Milwaukee and Menomonee River Creel Survey Report, 2006

Authors:
Cheryl A. Peterson and Pradeep S. Hirethota

January 2008

PUB-FH-514-2008

Wisconsin Department of Natural Resources
Southern Lake Michigan Fisheries Work Unit
600 E. Greenfield Ave., Milwaukee, WI 53204

Milwaukee and Menomonee River Creel Survey Report, 2006

Abstract

A creel survey was conducted in the Lower Milwaukee River and Menomonee River from March 1, 2006 to June 17, 2006 and September 1, 2006 to November 30, 2006. The main objective of the survey was to document walleye angling effort, catch and harvest. In the upstream section of the Milwaukee River, total angler effort was estimated at 20,604 hours, of which 1,687 was directed at walleye. In the downstream section of the Milwaukee River, total angler effort was 11,669 hours with 1,713 hours directed toward walleye. In the Menomonee River, anglers fished 8,617 hours of which 3,287 hours were spent targeting walleye. An estimated 326 walleye were caught in the Milwaukee River Upstream site, 15 of which were harvested. In the Milwaukee River Downstream site, 60 walleye were caught and 36 were harvested. Menomonee River anglers caught 281 walleyes and harvested 39. The angler caught walleye ranged from 10 to 22 inches with an average of 16 inches. A follow up creel survey is needed, incorporating a few modifications to the standard creel method.

Introduction

In an effort to rehabilitate the native walleye population in the Lower Milwaukee River and estuary, the Lake Michigan Work Unit (LMWU), Wisconsin Department of Natural Resources (WDNR) initiated an annual stocking program in 1995. The plan was to stock 10,000 extended growth walleye fingerlings annually, and monitor their growth, maturity and movement pattern (WDNR 1998 and 2005). Routine annual assessment data indicated that the stocked walleye were surviving, growing and attaining maturity. The growth rate of these walleye was greater than the state average. A substantial amount of interest was generated in the nearshore fishing community to fish for walleye in the Milwaukee harbor, Menomonee River, and the Lower Milwaukee River.

Although there were many anecdotes in the fishing community about successful walleye fishing in the area, WDNR did not have any systematically collected data to support that. The routine annual Lake Michigan creel survey conducted by the WDNR (Peterson and Eggold 2007), which includes the Milwaukee area, did not allow additional effort in the tributaries outside of the traditional salmon and trout spawning runs. Therefore, in March 2006, LMWU initiated a creel survey targeting this area to collect data on fishing effort, catch and harvest rates, with a focus on walleye.

Methods

The survey area included the Lower Milwaukee River downstream from Kletzsch Park to the river mouth (10.12 river miles) and the Menomonee River downstream from 45th Street to the confluence of the Milwaukee River (4.48 river miles), including the Burnham and South Menomonee canals (see Figure 1). The lower stretches of both rivers flow through highly urbanized and industrialized downtown sections of Milwaukee. For the purpose of data collection, the area was divided into three survey sites - *Milwaukee River Upstream* of the former North Avenue Dam, *Milwaukee River Downstream* of the former North Avenue Dam, and

Menomonee River. The Milwaukee River Upstream site encompassed seven access points (Figure 2), while the Milwaukee River Downstream site consisted of two access points (Figure 3). The Menomonee River encompassed six access points (Figure 4). All access points were accessible from shore, and no boat ramps were included in this survey.

The Kinnickinnic River, which also drains into the Milwaukee River near the harbor, was not part of this study area. The river has very limited fishing access and is highly degraded. Past WDNR assessments have shown a lack of game fish species in the Kinnickinnic River (Hirethota et al. 2005). However, habitat restoration efforts are underway which may enhance fish species diversity in the future.

The survey procedure for this study was derived from the open-water creel survey design for the annual Lake Michigan creel survey (Peterson and Eggold 2007), which is conducted using a modified access-point design called the Wisconsin Hybrid. It differs from a true access-point design in that the creel clerk visits several access points per site. The fishing season for this open-water creel survey was from March 1 to June 17 and September 1 to November 30 (Table 1). The summer months were not included in this survey based on current data of walleye movement patterns (Hirethota and Burzynski 2007), which indicate during this time walleye move to the cooler and deeper harbor waters.

Access points within a survey site were visited randomly, and surveys were conducted on every weekend day and holiday and on two randomly chosen days during the week. Each workday was comprised of two shifts, an AM and a PM shift. The clerk worked one shift per workday. The shifts were equal in duration, did not overlap and were sampled with equal probability. Three types of data were collected for each site sampled: counts of anglers for effort, interviews of anglers or parties for harvest rates and biological data on harvested fish.

Instantaneous angler counts were made by the creel clerk at all access points in the survey site. The count per site and the time the count was completed were recorded. Fishing effort estimates (expressed in angler hours) were derived from instantaneous counts of anglers. Counts were made at randomly computed times at each site during each visit. Angler effort and its variance were estimated within each stratum (survey site, month and day type). The variance of angler effort includes variability among days and variability within days. Formulas for two-stage surveys were used to calculate variance. For a complete description see Eggold (1995).

Angler parties were interviewed at the completion of their fishing trips. Anglers were asked if they were state residents, what time they started their fishing trip, what they fished for and the number of caught and harvested fish. Biological information was taken on harvested fish, including species, length, weight, fin clip, and tag information.

Harvest estimates were derived from interviews of anglers at all sites. The number of fish harvested and the hours fished from each interview were summed over all interviews in a stratum. The ratio of the two sums and the variance of the ratio were then calculated. The ratio was expanded by effort and summed across day types to estimate harvest. The harvest rate was obtained by dividing harvest by effort. For a detailed description see Eggold (1995).

Results and Discussion

Angling effort

The Milwaukee County park system extends along both banks of the Milwaukee River in the Upstream site, providing ample fishing access. In the Upstream site, from March 1st to June 17th, anglers fished a total of 7,179 hours (Table 2). From September 1st to November 30th, anglers fished a total of 13,425 hours. The higher effort in the fall is likely due to the influx of spawning run salmonids.

In the Milwaukee River Downstream site, from March 1st to June 17th, anglers fished a total of 6,125 hours (Table 3). From September 1st to November 30th, anglers fished a total of 5,544 hours. This section of the river generally receives less fishing pressure as most of it runs through the downtown Milwaukee area.

In the Menomonee River site, from March 1st to June 17th, anglers fished a total of 4,786 hours (Table 4). From September 1st to November 30th, anglers fished a total of 3,831 hours. The clerk noted that the demography of anglers and the composition of fish in this area are quite different from the Milwaukee River sites.

In the Milwaukee River Upstream site, the greatest angling effort was directed toward salmonids followed by smallmouth bass and walleye (Table 5). Rainbow and brown trout were the most targeted species in the Milwaukee River Downstream location (Table 6). A considerable amount of effort was directed at yellow perch, and less effort at Chinook and coho salmon. Directed walleye effort in the Downstream site was similar to the Upstream site. In contrast, Menomonee River anglers spent more time fishing for walleye than any other species (Table 7).

Catch composition

Annual WDNR assessments show that a variety of fish species exists in the study area (Hirethota et al. 2005). Resident species primarily targeted by anglers included smallmouth bass, yellow perch, walleye and northern pike. However, upstream migrations of salmonids in the spring and fall drive sport angling in the area.

The Milwaukee River Upstream site represents the most riverine habitat and supports a wide range of fish species. In the Milwaukee River Upstream location, Chinook salmon dominated the catch (Table 2) contributing about 60% of the total catch. A strong fall spawning run of Chinook salmon contributes to the higher catch. Smallmouth bass was the second most commonly caught species making up about 20%, followed by rainbow trout (13%) and walleye (3%). While all of the Chinook salmon were caught in the fall, the rainbow trout were caught throughout the year with greater numbers appearing in the spring. Smallmouth bass were caught in each month of the survey except November, whereas walleye were caught in each of the survey months. As an interesting observation, lake trout were caught in the Upstream section in the fall, which is uncommon for this lake dwelling species.

In the Milwaukee River Downstream site, yellow perch were the most commonly caught species (53%) followed by brown trout (24%) (Table 3). This survey area encompasses two very different habitat types. The Erie Street/River mouth access point (Figure 3) is dredged and channelized for navigation, representing harbor-like habitat. The majority of yellow perch and brown trout were caught at this access point. Portions of the upriver area, especially along the Caesar's Park access point, are not channelized and represent semi-riverine conditions. Rainbow trout accounted for 9% of the catch followed by smallmouth bass (7%) and Chinook salmon (4%). Walleye comprised only 2% of the overall catch, all of which were caught in September-October. Walleye tend to exhibit a seasonal movement pattern wherein they move to the Downstream location from the harbor in the fall (Hirethota and Burzynski 2007). Furthermore, during the spring walleye move upstream for spawning and would be less likely to be caught in this area.

In the Menomonee River site, Chinook salmon were the dominant species caught (32%) followed by rainbow trout at 25%, walleye at 16% and white perch at 13%. Smallmouth bass comprised only 7%. Brown trout, yellow perch, northern pike and coho salmon comprised 6% combined (Table 4). The 45th Street access point is sparsely used by anglers, while the Miller Park access point receives greater fishing pressure (Figure 4). The river at Miller Park is riverine and relatively shallow. Whereas, the downstream portion of the Menomonee River and the canals are generally deeper and channelized, more like the harbor environment. The water temperature in this area is also impacted by the warm water discharge from a local power plant. It appears that walleye move to this area during the winter because of the warm water, which is evident from the increased walleye catch in Spring and Fall. Chinook salmon and rainbow trout are primarily caught in the Miller Park area. The public access provided by the Milwaukee Metropolitan Sewerage District (MMSD) office (Figure 4) is popular with anglers where most of the white perch are caught.

Walleye catch and harvest rates

Data on walleye directed angling effort, catch, harvest, catch rate and harvest rate are summarized in Table 8. The annual catch rate of walleye was the highest in the Menomonee River (0.0326 fish per hour) followed by the Milwaukee River Upstream (0.0158 fish per hour) and Downstream (0.0051 fish per hour) sites. In the Milwaukee River Upstream site, the highest catch rate occurred in Spring, which coincides with the walleye spawning migration upriver. The walleye catch rate in the Menomonee River was the highest in November.

During this survey an estimated 326 walleye were caught in the Milwaukee River Upstream site, 60 in the Milwaukee River Downstream site, and 281 in the Menomonee River, for a total of 667 walleye in the survey area (Table 8). The annual walleye population assessment conducted by WDNR in 2006 estimated 7,066 walleye (juvenile and adult combined) in the study area (unpublished data, WDNR).

The greatest percentage of walleye harvest occurred in the Milwaukee River Downstream site, where 60% of the total catch was harvested (36 of 60 fish, Table 8). Conversely, only 5% of the catch (15 of 326 fish) was harvested from the Milwaukee River Upstream and 14% (39 of 281 fish) from the Menomonee River. Overall, walleye harvest rates were low at all sites throughout

the year, indicating primarily a catch and release fishery. As a result, limited biological data was collected during the survey (Table 9). The angler caught walleye ranged from 10 to 22 inches and 1 to 3 pounds, with an average length of 16.08 inches and 1.56 pounds. Walleye captured during annual LMWU surveys generally range from 6 inches to 26 inches in this area.

Survey limitations

Although we attempted to follow the standard Lake Michigan creel survey protocol for this study, we were limited by several obstacles due to the special nature of the survey area. However, our main objective of gathering additional species specific data, especially for walleye, was accomplished. The following is a list of these limitations that should be considered before another creel survey is conducted:

- Generally walleye fishing is more productive before dawn and after dusk, as walleye are actively feeding during this time. In order to accommodate this, the creel schedule encompassed early morning and late evening hours (Table 1). However, the safety of the creel clerk became an issue as the season progressed due to the nature of the urban environment. Hence, in the fall the shift times ended earlier in the evening, which may have limited data collection.

- Limited funding also restricted the survey in that shift times were shorter in duration than the standard Lake Michigan creel survey. Furthermore, the winter months were not included in the survey even though the lower Menomonee River and canals remain open and fishing remains active.

- Although there is a boat launch on the Milwaukee River, this survey was completed solely from shore fishing access points throughout the area and did not incorporate data from boat anglers.

- The angler community in the survey area consists of multiple ethnic backgrounds. Often a language barrier limited data collection.

Management implications

Walleye harvest

Results from this survey showed that in 2006 the overall angler harvest of walleye in the survey area was minimal in relation to the estimated population size. However, the harvest of undersized walleye has been an issue for local conservation wardens (personal communication, Supervisor, Milwaukee/Waukesha warden team, WDNR). An increased law enforcement presence as well as public education may help in implementing fishing regulations more effectively. The current regulations for walleye in the lower Milwaukee River system are a minimum length of 15 inches and a daily bag limit of 5 fish, and the season is open all year. There is no hook and line fishing allowed at night from September 15th to the first Saturday of the following May, which may have an impact on overall walleye catch and harvest.

Angler catch and harvest, along with population estimates, can be highly variable from year to year. Although it appears this is primarily a catch and release fishery, the removal of potential spawning fish from the system in any given year may impact walleye restoration. A local fishing club has proposed a regulation change to lower the daily bag limit of walleye from five fish to one (Conservation Congress Resolution, Milwaukee county, April 2007). The public will have an opportunity to provide their input at the statewide Spring Hearings in 2008.

Fish passage

A dam just downstream from the North Avenue bridge (Figure 2) was breached in 1990, facilitating fish movement. However, the Estabrook Park dam, which is further upriver, remains an impediment to fish migration. This not only limits fishing opportunities upstream of the dam but also prevents walleye from reaching potential spawning habitat upriver. Either removal of this upstream impediment or designing a proper fish passage system should be explored.

Concluding remarks

Water quality in the Milwaukee River continues to improve, facilitating a more diverse fish community (Hirethota and Burzynski 2005). The current Milwaukee River Estuary Walleye Management Plan (WDNR 2005) recommends continued stocking of 10,000 extended growth walleye fingerlings through 2009 as part of the restoration effort. The goal is to develop a naturally reproducing population with at least two adults per acre. Recently WDNR has constructed a reef on the Milwaukee River to enhance walleye spawning habitat (WDNR 2006). This reef, augmented by improved water quality, may facilitate restoration efforts.

WDNR continues to monitor the walleye population and assess natural reproduction. In general, walleye recruitment, angler catch and harvest, and population estimates are highly variable. Therefore, a follow up creel survey, with modifications based on this report, should be conducted to evaluate angler impacts on the walleye population in the Milwaukee River estuary.

Acknowledgements

Special thanks are due to Jeff Guidinger, the dedicated creel clerk who enthusiastically collected the data. Tom Burzynzki helped create GIS maps to depict sampling sites. We are thankful to LMWU staff for their helpful comments. We also appreciate the cooperation of local anglers and the support of area fishing clubs.

References

Eggold, B.T. 1995. Wisconsin's 1995 open water sportfishing effort and catch from Lake Michigan and Green Bay. Wisconsin Department of Natural Resources, Plymouth, Wisconsin. 19 pages.

Hansen, M.J. 1986. Size and condition of trout and salmon from the Wisconsin waters of Lake Michigan, 1969-84. Fish Management Report 126. Wisconsin Department of Natural Resources, Fisheries Management, Madison, Wisconsin. 28 pages.

Hirethota, P.S. and T.E. Burzynski. 2007. Movement of walleye in the Lower Milwaukee River and estuary. PUB-FH-513-2007. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 18 pages.

Hirethota, P.S., T.E. Burzynski and B.T. Eggold. 2005. Changing habitat and biodiversity of the Lower Milwaukee River and estuary. PUB-FH-511-2005. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 48 pages.

Peterson, C. and B. Eggold. 2007. Wisconsin's 2005 open water sportfishing effort and harvest from Lake Michigan and Green Bay. PUB-FH-830-07. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 19 pages.

WDNR 1998. An assessment of the impact of stocked walleye on stocked salmon in the Milwaukee estuary. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 17 pages.

WDNR 2005. Milwaukee River Estuary Walleye Management Plan. PUB FH-512-05. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 31 pages.

WDNR 2006. Milwaukee River Estuary Habitat Restoration Project - Fact Sheet. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 5 pages.

Table 1. Survey schedule design for 2006 Milwaukee and Menomonee River creel survey.

Month	Dates	# Weekdays per week	# Weekend days per week	Shift times*
March	1-31	2	2	6:00 AM – 12:15 PM 12:15 PM – 6:30 PM
April	1-30	2	2	6:00 AM – 1:00 PM 1:00 PM – 8:00 PM
May	1-14	2	2	5:30 AM – 1:00 PM 1:00 PM – 8:30 PM
May	15-31	2	2	1:00 PM – 6:00 PM 6:00 PM – 11:00 PM
June	1-17	2	2	1:00 PM – 6:00 PM 6:00 PM – 11:00 PM
September	1-30	2	2	5:30 AM – 12:45 PM 12:45 PM – 8:00 PM
October	1-31	2	2	6:30 AM – 12:45 PM 12:45 PM – 7:00 PM
November	1-30	2	2	5:00 AM – 11:15 AM 11:15 AM – 5:30 PM

* Shift times were driven by the night time fishing regulation which states, "from September 15th to the first Saturday of the following May, hook and line fishing is prohibited from ½ hour after sunset to ½ hour before sunrise in the tributaries."

Table 2. Estimated annual catch rate (catch per hour) and monthly catch by species for **Milwaukee River Upstream** in 2006.

Species	Catch per hour	Mar/Apr [SD]	May [SD]	Jun [SD]	Sept/Oct [SD]	Nov [SD]	Annual catch [SD]
Coho salmon	0.0009	0	0	0	18 [18]	0	18 [18]
Chinook salmon	0.3140	0	0	0	6320 [1282]	149 [76]	6469 [1294]
Rainbow trout	0.0662	890 [648]	33 [32]	15 [15]	392 [219]	33 [25]	1363 [681]
Brown trout	0.0025	0	0	0	18 [18]	33 [25]	51 [31]
Brook trout	0	0	0	0	0	0	0
Lake trout	0.0071	0	0	0	147 [90]	0	147 [90]
Northern pike	0.0062	18 [13]	39 [33]	0	47 [35]	24 [25]	128 [56]
White perch	0	0	0	0	0	0	0
Smallmouth bass	0.1063	265 [117]	690 [269]	665 [273]	571 [233]	0	2191 [460]
Yellow perch	0.0027	0	0	0	55 [55]	0	55 [55]
Walleye	0.0158	81 [66]	83 [64]	15 [15]	138 [84]	9 [9]	326 [127]
Total angler hours		3495 hrs [712]	1898 hrs [444]	1786 hrs [564]	11974 hrs [1538]	1451 hrs [334]	20604 hrs [1870]

SD = standard deviation

Table 3. Estimated annual catch rate (catch per hour) and monthly catch by species for **Milwaukee River Downstream** in 2006.

Species	Catch per hour	Mar/Apr [SD]	May [SD]	Jun [SD]	Sept/Oct [SD]	Nov [SD]	Annual catch [SD]
Coho salmon	0	0	0	0	0	0	0
Chinook salmon	0.0099	0	0	0	115 [44]	0	115 [44]
Rainbow trout	0.0204	197 [92]	0	0	13 [13]	28 [11]	238 [93]
Brown trout	0.0553	502 [171]	0	0	21 [15]	122 [37]	645 [174]
Brook trout	0.0005	0	0	0	0	6 [6]	6 [6]
Lake trout	0	0	0	0	0	0	0
Northern pike	0.0020	0	0	0	23 [18]	0	23 [18]
White perch	0	0	0	0	0	0	0
Smallmouth bass	0.0160	0	76 [72]	0	111 [76]	0	187 [105]
Yellow perch	0.1228	0	0	0	400 [114]	1033 [269]	1433 [286]
Walleye	0.0051	0	0	0	60 [31]	0	60 [31]
Total angler hours		4957 hrs [1206]	763 hrs [321]	405 hrs [152]	3687 hrs [583]	1857 hrs [368]	11669 hrs [1434]

SD = standard deviation

Table 4. Estimated annual catch rate (catch per hour) and monthly catch by species for **Menomonee River** in 2006.

Species	Catch per hour	Mar/Apr [SD]	May [SD]	Jun [SD]	Sept/Oct [SD]	Nov [SD]	Annual catch [SD]
Coho salmon	0.0017	0	0	0	15 [16]	0	15 [16]
Chinook salmon	0.0630	0	0	0	530 [176]	13 [13]	543 [179]
Rainbow trout	0.0498	398 [158]	0	0	31 [30]	0	429 [163]
Brown trout	0.0065	56 [25]	0	0	0	0	56 [25]
Brook trout	0	0	0	0	0	0	0
Lake trout	0	0	0	0	0	0	0
Northern pike	0.0027	5 [5]	9 [8]	0	9 [9]	0	23 [13]
White perch	0.0262	19 [19]	0	16 [12]	164 [78]	27 [21]	226 [84]
Smallmouth bass	0.0145	45 [26]	51 [27]	0	24 [18]	5 [5]	125 [43]
Yellow perch	0.0026	0	0	0	9 [9]	13 [13]	22 [16]
Walleye	0.0326	107 [48]	30 [16]	0	104 [49]	40 [32]	281 [79]
Total angler hours		3008 hrs [555]	1060 hrs [217]	718 hrs [359]	3144 hrs [471]	687 hrs [234]	8617 hrs [872]

SD = standard deviation

Table 5. Annual directed angling effort, catch, and harvest by species for **Milwaukee River Upstream** in 2006.

Species	Total effort (hrs)	Total catch [SD]	Catch rate (fish/hr)	Total harvest [SD]	Harvest rate (fish/hr)
Coho salmon	3016	18 [18]	0.0009	18 [18]	0.0009
Chinook salmon	11218	6469 [1294]	0.3140	1492 [358]	0.0724
Rainbow trout	8463	1363 [682]	0.0662	173 [128]	0.0084
Brown trout	4058	51 [31]	0.0025	24 [24]	0.0012
Brook trout	0	0	0	0	0
Lake trout	647	147 [90]	0.0071	29 [29]	0.0014
Northern pike	590	128 [56]	0.0062	0	0
White perch	0	0	0	0	0
Smallmouth bass	3245	2191 [460]	0.1063	51 [36]	0.0025
Yellow perch	161	55 [55]	0.0027	18 [18]	0.0009
Walleye	1687	326 [127]	0.0158	15 [16]	0.0007

Note: Catch, catch rate, harvest and harvest rate are calculated based on overall angling hours. SD = standard deviation

Table 6. Annual directed angling effort, catch, and harvest by species for **Milwaukee River Downstream** in 2006.

Species	Total effort (hrs)	Total catch [SD]	Catch rate (fish/hr)	Total harvest [SD]	Harvest rate (fish/hr)
Coho salmon	931	0	0	0	0
Chinook salmon	1982	115 [45]	0.0099	74 [32]	0.0063
Rainbow trout	7142	238 [93]	0.0204	201 [82]	0.0172
Brown trout	7801	645 [174]	0.0553	521 [141]	0.0446
Brook trout	0	6 [6]	0.0005	0	0
Lake trout	25	0	0	0	0
Northern pike	178	23 [18]	0.0020	8 [8]	0.0007
White perch	0	0	0	0	0
Smallmouth bass	963	187 [105]	0.0160	0	0
Yellow perch	2979	1433 [287]	0.1228	533 [112]	0.0457
Walleye	1713	60 [31]	0.0051	36 [18]	0.0031

Note: Catch, catch rate, harvest and harvest rate are calculated based on overall angling hours. SD = standard deviation

Table 7. Annual directed angling effort, catch, and harvest by species for **Menomonee River** in 2006.

Species	Total effort (hrs)	Total catch [SD]	Catch rate (fish/hr)	Total harvest [SD]	Harvest rate (fish/hr)
Coho salmon	372	15 [16]	0.0017	0	0
Chinook salmon	971	543 [179]	0.0630	114 [56]	0.0132
Rainbow trout	2275	429 [163]	0.0498	45 [23]	0.0052
Brown trout	963	56 [25]	0.0065	35 [21]	0.0041
Brook trout	0	0	0	0	0
Lake trout	75	0	0	0	0
Northern pike	375	23 [13]	0.0027	5 [5]	0.0006
White perch	70	226 [84]	0.0262	62 [31]	0.0072
Smallmouth bass	504	125 [43]	0.0145	0	0
Yellow perch	357	22 [16]	0.0026	22 [16]	0.0026
Walleye	3287	281 [79]	0.0326	39 [20]	0.0045

Note: Catch, catch rate, harvest and harvest rate are calculated based on overall angling hours. SD = standard deviation

Table 8. Directed angling effort for walleye in Milwaukee River Upstream, Milwaukee River Downstream and Menomonee River in 2006.

Survey area		Mar/Apr	May	Jun	Sept/Oct	Nov	Annual
Mil. R. Upstream	Effort (hrs)	358	476	146	444	263	1687
	Catch	81	83	15	138	9	326
	Catch rate	0.0232	0.0437	0.0084	0.0115	0.0062	0.0158
	Harvest	0	0	15	0	0	15
	Harvest rate	0	0	0.0084	0	0	0.0007
Mil. R. Downstream	Effort (hrs)	201	87	71	1223	131	1713
	Catch	0	0	0	60	0	60
	Catch rate	0	0	0	0.0163	0	0.0051
	Harvest	0	0	0	36	0	36
	Harvest rate	0	0	0	0.0098	0	0.0031
Menomonee R.	Effort (hrs)	937	556	10	1379	405	3287
	Catch	107	30	0	104	40	281
	Catch rate	0.0356	0.0283	0	0.0331	0.0582	0.0326
	Harvest	0	0	0	26	13	39
	Harvest rate	0	0	0	0.0083	0.0189	0.0045
Total for the survey	Effort (hrs)	1496	1119	227	3046	799	6687
	Catch	188	113	15	302	49	667
	Catch rate	0.0164	0.0304	0.0052	0.0161	0.0123	0.0163
	Harvest	0	0	15	62	13	90
	Harvest rate	0	0	0.0052	0.0033	0.0033	0.0022

Note: Catch, catch rate, harvest and harvest rate are calculated based on overall angling hours.

Table 9. Size of angler caught walleye in the three survey areas in 2006.

No. of walleye measured	Length range (in)	Weight range (lbs)	Avg. total length (in)	Avg. weight (lbs)
12	10 - 22	1 - 3	16.08 [SD=3.53]	1.56 [SD=0.73]

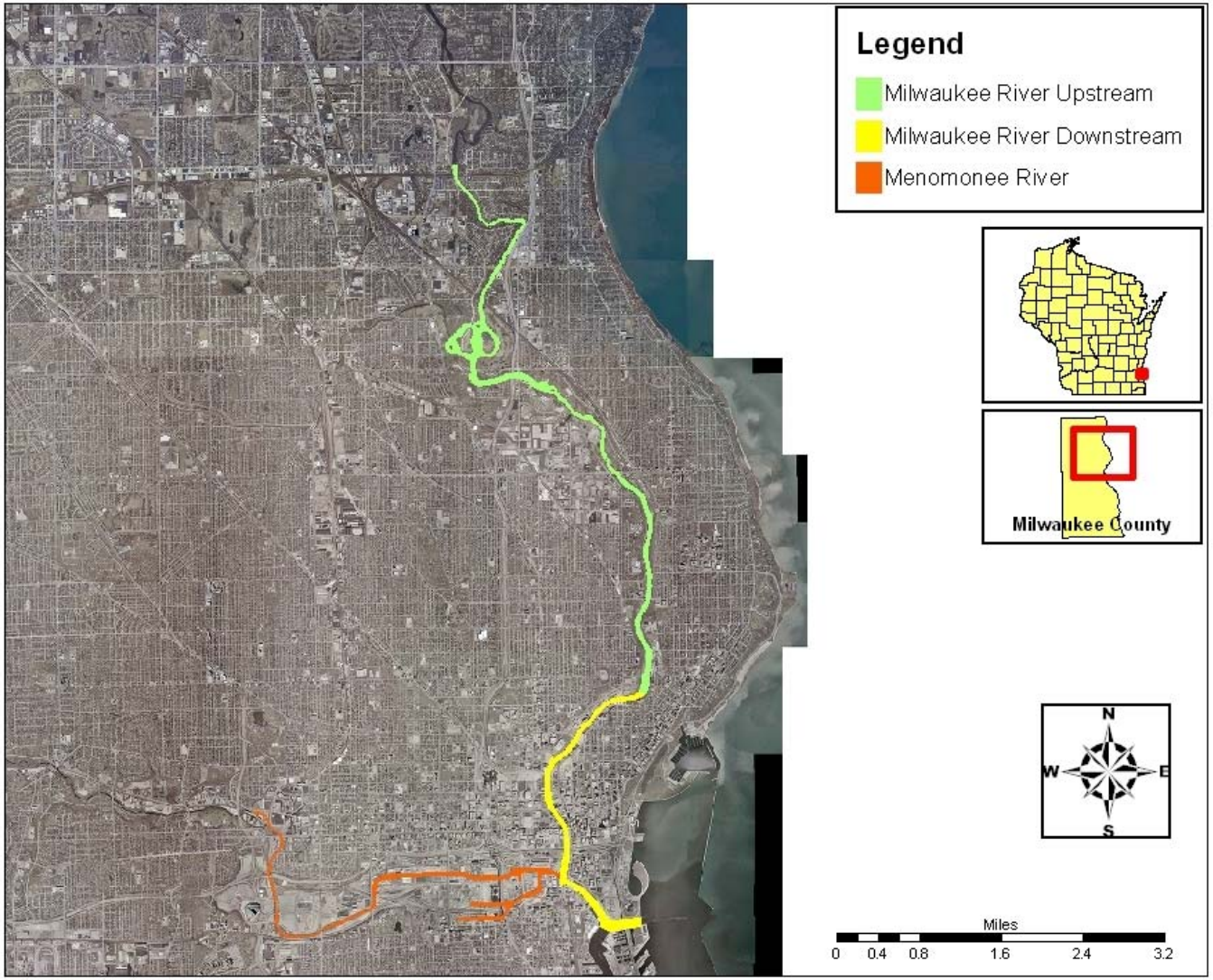

Figure 1. Overview of creel survey area, Milwaukee County, Wisconsin.

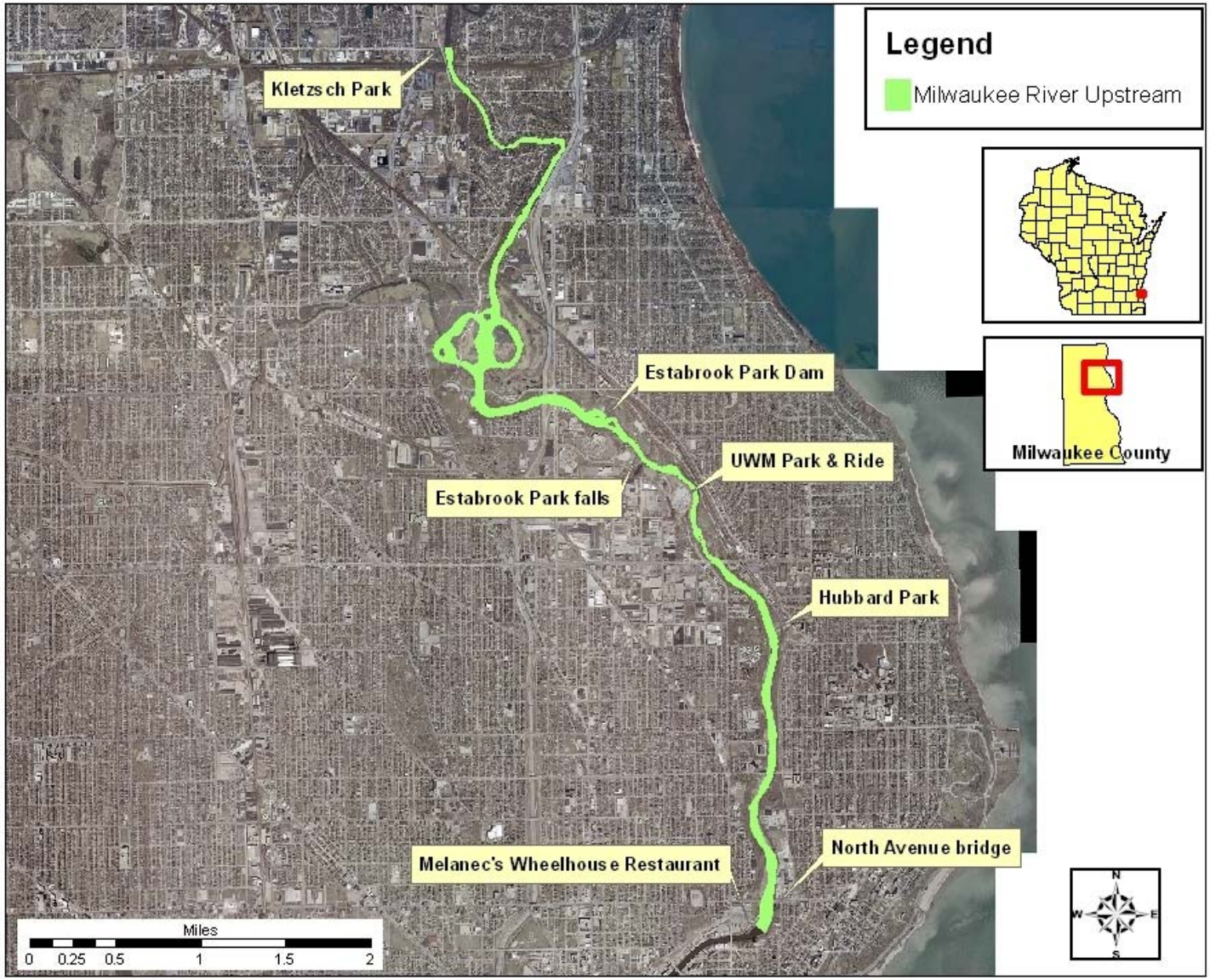

Figure 2. Milwaukee River Upstream survey site and access points.

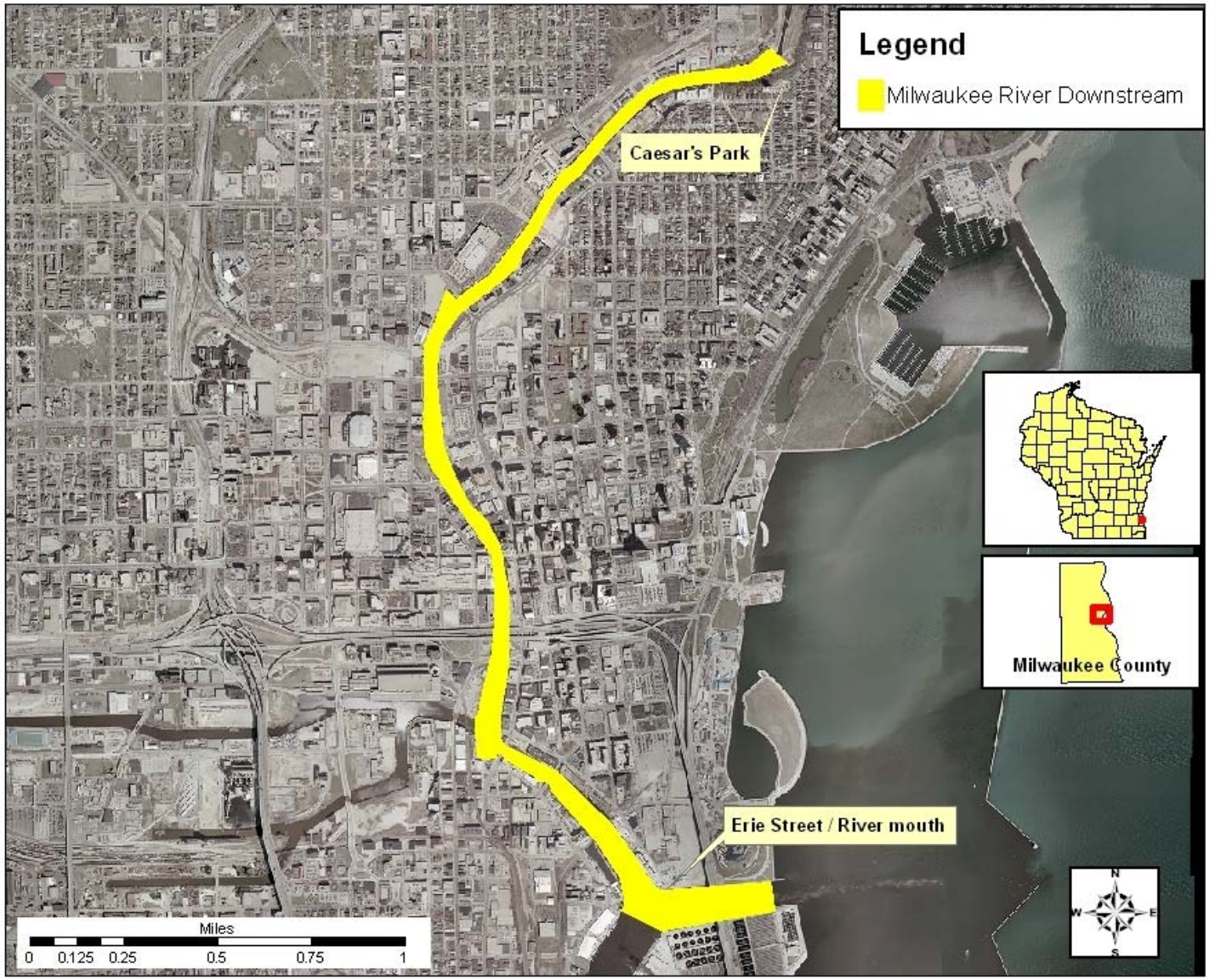

Figure 3. Milwaukee River Downstream survey site and access points.

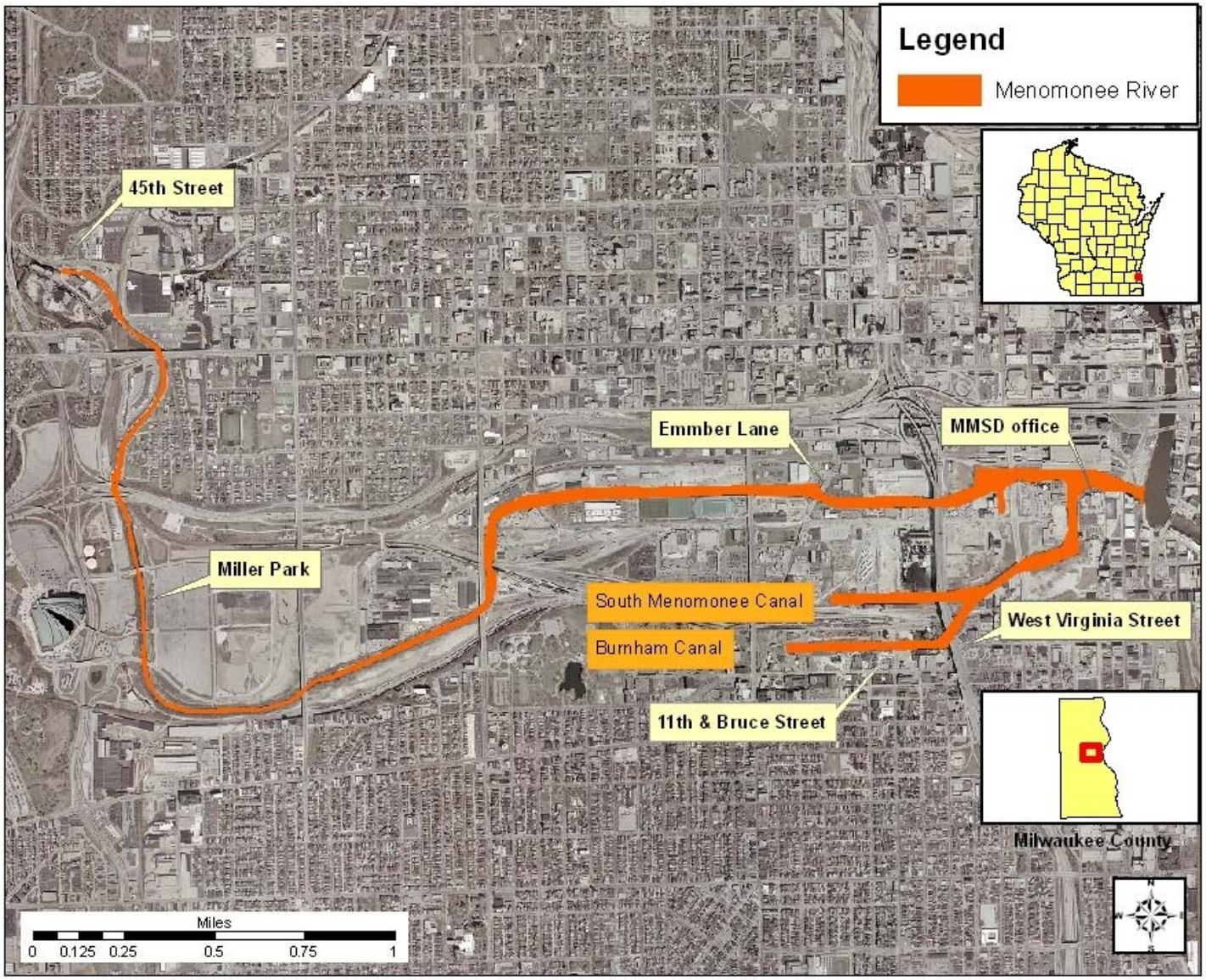

Figure 4. Menomonee River survey site and access points.

Photo 1. Milwaukee River Upstream – Kletzsch Park.

Photo 2. Milwaukee River Upstream – Estabrook Park falls.

Photo 3. Milwaukee River Upstream – North Avenue bridge.

Photo 4. Milwaukee River Downstream – Caesar's Park.

Photo 5. Milwaukee River Downstream - Erie Street/River mouth.

Photo 6. Menomonee River – Miller Park.

Photo 7. Menomonee River – MMSD office.

Photo 8. Menomonee River, Burnham Canal – 11th & Bruce Street.