	
(22")	550	24	9	
	560	14	10	
	570	10	5	
	580	7	6	
	590	8	5	
(24")	600	8	7	
	610	3	5	
	620	2	7	
	630	3	4	
	640	3	1	
(26")	650	1	4	
	660		10	
	670		5	
	680		6	
	690		2	
(28")	700		1	
	710	1	5	
Total		346	124	0
Ave. Length		511 (20.1")	598 (23.5")	
S.D.		57.1	59.7	

Table 3. The length frequency of Walleye captured from the Peshtigo River during spring electroshocking in 2016.

Length (in) mm	Male	Female	Unknown
360	3		
370	3		
380	3		
390	16		1
(16") 400	10		
410	15		
420	7		
430	6		
440	11		
(18") 450	13		
460	16		
470	15	1	
480	28	1	
490	14	1	
(20") 500	18	1	
510	14	3	
520	13	5	
530	17	6	
540	14	3	
(22") 550	17	5	
560	10	5	
570	13	8	
580	9	9	
590	4	4	
(24") 600	2	8	
610	4	5	
620	1	6	
630	1	6	
640	1	13	
(26") 650		8	
660		10	
670	1	9	
680		11	
690		8	
(28") 700		10	
710		5	
720		3	
730		3	
740		4	
(30") 750		1	
760		2	
770		1	
Total	299	165	1
Ave. Length	493 (19.4")	634 (25")	391 (15.4")
S.D.	62.2	66.4	--

Table 4. The length frequency of Walleye captured from the Oconto River during spring electroshocking in 2016.

Length (in) mm	Male	Female	Unknown
270	1		
280			
290			
(12") 300			
310			
320			
330			
340			1
(14") 350	1		
360	5		
370	8		
380	8		
390	19		
(16") 400	33		
410	12		
420	26		
430	17		
440	13		
(18") 450	19		
460	15		
470	17		
480	19		
490	20	3	
(20") 500	19	7	
510	16	3	
520	17	6	
530	13	5	
540	13	8	
(22") 550	7	12	
560	8	10	
570	5	14	
580	4	8	
590	3	7	
(24") 600	1	6	
610		3	
620	1	4	
630	1	3	
640		2	
(26") 650		2	
660		5	
670			
680		2	
690		3	
(28") 700		1	
710			
720			
730	1	2	
Total	342	116	1
Ave. Length	467 (18.4")	580 (22.8")	345 (13.6")
S.D.	61.1	53.8	--

Table 5. The length frequency of Walleye captured from the Fox River during spring electroshocking in 2016.

Length (in) mm	Male	Female	Unknown
380	5		
390	2		
(16") 400	5		
410	1		
420	1		
430			
440	5		
(18") 450	8		
460	18	1	
470	18		
480	23		
490	26	2	
(20") 500	24	1	
510	24	1	1
520	20	1	
530	12	4	
540	6	2	
(22") 550	12	10	
560	2	6	
570	3	11	
580		12	
590	1	9	
(24") 600	1	11	
610	1	10	
620		10	
630		14	
640		11	
(26") 650		9	
660		15	
670		17	
680		12	
690		2	
(28") 700		8	
710		4	
720		5	
730		3	
740			
(30") 750		4	
760			
770		1	
Total	199	213	1
Ave. Length	496 (19.2")	632 (24.9")	517 (20.4")
S.D.	40.7	57.9	--

Table 6. The length and age frequency of male Walleye captured from the Fox River during spring electroshocking in 2016.

Length (in) mm	Number Captured	Age										
		2	3	4	5	6	7	8	9	10	11	12
(14") 350												
360												
370												
380	5		5									
390	2		2									
(16") 400	5		5									
410	1		1									
420	1		1									
430	4		1	3								
440	1			1								
(18") 450	8		1	2	4	1						
460	18			4	13	1						
470	17			8	7	2						
480	17			3	11	3						
490	21			1	17	3						
(20") 500	23				11	9	3					
510	23				5	16	1	1				
520	20				4	13	2	1				
530	12				1	7	3		1			
540	5				1	3	1					
(22") 550	10				1	2	4	3				
560	2					1	1					
570	2					1	1					
580												
590	1						1					
(24") 600												
610	1											1
620												
630												
640												
(26") 650												
Total	199		16	22	75	62	17	5	1			1
Ave. Length	495 (19.5")		403 (16")	466 (18.3")	490 (19.3")	517 (20.4")	540 (21.3")	541 (21.3")	536 (21.1")			612 (24.1")
S.D.	40.9		19.2	17.1	22.2	21.9	24.0	17.9	--			--

Table 7. A comparison of average length at age of walleye captured during spring electroshocking surveys on the Peshtigo, Oconto, Menominee and Fox River in 2012 through 2015 and from the Fox River in 2016 to statewide averages. All measurements are in millimeters.

Location	Year/Sex	AGE												
		0	1	2	3	4	5	6	7	8	9	10	11	12
State Average		162 (6.4")	206 (8.1")	250 (10")	356 (14.1")	371 (14.6")	420 (16.5")	460 (18.1")	494 (19.4")	524 (20.6")	553 (21.7")	551 (21.7")	594 (23.4")	622 (24.5")
Peshtigo River	2012													
	Male				434	494	520	553	577	594				
	Female					525	567	595	605	631	681	655		
	2013													
	Male				430	466	494	540	544	576	605	622		
	Female				465	524	533	604	591	631	670	681	700	
	2014													
	Male				461	449	504	516	548	541	597	586	571	
	Female				460	516	545	558	623	603	632	672	691	651
	2015													
Male				432	487	481	509	553	551	596	601	648	645	
Female					507	540	550	569	634	610	656	696	692	
Oconto River	2012													
	Male				419	465	500	539	555	550				
	Female				495	515	572	573	605	619	648			
	2013													
	Male				423	458	476	517	513	500-	545	543		655
	Female					518	540	593	594	611	615	639	640	
	2014													
	Male				434	458	479	511	516	557	542	605		
	Female				505	510	539	572	608	565	605	678	659	
	2015													
Male				437	459	484	496	535	572	560	605	--	485	
Female				535	518	528	555	600	661	638	720			
Menominee River	2013													
	Male				433	469	492	535	530	537	588	571	555	640
	Female					519	553	596	615	633	620	656	675	725
	2014													
	Male				432	457	477	521	539	528	572	576		
	Female					506	540	567	611	643	625	657	636	653
2015														
Male			345	428	461	486	522	545	560	574	570	644	650	
Female					513	537	548	581	624	622	655	655	680	
Fox River	2013													
	Male				424	458	468	499	554	550	465	542	533	
	Female					499	594	605	621	620	651	678	670	705
	2014													
	Male			365	432	460	480	491	528	578	557	585	525	
	Female				455	518	548	558	628	625	650	669	665	672
	2015													
	Male				434	450	467	482	502	550	590	515		
	Female					502	538	563	570	637	634	652	672	706
	2016													
Male				403	466	490	517	540	541					
Female					506	534	582	607	627	647	659	677	688	

Table 8. The length and age frequency of female Walleye captured from the Fox River during spring electroshocking in 2016.

Length (in) mm	Number Caught	Age										
		4	5	6	7	8	9	10	11	12	13	
(18") 450												
460	1		1									
470												
480	4	1	1	1	1							
490	5		4	1								
(20") 500	2	1		1								
510	3		2					1				
520	1								1			
530	4	1	2			1						
540	3		2			1						
(22") 550	12		6	5			1					
560	6		1	4			1					
570	11		1	8	2							
580	13		2	7	2			1	1			
590	9			6	2			1				
(24") 600	12			6	3	2	1					
610	11			3	5	2				1		
620	10			3			3	1	1	1	1	
630	14					4	3	2	1		3	1
640	11					1	1	3	4	1	1	
(26") 650	9					2	1	3	1	1	1	
660	16			1	1		2	3	2	2	5	
670	17				1			4	5	1	4	2
680	12						1	3		3	4	1
690	2							1			1	
(28") 700	8								2	2	3	1
710	4										1	3
720	5								1	3	1	
730	3										3	
740												
(30") 750	4								1		2	1
760												
770	1										1	
780												
790												
800												
Total	213	3	22	46	26	17	24	20	15	31	9	
Ave. Length	624 (24.6")	506 (19.9")	534 (21.0")	582 (22.9")	607 (23.9")	627 (24.7")	647 (25.5")	659 (25.9")	677 (26.7")	688 (27.1")	696 (27.4")	
S.D.	63.5	24.6	35.4	32.7	42.2	34.0	40.6	48.6	34.3	38.9	33.5	

Table 9. Angler tag return locations from fish tagged from 2012-2015 on the Peshtigo, Oconto, Menominee and Fox Rivers as well as those tagged in the Sturgeon Bay area in 2013.

Tag Location	Sex	Year Tagged or Recaptured														
		2012	2012 in 2013	2012 in 2014	2012 In 2015	2012 in 2016	2013	2013 in 2014	2013 in 2015	2013 in 2016	2014	2014 in 2015	2014 in 2016	2015	2015 in 2016	2016
Fox River																
Tagged																
	Male						422				201			179		191
	Female						62				315			379		210
Recaptured																
	Male						5	4	2	2	1	3	2	28	2	9
	Female						2	0	1	0	4	10	2	13	8	6
Days at Large																
	Male						82	365	784	1131	44	479	799	64	465	99
	Female						45	0	836	0	34	434	858	80	412	76
Menominee River																
Tagged																
	Male						204				258			339		337
	Female						250				237			95		122
Recaptured																
	Male						8	7	2	3	4	9	4	17	10	13
	Female						8	2	13	2	11	12	10	6	6	6
Days at Large																
	Male						38	382	855	1128	14	391	822	50	379	62
	Female						54	376	770	1082	11	371	736	38	405	51
Oconto River																
Tagged																
	Male	112					401				272			210		335
	Female	97					131				177			60		116
Recaptured																
	Male	5	0	0	2	1	11	5	4	2	6	12	5	14	7	27
	Female	6	2	1	2	0	9	2	3	1	12	11	4	9	0	10
Days at Large																
	Male	45	0	0	1097	1483	55	373	812	1084	15	440	749	118	393	65
	Female	42	457	800	1173	0	46	372	797	1229	19	440	731	18	0	61
Peshtigo River																
Tagged																
	Male	289					305				295			310		287
	Female	71					148				133			154		162
Recaptured																
	Male	9	3	1	2	2	12	3	8	0	8	15	8	27	8	21
	Female	8	1	0	0	2	3	5	2	5	7	12	3	20	3	20
Days at Large																
	Male	55	408	767	1258	1556	57	353	796	0	8	371	723	85	387	77
	Female	22.8	Unk.	0	0	1530		372	840	1128	19	420	760	59	468	75

Table 10. The recapture of tagged walleye in 2016 during DNR surveys by year and river. The number indicates the number recaptured in that location. All recaptures were made utilizing the boom shocker boat.

River Tagged	Year Tagged	Recapture River			
		Oconto River	Peshtigo River	Menominee River	Fox River
Menominee River	2013			2	
	2014			2	
	2015			2	
	2016				
Peshtigo River	2012		2		
	2013		1		
	2014		1	1	
	2015		7		
	2016		1		
Oconto River	2012				
	2013	1		1	
	2014				
	2015	3			
	2016	3			
Fox River	2013				1
	2014				4
	2015				2
	2016				2