

**Lower Peshtigo River Watershed  
Nonpoint Source Assessment Report**

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## I. INTRODUCTION

As recommended in the *Upper Green Bay Basin Water Quality Management Plan (1993)*, Lake Michigan District Department of Natural Resources monitored the Lower Peshtigo River watershed (Figure 1) in 1993 to evaluate the extent of nonpoint source impacts on water quality. This information, along with existing watershed data, was used to rank the priority of the watershed for potential selection in the Priority Watershed program.

## II. BACKGROUND

Located in Marinette County, the Lower Peshtigo River watershed consist of the lower 38 miles of the Peshtigo River before it dischargers to Green Bay, tributaries to the Peshtigo River in that 38 mile section, and the Little River which drains directly to Green Bay.

Much of the watershed is forested or wetlands with limited areas of agriculture. Soils are primarily poorly drained, sandy and mucky in glacial lake basins. The community of Peshtigo and part of the city of Marinette are located in this watershed.

Existing water quality data for the Peshtigo River system is extensive. Water chemistry samples have been collected monthly on the Peshtigo River at US 41 in Peshtigo (STORET No. 383001) from 1961 to 1993. These data, along with other historical data can be found in the Department of Natural Resources Lake Michigan District water quality files. Additional water quality data was collected by Wisconsin Public Service Corporation (WPSC) as part of the Peshtigo and Potato Rapids Hydroelectric dam relicensing process (FERC Project Numbers 2581-002 and 2560-001, respectively). For both projects, these data include: water chemistries from the flowage and tailwater; continuous dissolved oxygen, temperature, pH, and specific conductance in the tailwater; flowage profile dissolved oxygen and temperature; sediment analysis; fish surveys; and macrophyte surveys.

## III. METHODS AND PROCEDURES

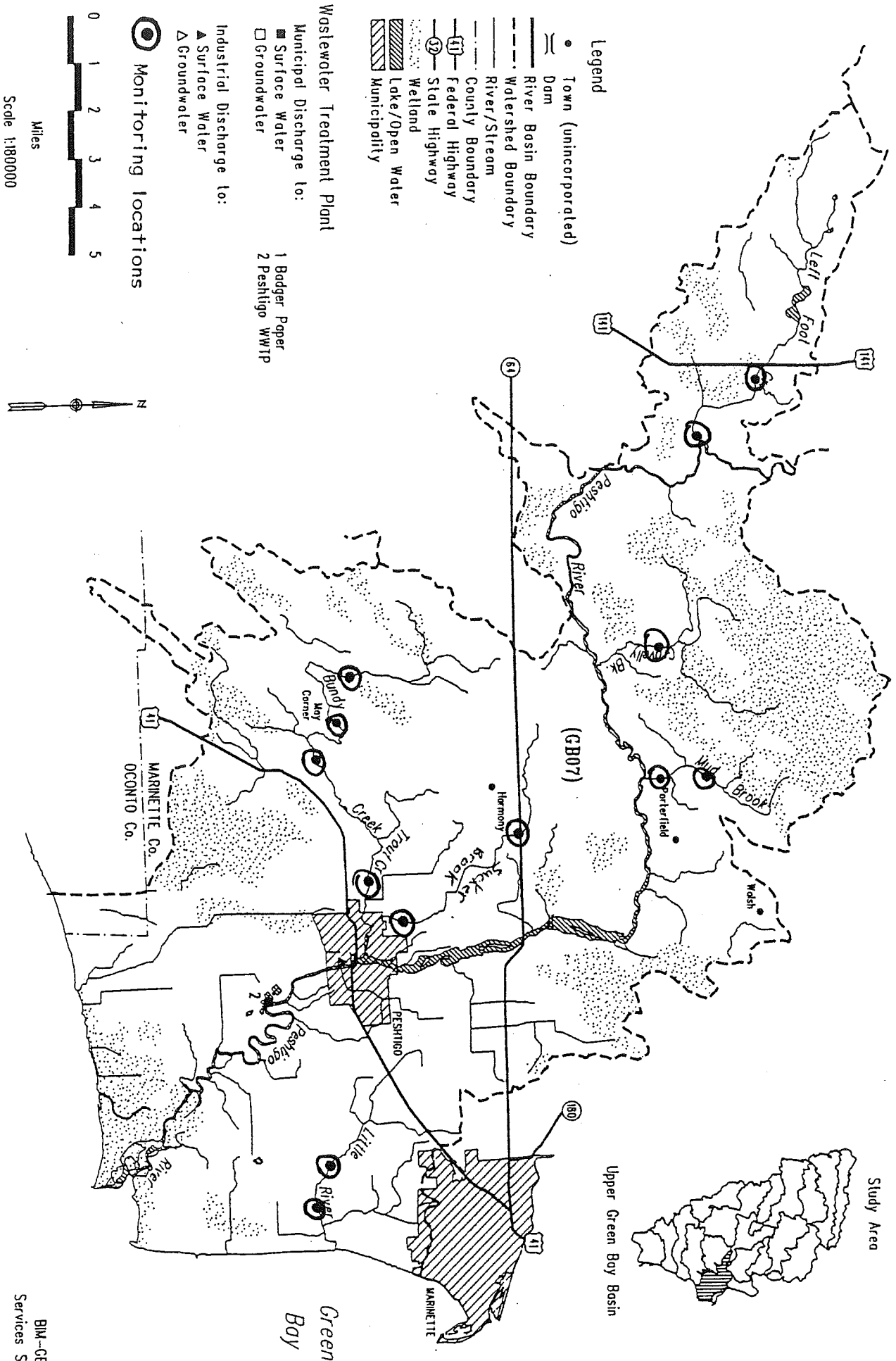
Described below is additional monitoring that was conducted in the Lower Peshtigo River watershed to evaluate the extent of nonpoint source pollution impacts on the water resources.

Stream habitat conditions were evaluated throughout the watershed in the spring and summer and recorded on the Stream Habitat Evaluation Form (Ball, 1982).

Aquatic macroinvertebrates were collected in spring and/or fall at several locations in the watershed and sent to UW-Stevens Point for sorting and identification. Sample results were

Figure 1.

# Lower Peshigo River (GB07) Watershed



evaluated using the Hilsenhoff Biotic Index (HBI) which provides a relative measure of organic loading to the streams (Hilsenhoff, 1987).

Water chemistry samples were collected and preserved following "Sample Handling and Preservation Handbook" protocol (1988). All samples were chilled on ice and sent to the State Lab of Hygiene for analysis. Samples were analyzed for total and dissolved phosphorus, suspended solids, nitrate-nitrogen, ammonia, and biochemical oxygen demand. Stream flows were collected at the same time as chemistry samples so that nutrient loadings could be calculated.

Using criteria defined in the Department of Natural Resources Planner's Guidance (1991), existing and new water quality information was applied to such things as endangered resources, the fishery, water chemistry, macroinvertebrates, vegetation, and physical habitat so the watershed could be ranked for potential selection as a Priority Watershed.

#### IV. RESULTS AND DISCUSSION

Since extensive data exists, no additional data was collected on the Peshtigo River itself; however, since the tributaries to the Peshtigo River has little or no previous data, the nonpoint source assessment was focused on these streams. The Lower Peshtigo River watershed with monitoring locations are shown in Figure 1. A summary of habitat evaluation results, biotic index results, stream classifications, and if the stream is meeting its formal classification for the major tributaries in the watershed are presented in Table 1. Water chemistry and loading results are shown in Table 2. Following is a discussion of monitoring results for each of the major watershed streams.

##### Peshtigo River, Mainstem

Data collected by WPSC shows good water quality in the Peshtigo River system (WPSC, 1991). Monthly water chemistry samples collected by the Department of Natural Resources from 1961 to 1993 found only one dissolved oxygen violation (less than 5 mg/l) and one high suspended solids concentration (greater than 420 mg/l). Ammonia and nitrate-nitrogen concentrations were all low. Hence, nonpoint source pollution does not appear to significantly impact water quality and habitat in the Peshtigo River itself. The mainstem of the Peshtigo River is classified as warm water sport fish.

Table 1.

Water Resource Conditions for Streams in the Lower Peshtigo River Watershed - 1993

Stream	Location	Habitat Rating <sup>1</sup>		Biotic Index <sup>2</sup>		Stream Meeting <sup>3</sup> Classification <sup>4</sup>	Stream Classification <sup>4</sup>
		Spring	Summer	Spring	Fall		
Left Foot Creek	5th Road (T31N,R20E,S13,NWNW)	Good/112	Good/117	Excellent/ 2.63	Very Good/ 3.60	Yes	WWSF
Left Foot Creek	East 26th Road (T31N,R20E,S2,SWSW)	—	Good/125	—	—	Yes	WWSF
Gravelly Brook	Gravelly Brook Road (T31N,R21E,S22,NENW)	—	Fair/182	—	—	Yes	WFFF
Mud Brook	Mud Brook Road (T31N,R21E,S13,SESE)	—	Poor/208	—	—	Unknown	Unknown
Bundy Creek	Town Hall Road-east (T30N,R22E,S21,SESE)	—	Fair/152	—	Good/5.44	Yes	WFFF
Bundy Creek	Church Road (T30N,R22E,S20,SWSE)	—	Fair/141	—	—	Yes	WFFF
Bundy Creek	CTH B (T30N,R22E,S19,NWNE)	—	Fair/148	—	—	Yes	WFFF
Trout Creek	Townline Road (T30N,R22E,S23,SENE)	Fair/136	Good/118	Poor/7.92	Fairly Poor/6.63	Yes	WFFF
Sucker Brook	HWY 64 & CTH E (T30N,R22E,S2,NWNW)	—	Fair/149	—	—	Unknown	Unknown
Sucker Brook	CTH D (T30N,R22E,S13,NWNE)	—	Fair/182	—	Good/5.41	Unknown	Unknown
Little River	Krause Road (T30N,R23E,S25,NESE)	—	Fair/176	—	—	No	WWSF
Little River	CTH B (T30N,R23E,S26,NWNE)	—	Fair/191	—	—	No	WWSF

## 1. Habitat Rating:

<70 = excellent habitat  
71 - 129 = good habitat  
130 - 200 = fair habitat  
>200 = poor habitat

## 3. Stream Meeting Classification:

This indicates if the stream is or is not meeting its formal stream classification.

## 4. Stream Classification:

Cold - cold water trout stream  
WWSF - warm water sport fishery  
WFFF - warm water forage fishery  
LFF - limited forage fishery

## 2. Hilsenhoff Biotic Index (HBI):

Biotic Index      Water Quality      Degree of Organic Pollution

0-3.50      Excellent      No apparent organic pollution

3.51-4.50      Very good      Possible slight organic pollution

4.51-5.50      Good      Some organic pollution

5.51-6.50      Fair      Fairly significant organic pollution

6.51-7.50      Fairly poor      Significant organic pollution

7.51-8.50      Poor      Very significant organic pollution

8.51-10.0      Very poor      Severe organic pollution

Table 2.  
Lower Peshtigo River Watershed  
Water Chemistry and Loading Results - 1993

Location	Date	Flow cfs	BOD <sub>5</sub> mg/l	BOD <sub>5</sub> lbs/day	Ammonia mg/l	Ammonia lbs/day	Nitrate+Nitrite-N mg/l	Nitrate+Nitrite-N lbs/day	Total Phos mg/l	Total Phos lbs/day	Diss Phos mg/L	Diss Phos lbs/day	Susp Solids mg/l	Susp Solids lbs/day	Diss Oxygen mg/l	Temp 'C	pH
Trout Creek (Townline Road)	3/29/93*	124	1.8	1,203.05	0.037	24.73	0.497	332.17	0.06	40.10	0.008	5.35	11	7,351.96	—	—	—
Mud Brook (Mudbrook Road)	3/29/93*	33.8	<1.0	—	0.024	4.37	0.087	15.85	0.03	5.47	0.007	1.28	<2	—	—	—	—
Left Foot Creek (5th Road)	3/29/93* 9/22/93	37.6@	1.4	283.73	0.105	21.28	0.662	134.16	0.04	8.11	0.009	1.82	18	3,647.95	—	—	—
Trout Creek (Townline Road)	6/17/93# 9/16/93	30.1	1.4	227.13	0.092	14.93	0.755	122.49	0.14	22.71	0.036	5.84	26	4,218.21	7.3	13.5	—
Mud Brook (Mudbrook Road)	6/17/93#	—	1.1	—	0.023	—	0.047	—	0.03	—	0.005	—	3	—	7.6	13.0	—
Left Foot Creek (5th Road)	6/17/93# 9/16/93	66	1.5	533.61	0.049	17.43	0.284	101.03	0.06	21.34	0.005	1.78	22	7,826.28	8.1	13.5	7.5
Gravelly Brook (Gravelly Brook Road)	6/17/93# 9/22/93	—	<1.0	—	0.032	—	0.067	—	0.04	—	0.010	—	10	—	7.6	13.0	—
															9.8	12.0	—

\* major snow melt runoff  
# significant rain event runoff  
@ flow estimated

### Left Foot Creek

Left Foot creek is a perennial cold water class II trout stream in the upper 2.5 miles above Left Foot Lake. The lower 5.5 mile are classified as warm water sport fish.

Left Foot Creek received habitat evaluation rankings of good at 5th road and at East 26th Road. The creek substrate is mostly sand with limited gravel in riffle areas. The average creek width is 11 feet. The stream banks are very stable with a diverse growth of trees, shrubs, and grasses.

Macroinvertebrate sampling was difficult because of the lack of suitable gravel riffle habitat; however, samples were eventually collected at 5th Road and received biotic index values of 2.63 and 3.60 which rates Left Foot Creek as excellent to very good water quality with no apparent to possible slight organic pollution present.

Water chemistry samples collected during spring snow melt runoff and a summer rain event showed low concentrations of nutrients, suspended solids, and biochemical oxygen demand. Temperature and dissolved oxygen concentrations were both normal.

### Gravelly Brook

Gravelly Brook is a small perennial warm water forage fish classified stream. Gravelly Brook received a fair habitat rating. The stream substrate is mostly muck, silt, and sand. No gravel could be found to support Gravelly Brook's name. This is likely due to the wetland influence on the stream. Gravelly Brook is fairly wide and deep. Macroinvertebrate samples could not be collected because of the high water. Waterlilys (Nuphar) were common.

Water chemistry samples collected during a summer rain runoff event showed low concentrations of suspended solids and biochemical oxygen demand. Dissolved phosphorus was slightly elevated at 0.01 mg/l, but other nutrient concentrations were low. Temperature and dissolved oxygen concentrations were both normal.

### Mud Brook

Mud Brook is a small perennial stream that has not been formally classified. Mud Brook received a poor habitat rating. Muck is the primary stream substrate. At both Mud Brook Road and Porterfield Road, the creek is slow and wide without a well defined channel. The banks frequently flood and are marsh-like. Macroinvertebrate samples could not be collected because of the lack of gravel riffle areas and deep water.

A plowed field northwest of Mud Brook Road had significant sediment runoff to Mud Brook during a summer rain event; however, water quality samples during that event did not show elevated concentrations of nutrients, biochemical oxygen demand, or suspended solids probably due to dilution. Dissolved oxygen and temperature readings were both normal.

### Bundy Creek

Bundy Creek is a small perennial warm water forage fish classified stream that is tributary to Trout Creek. Bundy Creek received fair habitat ratings at CTH B, Church Road, and the east most crossing at Town Hall Road. At CTH B and Church Road, the creek is narrow and shallow with very little flow; nevertheless, downstream at Town Hall Road, the creek becomes much larger (30-40 feet wide and 2 feet deep) and more stagnant. Macrophytes are common.

The creek bottom in the upper reaches is rock, rubble and other stable habitat. Some filamentous algae and aquatic moss can be found on the rocks in the open unshaded areas. The banks are well protected and no evidence of bank erosion could be seen. Dissolved oxygen and temperature readings were both normal.

A macroinvertebrate sample in fall at Town Hall Road received a biotic index value of 5.44 which rates Bundy Creek as good water quality with some organic pollution present.

### Trout Creek

Trout Creek is a small perennial warm water forage fish classified stream which flows into the Peshtigo Flowage. The upper reaches of Trout Creek above the confluence of Bundy Creek is intermittent.

Trout Creek received a fair habitat rating in the spring and a good rating in the summer at Townline Road. The water is slow moving and deep with minimal riffle areas. The creek substrate is 30-50% rubble, gravel and other stable habitat. Submergent macrophytes and filamentous algae are common in the creek. There is no evidence of bank erosion.

The water was very turbid and muddy color during a summer runoff event. Water chemistry results showed slightly elevated concentrations of total and dissolved phosphorus and suspended solids. Other nutrients and biochemical oxygen demand concentrations were low. Chemistry results from spring snow melt runoff showed low concentrations and loadings with dissolved oxygen and temperature readings normal.



Macroinvertebrate samples in spring and fall received biotic index values of 7.92 and 6.63 at Townline Road which rates Trout Creek as poor to fairly poor water quality with significant to very significant organic pollution.

### Sucker Brook

Sucker Brook is a small perennial stream that flows into Trout Creek just before discharging into the Peshtigo Flowage. Sucker Brook has not been classified.

The entire creek has been ditched which has substantially reduced the natural stream habitat. The upper reaches have very little stream flow (< 1 cfs) in the summer. Habitat evaluations ranked this stream as fair habitat at both the junction of HWY 64 and CTH E and CTH D. Stream substrate is predominantly sand with areas of rock and rubble. The stream banks are generally protected with trees, shrubs, and dense grasses. Dissolved oxygen and temperature readings were all normal.

A macroinvertebrate sample in fall at CTH D received a biotic index value of 5.41 which rates Sucker Brook as good water quality with some organic pollution present.

### Little River

Little River is a perennial warm water sport fish classified stream that discharges directly to Green Bay.

The upper reaches of the Little River have been substantially ditched which has destroyed the streams natural meandering and habitat. The stream received fair habitat ratings at both CTH B and Krause Road although the creek substrate is completely different. At CTH B, the bottom is strictly sand with no rocks or rubble present but at Krause Road, the bottom is completely covered by silt and sediment. Macroinvertebrate samples could not be collected because of the lack of suitable habitat.

Although water chemistry samples were not collected, I noted the stained water was extremely muddy after a significant summer rain event. The stream banks are well protected with shrubs and little bank erosion was evident. Dissolved oxygen and temperature values were normal.

## V. CONCLUSIONS

The Lower Peshtigo River watershed is predominantly wetlands or forested with some agricultural areas. The watershed streams do not appear to be significantly degraded or threatened by nonpoint source pollution. Therefore, this watershed shall be ranked *medium* priority for potential selection in the Nonpoint Source Priority Watershed Program.

## VI. REFERENCES

- Ball, Joe. 1982. Stream Classification Guidelines for Wisconsin. Wisconsin Department of Natural Resources Technical Bulletin.
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