Lower Menominee River AOC Fish Reference Site Monitoring

Final Report

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Review of Deliverables Completed

In 2012, a project team of fisheries experts from Michigan Department of Natural Resources (MDNR), Wisconsin Department of Natural Resources (WDNR), and the U.S. Fish and Wildlife Service were assembled to review existing fisheries data for the Lower Menominee River Area of Concern (AOC) and establish restoration targets (recruitment targets) for select fish species. This effort was coined the "Fisheries Data Roundup." The AOC was broken into two sections: the Lower Scott Flowage (Menominee River between the Park Mill and Menominee Dams) and the Lower Menominee River (Menominee River below the Menominee Dam). After reviewing available data, the team determined that yellow perch had achieved their restoration target for the lower river, but recommended collecting additional fisheries data for the Lower Scott Flowage, Lower Menominee River, and reference sites before assessing other species. Recommended data collection was completed in 2013, 2014, and 2015 by fisheries staff from the WDNR and MDNR with funding from the Great Lakes Restoration Initiative. This report details the results and conclusions of those data collection efforts.

A scope of work and quality assurance project plan were developed in 2013 and uploaded to the WDNR Surface Water Integrated Monitoring System (SWIMS) database, which was used to store project information and share it with the team members. The WDNR completed electrofishing surveys on the Lower Scott Flowage, Lower Menominee River, and Peshtigo River reference site. The MDNR completed survey work on the Escanaba River reference site. Data from surveys conducted in Wisconsin waters have been uploaded to the WDNR Fisheries Management Database. Photocopies of 2014, 2015, and 2016 field data sheets and photographs of field work in progress are included as Appendices A and B of this report.

The project team met twice in 2013 to discuss results from the Lower Scott Flowage. The minutes from those meetings are included as Appendices C and D of this report. The project team then discussed results from the Lower Menominee River in 2016, and the minutes from that meeting are included as Appendix E.

This project advances the objectives set in the *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update* (WDNR and MDEQ, 2013) and *2014 Remedial Action Plan Update* (WDNR and MDEQ, 2015), making progress towards the removal of the "degradation of fish and wildlife populations" and "loss of fish and wildlife habitat" beneficial use impairments (BUIs). Determining the recruitment status for target species of fish in the AOC is a necessary step towards meeting the restoration goals for the AOC. This report will be made available to the Lower Menominee River Citizens and Technical Advisory Committees, and will be referenced in the final BUI removal request for the fish and wildlife habitat and populations BUIs.

Summary of Challenges Encountered

Dredging activities in the South Channel prevented the Lower Menominee River survey from occurring in that area in 2012, 2013, and 2014. The South Channel was included in the 2015 survey. Field crews did not experience other notable difficulties or challenges while conducting their work.

Results

LOWER SCOTT FLOWAGE

Survey Date	4/25/2011	5/24/2011	5/22/2012	5/20/2013	**Average CPE (2011-2013)**	**Restoration Goal Percentile**	**2011-2013 Calculated Percentile**
Species Catch Totals							
Bluegill		3	4	5	3.4	25th	**4.6**
Largemouth Bass	1	0	0	0	0.1	"	**20.3**
Northern Pike	14	8	1	0	1.7	"	**30.5**
Rock Bass		28	14	14	14	"	**47.8**
Smallmouth Bass	7	87	11	41	14.5	"	**44.1**
Walleye	31	24	0	7	4.7	"	**50.9**

Table 1. Spring electrofishing catch totals and average catch-per-effort (CPE; number of individuals caught per mile) in the Lower Scott Flowage. A blank cell indicates that the species was not targeted in that survey. Average CPE and calculated percentile are derived from information found in the Lower Menominee River AOC Fisheries Data Roundup Final Report (2013).

Survey Date	9/16/1987	10/4/1989	7/31/2003	8/4/2003	10/3/2011	10/1/2012	**Average CPE (1987-2012)**	**Restoration Goal Percentile**	**1987-2012 Calculated Percentile**
Species Catch Totals									
Bluegill	7	16	0			5	2.8	25th	**24.3**
Largemouth Bass	5	0	0	0	2	4	0.9	-	**53.4**
Northern Pike	1	11	0	3	7	0	2.0	-	**3.6**
Rock Bass	53	80	21			38	18.3	-	**94.5**
Smallmouth Bass	26	8	0	29	50	22	12.0	-	**81.2**
Walleye	16	22	18	0	7	12	4.1	-	**16.8**

Table 2. Fall electrofishing catch totals and species specific average CPE (number per mile) in the Lower Scott Flowage. A blank cell indicates that the species was not targeted in that survey. Average CPE and calculated percentile are derived from information found in the Lower Menominee River AOC Fisheries Data Roundup Final Report (2013).

LOWER MENOMINEE RIVER

Survey Date	10/23/2012	9/23/2013	09/30/2014	10/13/2015	**Average CPE (2012-2015)**	**Restoration Goal Percentile**	**2012-2015 Calculated Percentile**
Species Catch Totals							
Muskellunge	2	0	0	4	0.73	25th	**94.2**
Largemouth Bass	5	4	0	3	1.80	"	**91.4**
Northern Pike	1	1	1	5	1.00	"	**44.8**
Smallmouth Bass	1	0	2	2	0.70	"	**41.9**
Walleye	12	0	23	19	7.73	"	**79.1**

Table 3. Fall electrofishing catch totals and species specific average CPE in the Lower Menominee River. Average CPE is based on catch totals and either 1.5 mile survey effort (2012, 2013, and 2014) or 2.5 mile survey effort (2015). Calculated percentile is derived from information found in the Lower Menominee River AOC Fisheries Data Roundup Final Report (2013)

PESHTIGO RIVER

Survey Date	10/01/2013	09/29/2014	10/12/2015	**Average CPE (2013-2015)**
Species Catch Totals				
Muskellunge	0	0	0	0.00
Largemouth Bass	0	0	0	0.00
Northern Pike	4	0	2	0.89
Smallmouth Bass	5	18	4	4.00
Walleye	0	0	1	0.15

Table 4. Fall electrofishing catch totals and species specific average CPE in the Peshtigo River. Average CPE is based on catch totals and 2.25 mile survey effort.

ESCANABA RIVER

Survey Date	10/7/2013	10/08/2014	10/09/2015	**Average CPE (2013-2015)**
Species Catch Totals				
Muskellunge	0	0	0	0.00
Largemouth Bass	0	0	0	0.00
Northern Pike	18	55	23	13.51
Smallmouth Bass	16	5	1	3.03
Walleye	9	8	7	3.40

Table 5. Fall electrofishing catch totals and species specific average CPE in the Escanaba River. Average CPE is based on catch totals and either 2.43 mile survey effort (2013 and 2014) or 2.19 mile survey effort (2015).

Conclusions

Lower Scott Flowage

Members of the project team met twice in 2013 to discuss results from the Lower Scott Flowage. Meeting records are included with the Lower Menominee River Technical Advisory Committee meeting minutes and are stored by the WDNR AOC program in Green Bay. They are also included in this report as Appendices C and D.

During the June meeting, the team qualitatively concluded that while smallmouth and rock bass populations did not require assistance, other Lower Scott Flowage target species could benefit from habitat improvement work. The "11th Avenue Pool" project was the only habitat improvement project identified in the Lower Menominee River AOC Remedial Action Plan within the flowage. Concerns over project longevity, pending sediment contaminant characterization work, and need were discussed at the July meeting. The team concluded that due to the uncertain impact of future sedimentation and the perceived quality of existing habitat that restoration work at the 11th Avenue Pool should only be part of the Lower Menominee River AOC Remedial Action Plan if a future sediment remediation disturbs the area. The intent would be to return habitat disturbed during sediment remedial activities to a beneficial state. If sediment remediation would be found to be unnecessary, no further habitat improvement actions in the flowage would be required by the Remedial Action Plan.

Other than bluegill, all target species were above the 25th percentile restoration goal in at least one monitoring season (Tables 1-2). The team stopped short of saying that all target species populations were meeting their targets, but did discuss the reasons why this may be the case:

- The 11th Avenue Pool was not surveyed during electrofishing events because of shallow water depth and dense vegetation. Both factors could cause damage to electrofishing equipment, but also attract bluegill and juvenile fish.
- A Fyke net survey conducted in 2006 near the 11th Avenue Pool found bluegill to be common.
- Downstream fish passage improvements planned for the Park Mill Dam will benefit all Lower Scott Flowage target species.

The 2013 Interim Report (WDNR, 2014) concluded that the Lower Scott Flowage target species populations were currently meeting their restoration targets, but that the target would not be considered achieved until results of the sediment characterization work had been obtained. If sediment remediation was required in the 11th Avenue Pool area, then post-remedial habitat restoration would be required before this target would be considered achieved.
Results of the sediment characterization in the Lower Scott Flowage became available in 2014, and they showed that remediation will not be needed in the flowage (CH2MHill, 2014). **Thus, we can consider the target met for the Lower Scott Flowage.**

Lower Menominee River

Members of the project team met again (via conference call) in October of 2016 to discuss results from the Lower Menominee River (below the Menominee Dam), Escanaba River, and Peshtigo River data analysis. Meeting records are included with the Lower Menominee River Technical Advisory Committee meeting minutes and are stored by the WDNR AOC program in Green Bay. They are also included in this report as Appendix E.

The preliminary results showed that all target species other than northern pike were above the 25th percentile restoration goal. Therefore, much of the meeting was spent discussing possible reasons for the low pike numbers in the lower river and how pike habitat would be improved through two soon-to-be-completed habitat restoration projects—the Menekaunee Harbor project and the South Channel project. The team agreed to not require additional data collection to confirm northern pike population improvement before removal of the "loss of fish and wildlife habitat" and "degradation of fish and wildlife populations" BUIs.

After correcting some of the data analysis, the final data set (Tables 3, 4, and 5) shows that all target species, including northern pike, are meeting the 25th percentile restoration goal. The South Channel and Menekaunee Harbor restoration projects are expected to improve habitat for northern pike and other fish species in the area, potentially increasing recruitment in the future. **Thus, we can consider the target met for the Lower Menominee River.**

References

CH2MHill, 2014. *Final Site Characterization Report: Assessment of Contaminated Sediments in the Lower Scott Flowage in Menominee River Area of Concern.* CH2MHILL for USEPA. U.S. Environmental Protection Agency, 77 West Jackson Boulevard, Chicago, IL 60604.

Wisconsin Department of Natural Resources (WDNR), 2013. *Lower Menominee River AOC Fisheries Data Roundup Final Report*. WDNR, 2984 Shawano Ave, Green Bay, WI 54313. http://dnr.wi.gov/topic/GreatLakes/documents/MenomineeRiverFisheriesDataRoundupFinalReport.pdf

Wisconsin Department of Natural Resources (WDNR), 2014. *Menominee River AOC Fish Reference Site Monitoring 2013 Interim Report.* WDNR, 2984 Shawano Ave, Green Bay, WI 54313.

WDNR and MDEQ, 2013. *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update for the Lower Menominee River Area of Concern.* http://dnr.wi.gov/topic/greatlakes/documents/Menominee2013FishAndWildlifePlan.pdf

WDNR and MDEQ, 2015. *2014 Remedial Action Plan Update for the Lower Menominee River Area of Concern.* http://dnr.wi.gov/topic/greatlakes/documents/Menominee2014RAPUpdate.pdf

Appendix A Photocopies of 2013, 2014, and 2015 field data sheets

(Interstate Bridge) Start 45.105726 / -87.625222

(Ogden St. Bridge) End 45.095511 / -87.598648

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 4-92

~~Lake~~ Lower Menominee River MWB Code: _____ Date: 9/23/13 County: Marinette Collector: Lange, Ryan, Kussow

Target Fish: ~~[illegible]~~ Z100 Survey Type: _____ Mark Given: _____ H_2O Temp: 61 F Time ___ : WAE

Adverse Conditions: _____ H_2O Conduct: _____ Station: AOC / Fall run

Volts: 275 Amps: 10 Current Type (AC/DC/Pulsed DC) Pulse Rate: 50 Duty Cycle: 25

Gear Type: Boomshocker Start Time: 19:00 End Time: 19:43 Distance Shocked: 1.5 mi.

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 1/4 in. H_2O Clarilty: (Clear/Turbid/Very Turbid)

Length in M.M.s

	NP mm	Y. Perch	B Gill	LMB	P. Seed				
	363	220		114	122				
		235		111	113				
		274		119	111				
		167		87	109				
		84							
		160							

(oracle)

ENTERED BSR 9/30/13

Bow fin (1)

White Sucker 1+1 (2)

Carp 5+6 (11)

Redhorse 20 (23)

Log Perch (1)

Emerald Shiner (1)

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Start Time 6:45 pm End " 7:43 pm 4-92

Lake Peshtigo River MWB Code: _____ Date: 10 / 1 / 13 County: Marinette Collector: RL, RR, LK

Target Fish: All Survey Type: Index Mark Given: — H_2O Temp: 62 Time 6:45 pm

Adverse Conditions: Clear South wind H_2O Conduct: _____ Station: Peshtigo R. Index

Volts: 300 Amps: 14 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 Duty Cycle: 25

Gear Type: Boom Shocker Start Time: 6:45 pm End Time: 7:43 pm Distance Shocked: 2.25

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 1/2" H_2O Clarity: (Clear/Turbid/Very Turbid)

	1 ← Counts →								
	G. Redhorse	W. Sucker	Carp	C. Musk	Golden Shiner	Common Shiner			
	421	2	2	1	1	2			
	294	1							
	115	1							
	501								
	1								
	6								
	3								
	5								
	Lengths								
SMB	232mm								
NP	268								
SMB	398								
NP	243								
Y. Perch	66								
NP	255								
Rock Bass	140								
Rock Bass	168								
SMB	321								
2	215								
2	350								
Y. Perch	138								
N.P.	311								
Y. Perch	153								
	86								
	144								
	120								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Rev. 5-95

Lake ESCANABA RIVER MWB Code: ____ Date: 10 / 7 / 13 County: DELTA Collector: KRAMER

Target Fish: NOP, SMB, WAE, LMB, MUS Survey Type: ____ Mark Given: N/A H_2O Temp: 58.8 °F Time 8 : 30

Adverse Conditions: NONE H_2O Conduct: ____ Station: ____

Latitude: 45.79415 Longitude: -87.07782 6 stars lat: 45.77863 lon: -87.065086 end

Volts: ~ Amps: 5.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 pps Duty Cycle: ~

Gear Type: boomshocker Start Time: 8:30 pm End Time: 9:19 pm Distance Shocked: 6,909 ft.

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 3/8" H_2O Clarity: (Clear/Turbid/Very Turbid)

Site-7 ESCANABA RIVER - Southside (escanaba side) bank at main channel

NOP	SMB	WAE	LMB	MUS
22.3	6.5	11.4		
14.1	7.9	7.7		
18.5	4.9	13.4		
21.6	7.4	17.3		
12.3	18.2	11.7		
23.7	2.8	15.2		
12.5	3.7	12.4		
12.8	7.3			
13.5	7.5			
14.4				
12.9				
N=11	N=9	N=7	N=0	N=0

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

(2)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Rev. 5-95

Lake Escanaba River ~~MWB Code:~~ Date: 10 / 7 / 13 County: Delta Collector: Kramer

Target Fish: NOP, MUS, WAE, Bass Survey Type: Mark Given: N/A H_2O Temp: 58.8 °F Time :

Adverse Conditions: very shallow ~~H_2O Conduct:~~ ~~Station:~~

Latitude: 45.79425 Longitude: -87.07774 ← start lat: 45.78439 lon: -087.07009 ← end

Volts: – Amps: 5.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 pps Duty Cycle: –

Gear Type: boomshocker Start Time: 10:25 pm End Time: 11:03 pm Distance Shocked: 4,560 ft.

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/Turbid/Very Turbid)

site → Escanaba River - northeast (Gladstone side) bank of main channel

	NOP	SMB	WAE	LMB	MUS				
	20.5	12.5	11.3						
	11.6	7.8							
	13.0	8.1							
		16.2							
		8.4							
	N=3	N=5	N=1	N=0	N=0				

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

(2)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Rev. 5-95

Lake Escanaba River MWB Code: _____ Date: 10 / 7 / 13 County: Delta Collector: Kramer

Target Fish: NOP, sma, LMB, bass Survey Type: _____ Mark Given: n/a H_2O Temp: 58.8° Time ____ : ____

Adverse Conditions: very shallow H_2O Conduet: _____ Station: _____

Latitude: 45.78678 Longitude: -87.06878 ← start lat: 45.78937 lon: -87.06962 ← end

Volts: ~ Amps: 5.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 pps Duty Cycle: ~

Gear Type: boom shocker Start Time: 11:17 pm End Time: 11:29 pm Distance Shocked: 1,377 ft.

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/Turbid/Very Turbid)

Site 7 Escanaba River - northeast (Gladstone side) small side channel behind islands

	NOP	SMB	LMB	LMB	MUS				
	20.1	18.0	18.9						
	13.5	6.3							
	12.5								
	8.7								
	N: 4	N: 2	N: 1	N: 0	N: 0				

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 4-92

Lake Lower Peshtigo River MWB Code: _____ Date: 09/29/14 County: Marinette Collector: Rod Lange, Ron Rhode, Steve Surondonk

Target Fish: Walleye Survey Type: Walleye Index/AOC Mark Given: — H_2O Temp: 62°F Time 18 : 30

Adverse Conditions: No H_2O Conduct: — Station: Upstream BB Landing to Mouth

Volts: 300 Amps: 12 Current Type (AC/DC/(Pulsed DC)) Pulse Rate: 50 Duty Cycle: 25%

Gear Type: Maxi - Boomshocker Start Time: 18:30 End Time: 19:25 Distance Shocked: 2.25 miles

# of Dippers: (1(2)) Entire Shoreline Shocked: (Y(N)I) Dip net mesh size: .25 Delta H_2O Clarilty: ((Clear)/Turbid/Very Turbid)

Smallmouth Bass Lengths in mm	Common Shiner	Emerald Shiner	Rosyface Shiner	Gizzard Shad	Yellow Perch	Shorthead Redhorse	Golden Redhorse	White Sucker	
403 mm									
388	(1)	(1)	(1)	(3)	(2)	(5)	(83)	(3)	
382									
438									
437									
412									
487									
304									
239									
361									
397									
350									
378									
395									
316									
415									
494									
372									
Total (18)									

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 4-92

Lake Lower Menominee River MWB Code: _____ Date: 09/30/14 County: Marinette Collector: Tammie Paoli, Steve Hogler, Red Lange

Target Fish: Walleye Survey Type: Walleye Index/AOC Mark Given: — H_2O Temp: 61°F Time 19 : 20

Adverse Conditions: No H_2O Conduct: — Station: Interstate Bridge to Ogden Street

Volts: 300 Amps: 12 Current Type (AC/DC/(Pulsed DC)) Pulse Rate: 50 Duty Cycle: 25%

Gear Type: Maxi-Boomshocker Start Time: 18:40 End Time: 19:20 Distance Shocked: 1.5 miles

# of Dippers: (1(2)) Entire Shoreline Shocked: (Y(N)) Dip net mesh size: .25 Delta H_2O Clarity: ((Clear)/Turbid/Very Turbid)

observed

Walleye Lengths in mm	Northern Pike	Smallmouth Bass	Bluegill	Emerald Shiner	Bowfin	Black Crappie	Chinook Salmon	Steelhead	Yellow Perch
172 mm	432 mm	372 mm							
143		340							
243	(1)	(2)	(2)	(16)	(1)	(2)	(5)*	(1)*	(16)
531									
140									
170									
150									
163			Golden	White					
369	Logperch	Rock Bass	Redhorse	Sucker					
479									
381	(1)	(2)	(6)	(1)					
357									
147									
282									
506									
146									
235									
269									
250									
153									
183									
169									
152									
Total (23)									

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET

Form 3600-186 Rev. 5-95

Lake Escanaba River ~~MWB Code:~~ Date: 10 / 8 / 14 County: Delta Collector: Kramer

Target Fish: NOP, WAE, muskellunge Survey Type: _____ Mark Given: N/A H_2O Temp: 50°F Time ____ : ____

Adverse Conditions: poor visibility: 2-3' ~~H_2O Conduct:~~ ~~Station:~~

Latitude: 45.79415 Longitude: -87.07782 Start → 45.77863 -87.065086

Volts: — Amps: 3.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 pps Duty Cycle: —

Gear Type: boomshocker Start Time: 8:40 pm End Time: 9:28 pm Distance Shocked: 6,900'

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/Turbid/Very Turbid)

site: SW bank of main channel (Escanaba side) MY/cheest, Karpi, Krama 390ys

	NOP	WAE	SMB						
	18.0	9.3	18.2						
	18.6	15.4							
	9.5	6.2							
	17.7	14.3							
	19.5	15.5							
	19.7	6.2							
	10.2	12.5							
	18.9								
	26.5								
	29.4								
	19.5								
	25.1								
	23.1								
	19.5								
	7.7								
	17.4								
	26.6								
	21.2								
	17.9								
	15.8								
	10.2								
	9.9								
	27.2								
	13.8								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

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Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Rev. 5-95

Lake Escanaba River ~~MWB Code:~~ Date: 10 / 8 / 14 County: Delta Collector: Kramer

Target Fish: NOP, WAE, MUS, Bass Survey Type: Mark Given: N/A H_2O Temp: 50°F Time 10 : 04

Adverse Conditions: poor visibility → 2÷3' ~~H_2O Conduct:~~ ~~Station:~~

Start Latitude: 45.79425 Longitude: -87.07774 Stop → 45.78439 -87.07009

Volts: — Amps: 3.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 pps Duty Cycle: —

Gear Type: boomshocker Start Time: 10:04 pm End Time: 10:41 pm Distance Shocked: 4,500

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/Turbid/Very Turbid)

-site - NE bank of main channel (Gladstone side) Mylchreest, Korpi, Kramer 390ps

	NOP	WAE	SMB						
	34.1	10.5	19.3						
	26.5		14.3						
	19.1		13.0						
	24.1								
	18.2								
	28.6								
	21.5								
	21.4								
	21.9								
	20.9								
	18.0								
	12.1								
	19.6								
	14.7								
	18.9								
	24.8								
	13.9								
	9.5								
	8.5								
	17.8								
	24.1								
	21.5								
	12.5								
	7.8								
	7.7								
	8.7								
	12.1								
	8.5								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

(3)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET

Form 3600-186 Rev. 5-95

Lake ESCANABA RIVER ~~MWB Code:~~ Date: 10 / 8 / 14 County: DELTA Collector: KRAMER

Target Fish: NOP, WAE, SMB, Bass Survey Type: _____ Mark Given: N/A H_2O Temp: 60°F Time 10 : 58 AM

Adverse Conditions: poor visibility ~2-3' ~~H_2O Conduct:~~ ~~Station:~~

Latitude: 45.78678 Longitude: -87.06878 Start: 45.78937 -87.06962

Volts: — Amps: 3.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 pps Duty Cycle: —

Gear Type: boat-shocker Start Time: 10:58 PM End Time: 11:13 PM Distance Shocked: 1,400'

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N) Dip net mesh size: 3/8" H_2O Clarity: (Clear/Turbid/Very Turbid)

Site: NE small side channel (behind islands) Mylchreest, Korpi, KRAMER

	NOP	SMB							
	20.5	16.5							
	15.2								
	11.7								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Rev. 5-95

Lake Lower Menominee River MWB Code: 609000 Date: 10 / 13 / 15 County: Marinette Collector: Large Paoli, Rhode

Target Fish: Walleye Survey Type: Walleye / AOC study Mark Given: _____ H_2O Temp: 58°F Time _____ : _____

Adverse Conditions: _____ H_2O Conduct: _____ Station: _____

Latitude: _____ Longitude: _____

Volts: 220V Amps: 15 A Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 Duty Cycle: 25

Gear Type: Maxi-Boomshocker Start Time: 6:27 pm End Time: 7:41 pm Distance Shocked: 2½ miles

# of Dippers: (1)(2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: .25 Delta inch H_2O Clarity: (Clear/Turbid/Very Turbid)

ALL SPECIES COLLECTED

Northern Pike
379 mm ✓
686 ✓
570 ✓
694 ✓
312 ✓
(5) ✓
OK

Walleye
527 ✓
449 ✓
482 ✓
598 ✓
492 ✓
460 ✓
486 ✓
498 ✓
376 ✓
515 ✓
466 ✓
475 ✓
292 ✓
159 ✓ (Photo)
261 ✓
371 ✓
531 ✓
463 ✓
155 ✓ (photo)
(19) ✓
OK

Floy yellow #01403 ✓

Largemouth Bass
108 ✓
116 ✓
115 ✓
(3) ✓
OK

GL Spotted Musky
2822 LV ✓
292 LV ✓
439 R/V (Photo) ✓
308 LV ✓
(4) ✓
OK

Smallmouth Bass
462 ✓
446 ✓
(2) ✓
OK

Rainbow Trout
401 (Photo)
(1) ✓
OK

ENTERED 10/19/15 ✓
Complete and Proofed

White Sucker
(10) ✓
OK

Yellow Perch
(26) ✓
OK

Bowfin
(4) ✓
OK

Common Carp
(5) ✓
OK

Pumpkinseed
(3) ✓
OK

Shorthead Redhorse
(3) ✓
OK

Golden Redhorse
(1) ✓
OK

Silver Redhorse
(3) ✓
OK

Quillback
(1) ✓
OK

Brown Bullhead
(6) ✓
OK

1 adult musky observed near Mystery Ship landing ✓ but not able to net

Shocked in South Channel, to RR bridge & then ✓ back upstream.

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET
Form 3600-186 Rev. 5-95

Lake Lower Peshtigo River MWB Code: 515500 Date: 10/12/15 County: Marinette Collector: Paoli, Lange, Meseberg

Target Fish: Walleye Survey Type: Walleye / AOC Study Mark Given: _____ H_2O Temp: 59°F Time ____ : ____

Adverse Conditions: rain / W wind 20+ mph H_2O Conduct: _____ Station: Above BB landing to mouth

Latitude: _____ Longitude: _____

Volts: 275V Amps: 14A Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 Duty Cycle: 25

Gear Type: Maxi-Boomshocker Start Time: 6:00 pm End Time: 7:00 pm Distance Shocked: 2 1/4 miles

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: .25 inch Delta H_2O Clarilty: (Clear/Turbid/Very Turbid)

ALL SPECIES COLLECTED

Walleye YOY	Smallmouth Bass	Northern Pike		Shorthead Redhorse		Silver Redhorse	13? dorsal rays	Greater Redhorse	14+ dorsal rays
156 mm	483 mm	536 mm		𝍸		𝍸		𝍸	
	461 mm	470 mm				𝍸			
	331 mm					𝍸			
	442 mm					𝍸			
						𝍸			
						𝍸			
						𝍸			
						𝍸			
						𝍸			
						𝍸			
						𝍸			
1	4	2		5		𝍸			
ok	ok	ok		ok					
								2	
						54		ok	
						ok			

White Sucker Adult	White Sucker YOY		Yellow Perch YOY	Yellow Perch Adult	Common Shiner
11	111		𝍸	1	111
			𝍸		
2	3		9	1	3
ok	ok		ok	ok	ok

ENTERED 10/19/15

Complete and Proofed

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET

Form 3600-186 Rev. 5-95

Lake Escanaba River ~~MWB Code:~~ Date: 10 / 09 / 15 County: Delta Collector: J. McWethy

Target Fish: LMB, SmB, NOP, NM4 WAE Survey Type: AOC Mark Given: _____ H_2O Temp: 54 Time 9 : 00 pm

Adverse Conditions: None ~~H_2O Conduct:~~ ~~Station:~~

Latitude: N 45.78389 Longitude: W 87.07043 End: 45.79400 W 87.07850

Volts: _____ Amps: 4.0 Current Type (AC/DC/(Pulsed DC)) Pulse Rate: 60 Duty Cycle: Low Range - 20%

Gear Type: Boom shocker Start Time: 8:27 pm End Time: 9:00pm Distance Shocked: 0.9 miles

# of Dippers: (1/(2)) Entire Shoreline Shocked: ((Y)/N/I) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/(Turbid)/Very Turbid)

NOP	19.3								
NOP	17.2								
NOP	17.7								
NOP	24.3								
NOP	16.2								
NOP	18.7								
NOP	15.5								
NOP	17.8								
NOP	22.9								
NOP	18.4								
NOP	16.8								
WAE	9.8								
WAE	11.0								
WAE	11.8								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET

Form 3600-186 Rev. 5-95

Lake Escanaba River ~~MWB Code:~~ Date: 10 / 9 / 15 County: Delta Collector: J. McWethy

Target Fish: LMB, SMB, NOP, WAE, NMU Survey Type: AOC Mark Given: _____ H_2O Temp: 54 Time 9 : 00 pm

Adverse Conditions: None ~~H_2O Conduct:~~ ~~Station:~~

Latitude: N45.79458 Longitude: W87.07789 End: N 45.78419 W 87.06923

Volts: _____ Amps: 4.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 Duty Cycle: Low Range - 20%

Gear Type: Boomshocker Start Time: 9:13 pm End Time: 9:38 pm Distance Shocked: 0.9 miles

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/Turbid/Very Turbid)

NOP	16.8								
	20.7								
	18.6								
	17.9								
	16.3								
	20.6								
NOP Top Canoe	30.0								
	31.6								
WAE	11.5								
	10.9								
SMB	13.2								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Department of Natural Resources

LAKE ELECTROFISHING DATA COLLECTION SHEET

Form 3600-186 Rev. 5-95

Lake Escanaba River ~~MWB Code:~~ Date: 10 / 9 / 15 County: Delta Collector: J. McWethy

Target Fish: ~~LMB, SMB, NOP, WMU~~ WAE Survey Type: AOC Mark Given: _____ H_2O Temp: 54 Time 9 : 40 pm

Adverse Conditions: None ~~H_2O Conduct:~~ ~~Station:~~

Latitude: N 45.78516 Longitude: W 87.06904 End: N45.78962 W87.07121

Volts: _____ Amps: 4.0 Current Type (AC/DC/Pulsed DC) Pulse Rate: 60 Duty Cycle: Low Range - 20%

Gear Type: Boomshocker Start Time: 9:49 pm End Time: 10:01 pm Distance Shocked: 0.39 miles

# of Dippers: (1/2) Entire Shoreline Shocked: (Y/N/I) Dip net mesh size: 3/8" H_2O Clarilty: (Clear/Turbid/Very Turbid)

NOP	14.7								
NOP	11.9								
NOP	18.2								
NOP	15.2								
WAE	18.0								
	19.1								

Other fish: (Can include rarely caught species and fish greater than 30 inches.)

Appendix B Photographs of field work (more available upon request)

Lower Menominee River survey, October 13th, 2015.

Lower Menominee River survey, October 13th, 2015.

Escanaba River survey, October 8th, 2014.

Escanaba River survey, October 7th, 2013.

Escanaba River survey, October 7th, 2013.

Escanaba River survey, October 7th, 2013.

Appendix C June 2013 Lower Menominee River AOC Technical Advisory Committee meeting minutes

Lower Menominee River Area of Concern
Technical Advisory Committee Meeting
June, 19 2013
1:00pm – 3:00 pm CDT

WDNR Service Center, Peshtigo
101 N Ogden Rd
Peshtigo WI 54157-0208

Dial-in Audio Number: 1-(855)-947-8255 Access Code: 8793-849#
1-(630)-424-2356

Meeting Objectives

1. Determine the next steps regarding assessing the feasibility for modifying fish access and/or carp exclusion from the Seagull Bar pocket.
2. Conclude whether or not all target fish species in the Lower Scott Flowage are meeting their recruitment goals. If not, determine the next steps towards conducting habitat improvement work in the 11th Avenue Pool.
3. Members of the TAC are aware of recent activities associated with the Island Rookery and Menekaunee Harbor habitat restoration projects, and have an opportunity to provide feedback.

Participating

Patrick Hanchin MDNR, Sharon Baker MDEQ, Betsy Galbraith USFWS, Mike Bryant EPA, Ben Uvaas, Andy Fayram, Cheryl Bougie, Tammie Paoli, and Dave Hoffman WDNR

Seagull Bar Pocket: Fish Access and Carp Exclusion

Donofrio, Paoli, and Uvaas noted the presence of a significant number of adult common carp spawning in the Seagull Bar pocket over several dates this spring. The purpose of this discussion was to determine if pursuing the exclusion of carp from the pocket should be an activity required to remove the F&W BUIs. The group discussed various carp exclusion methods while considering other variables which included: maintaining navigation, baseline turbidity and vegetation data, water level variation, and access for desirable species like northern pike. Paoli shared her experiences with the carp exclusion structure at Winegar Pond in Peshtigo. The two structures completed cost of about $400K and required significant permitting to install. The structures are actively managed by WDNR to allow for the passage of desirable fish species during their spawning runs, and they are also designed to allow for seasonal navigation. Lastly, the structures are only designed for about a 3' rise in Green Bay's water level, which is currently 6' below its historic high point. There is currently no known dataset indicating that the spawning of common carp in the Seagull Bar Pocket is negatively impacting another fish species, water quality, or the vegetation community.

→ The Committee determined that there is not enough information available at this time indicating carp exclusion work here should be required for BUI removal. The team supports carp exclusion efforts here as a "tier 2" or Lakewide Management Plan project, but considers it outside what is necessary to remove BUIs.

Fisheries Data Roundup: Lower Scott Flowage Results

The Committee reviewed the Lower Scott Flowage Data which now includes electrofishing data from May 2013. Rock bass and smallmouth bass CPE rates were above goal (25th percentile) in both seasons and bluegill were below goal in both seasons, while northern pike, walleye, and largemouth bass were above in one season and below in another. They felt that the best way to interpret these results were to group the species into qualitative categories. In that spirit, Lower Scott Flowage rock and smallmouth bass populations "do not need help," while bluegill, northern pike, walleye, and largemouth bass populations "may benefit from assistance through habitat improvement."

USFWS 11th Avenue Pool Project

Steve Choy of the USFWS has successfully competed for project funding in an internal opportunity for work with a contaminant link in AOCs. The project will assess the existing habitat and design a habitat improvement project at the 11th Ave Pool (shallow water area west of 11th Ave boat launch). Habitat restoration work will focus on the needs of fish species that may benefit from assistance through habitat improvement, but will also benefit other fish and wildlife species. Work will take place in 2013 and 2014, resulting in a shovel-ready design. Also in 2013, USEPA GLNPO will characterize the Flowage's sediment for contamination. The TAC strongly supported this design work, but wanted to wait until the implementation timeframe was available before tying it to removal of the fish and wildlife BUIs.

→ Choy, Galbraith, and Uvaas will contact individuals from the TAC to provide technical expertise on design development when the time comes.

Agency Updates

Island Rookery Habitat Restoration- Baker informed the group that the Great Lakes Commission will be serving as the fiscal agent for this project. Expertise from the TAC is currently being utilized to develop the project scope. A request for bids will be developed shortly and released in early July. Additional assistance may be requested of the TAC for review of the received bid proposals. All restoration work will take place after the fledging season to avoid disrupting the rookery.

Menekaunee Harbor Restoration- Uvaas and Bougie updated the committee on the Menekaunee Harbor Restoration project. Ayres and WDNR have revised the project scope to include the design of habitat restoration in their existing contract with the City of Marinette. Next the City Council needs to review and approve of the scope and revised contract. Afterward approval, Ayers will approach members of the TAC to provide their technical expertise on restoration design aspects. Plans and designs are expected to be approximately 60% complete by September, and will include multiple opportunities for public input during development.

Other News

→ Uvaas is responsible for draft minutes and will supply a doodle poll link to select the date for the next TAC meeting.

Contact information

Ben Uvaas, Wisconsin DNR
Benjamin.uvaas@wisconsin.gov
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Sharon Baker, Michigan DEQ
BakerS9@michigan.gov
517-335-3310

Appendix D July 2013 Lower Menominee River AOC Technical Advisory Committee meeting minutes

Lower Menominee River Area of Concern
Technical Advisory Committee Meeting Minutes
July, 29 2013
9:00 – 11:00am CDT

WDNR Service Center, Peshtigo
101 N Ogden Rd
Peshtigo WI 54157-0208

Dial-in Audio Number: 1-(855)-947-8255 Access Code: 8793-849#
1-(630)-424-2356

Meeting Objectives

1. Determine whether or not the TAC supports USFWS design work at the 11th Ave Pool
    a. If not, determine how to address fish populations below recruitment goal in flowage
2. Modify and approve of the South Channel Decision Tree

Participating

Mark Erickson CAC, Patrick Hanchin MDNR, Sharon Baker and Ryan McCone MDEQ, Steve Choy USFWS, Mike Bryant EPA, Ben Uvaas, Andy Fayram, Vic Papas, Mike Donofrio, and Tammie Paoli WDNR

11th Avenue Pool and Fisheries Data Roundup Results for the Lower Scott Flowage

Sedimentation/Project Longevity - Uvaas, Baker, and McCone worked prior to the meeting to find a ballpark sedimentation rate for the Lower Scott Flowage. They searched for permitting documents indicating if parts of the Flowage had been dredged in the past, contacted the dam owner, and spoke with local fisheries staff. All sources indicate that the flowage has not been dredged in recent history. Donofrio added that there may be bathymetric maps of the flowage from the 1970s that could be compared to 2012 maps produced during FERC relicensing. Later it was found that the Flowage was not surveyed in the 1970's and 2012 maps wouldn't be helpful.

→ An approximate sedimentation rate could not be developed. Donofrio requested GLNPO to collect bathymetric information as part of the sediment assessment work if possible.

Project Need – The TAC previously identified bluegill, northern pike, walleye, and largemouth bass populations as below the recruitment goal (25th percentile compared to other flowages upstream) in one or both monitoring seasons, and added that they "may benefit from assistance through habitat improvement". Bluegill was recorded as the only species below recruitment goal in both seasons. Donofrio added that the 11th Ave Pool area is not surveyed during electrofishing surveys in the flowage because of shallow water and dense vegetation. Fyke netting conducting in 2006 near the pool found that bluegill and other panfish were common. Others added that electrofishing during the summer, opposed to spring of fall, yields greater numbers of panfish like bluegill. Downstream fish passage efforts are also expected to benefit all species of fish.

→ Participating TAC members felt that a habitat improvement project should not be required to remove BUIs, but supported the project as a means to improve the fishery.

→ If GLNPO sampling finds that sediment remediation is required, habitat restoration should be a component of the work. Shallow water habitat (<3' deep) should be emphasis of any future habitat work.

Existing USFWS Funds – Choy confirmed that USFWS has already set aside funds to complete site assessment work and develop a habitat restoration plan for the 11th Ave Pool. He added that the Service would prefer to see funds spent on projects required for BUI removal, and that funding could be redirected to another site in the AOC as long as it has a contaminated sediment linkage and is required for BUI removal.

→ Choy, Uvaas, and Baker will explore other opportunities in the AOC for this funding.

South Channel Decision Tree

Remediation of the Ansul arsenic site is currently underway, but the next phase of remediation and how it will impact habitat restoration efforts in the South Channel is currently unknown. Uvaas developed a decision tree to record the TAC's priorities spanning a variety of future scenarios. Meeting participants suggested utilizing USFWS funding set aside for 11th Ave Pool work for bio-monitoring of the South Channel, restructuring the table for clarity and, eliminating the option of the South Channel habitat work not being required for BUI removal at this time.

→ Uvaas will update the table and include the revision with meeting minutes.

→ Choy will follow up with others at USFWS to determine if bio-monitoring is an allowable use of these funds.

Agency Updates

Island Rookery Habitat Restoration - The Great Lakes Commission is serving as the fiscal agent for this project. Baker and Uvaas thanked TAC members for their assistance in refining the project scope. A request for bids was released July 16th and bidding closes August 6th. Additional assistance may be requested of the TAC for review of the received bid proposals. A selection will be made August 16th. All restoration work will take place after the fledging season to avoid disrupting the rookery.

Menekaunee Harbor Restoration - Uvaas updated the committee on the Menekaunee Harbor Restoration project. The Marinette City Council has approved of the revised contract with Ayres which includes the design of habitat restoration. Ayers conducted a series of interviews with stakeholders and TAC members to develop conceptual designs for the harbor. Ayres will request the TAC to provide their technical expertise on restoration design specifics when being developed. All plans and designs are expected to be approximately 60% complete by September.

→ Design alternatives to be discussed August 6th, 5:30pm at Marinette City Hall

Other News

→ Uvaas is responsible for draft minutes and will supply a doodle poll link to select the date for the next TAC meeting.

Contact information

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517-335-3310

Appendix E October 2016 Lower Menominee River AOC Fish Reference Site Monitoring Project call minutes

Lower Menominee River Area of Concern
Fish Reference Site Monitoring Call
October 19th, 2016, 2:00 – 3:00 pm CST

Minutes prepared by Laurel Last

Meeting Objectives

- Fish Team learns about and discusses fall electrofishing data analysis results for Lower Menominee River and reference sites (Peshtigo and Escanaba Rivers)
- Fish Team decides on next steps related to the Fish and Wildlife Populations and Habitat BUIs for this AOC

Attendees

Kendra Axness (WDNR), Sharon Baker (MDEQ), Mike Donofrio (WDNR), Darren Kramer (MDNR), Laurel Last (WDNR), Tammie Paoli (WDNR), Ben Uvaas (WDNR)

- Ben went through data analysis for Lower Menominee River and reference sites
    - Followed project QAPP
    - Added 2013, 2014, and 2015 data
    - Used Shapiro-Wilk to test for normality (<0.05 = non-normal)
    - If data non-normal, performed natural log transformation
- Results (Laurel sent out before meeting)

Species	N	Shaprio-Wilk p-value	Transformation	Mean	Std Deviation	Lower River CPE	Percentile	Percentile as %
Largemouth Bass	10	0.000171	LN	-2.985403039	2.782514842	2.4	0.91759	**91.76%**
Muskellunge	10	0.000008	LN	-4.060689711	2.36580225	0.977777778	0.956479124	**95.65%**
Northern Pike	10	0.688085	X	4.721010204	2.281753254	1.111111111	0.021747479	**2.17%**
Smallmouth Bass	10	0.006316	LN	0.040372016	2.585684554	0.488888889	0.387996335	**38.80%**
Walleye	10	0.031015	X	4.157000958	3.117041898	5.2	0.631041034	**63.10%**

- All target species except northern pike meeting 25th percentile objective (see note)
- Group discussed possible reasons for low pike numbers
    - Escanaba River has been very successful for pike in recent years, possibly skewing results
    - Lower Menominee River doesn't have a lot of low-flow, weedy habitat for pike
    - Fall is not best time to survey pike
- Group discussed reasons that low pike numbers are ok
    - Menekaunee Harbor restoration project (completed 2015) improves pike habitat
    - South Channel restoration project (completed by end of 2016) will improve pike habitat (includes channel into wetland area to improve pike spawning access)
- Group discussed next steps

- Ben will re-check data analysis—looking at table, question about why walleye data was not transformed
- Kendra will report back to Donalea (couldn't be on today's call) to see if she has any additional input to the process
- Laurel will put together draft final project report and share with group for review
- Group agreed to not require additional data collection for BUI removal (planned for 2018)
- Laurel will include reasons/explanations listed above in final report, and eventually in BUI removal request document

*After checking data analysis directly after the call, Ben found some mistakes, and that northern pike are actually meeting the 25% objective. New table:

Species	N	Shaprio-Wilk p-value	Transformation	Mean	Std Deviation	Lower River CPE	Percentile	Percentile as %
Largemouth Bass	10	0.000171	LN	-2.985403039	2.782514842	2.4	0.91759	**91.76%**
Muskellunge	10	0.000008	LN	-4.060689711	2.36580225	0.977777778	0.956479124	**95.65%**
Northern Pike	10	0.688085	X	4.721010204	7.179125746	1.111111111	0.307540955	**30.75%**
Smallmouth Bass	10	0.006316	LN	0.040372016	2.585684554	0.488888889	0.387996335	**38.80%**
Walleye	10	0.031015	LN	-0.409161001	3.03646841	5.2	0.751220141	**75.12%**