# Pine 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 Florence County portion of the Pine River watershed in 1993 to evaluate the extent of nonpoint source impacts on water quality. This information, along with existing watershed data, will be used to reevaluate the watershed for priority watershed selection.

## II. BACKGROUND

The Pine River watershed consist of the Pine River and its tributaries to the Menominee River. The Pine River is designated as both Wild River (Wisconsin Statutes 30.26) and Outstanding Resource Waters (Wisconsin Administrative Code NR102.10). Most of its tributaries in Florence County are also Outstanding Resource Waters. Outstanding designation means they have the highest value as a resource, excellent water quality, a high quality fishery, and no current wastewater discharge. Wild River designation means the river shall receive special management to assure its preservation, protection, and enhancement of its natural beauty, unique recreational and other inherent values.

Historical data for the Pine River watershed can be found in the Department of Natural Resources Lake Michigan District water quality files. Existing data consist of a 1973 phosphorus survey on the Pine River at CTH N and STH 55; a 1980 macroinvertebrate survey on Halls Creek and at five locations on the Pine River; and lastly, extensive water quality data collected by Wisconsin Electric Power Company as part of the Pine River Hydroelectric dam relicensing process (Wisconsin Electric Power Company, 1992). These data include: water chemistries from the flowage and tailwater; continuous dissolved oxygen, temperature, pH, and specific conductivity; macroinvertebrate monitoring; flowage profile dissolved oxygen, temperature, pH, and specific conductivity; sediment analysis; fish surveys; and macrophyte surveys.

## III. METHODS AND PROCEDURES

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

Aquatic macroinvertebrates were collected in spring or fall at five locations in the watershed and sent to UW-Stevens Point for sorting and identification. Sample results were 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 nutrient loadings could be calculated.

## IV. RESULTS AND DISCUSSION

The Pine River watershed and monitoring locations in Florence County are shown in Figure 1. A summary of habitat evaluation results, biotic index results, stream classifications, and special resource status for the major streams in the Pine River 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.

### Pine River, Mainstem

The mainstem of the Pine River located in Florence County is classified as a cold water trout stream. The entire watershed is primarily forested. No additional monitoring was conducted on the Pine River itself.

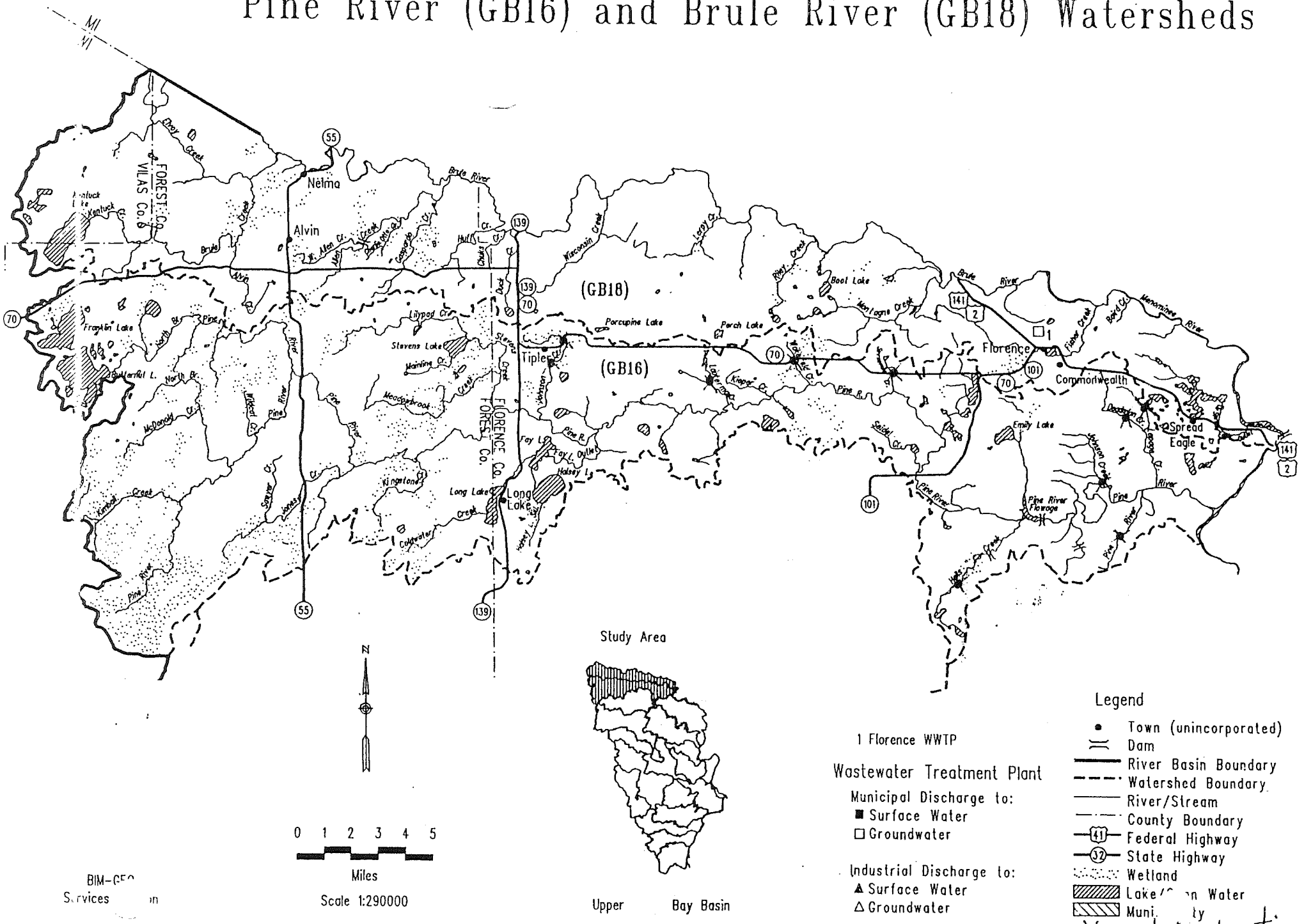
### Halls Creek

Halls creek is a perennial cold water stream designated as Outstanding Resource Waters. Halls Creek originates at Bass Lake, flows through three small lakes and a wetland before discharging to the Pine River flowage. This predominantly sandy bottom stream received good and fair habitat ratings. Macroinvertebrate samples could not be collected because of the lack of stable riffle and gravel areas at Fire Lane Road crossing. Macrophytes are abundant in the unshaded areas and cover much of the stream bottom. Crayfish and minnows are also abundant.

Water chemistry samples collected during a summer rain event on July 19, 1993 showed very low concentrations of nutrients, suspended solids, and biochemical oxygen demand. Dissolved oxygen was in the acceptable range while water temperature seemed a bit high at 81°F.

Figure 1.

# Pine River (GB16) and Brule River (GB18) Watersheds




BIM-GEO Services

Table 1. Water Resource Conditions for Stream in the Pine River Watershed - 1993

| Stream | Location | Habitat Rating[1] Summer | Habitat Rating[1] Fall | Biotic Index[2] Spring | Biotic Index[2] Fall | Stream Classification[3] | Stream Meeting Class[4] | Special Status[5] |
|---|---|---|---|---|---|---|---|---|
| Pine River | Entire River | ___ | ___ | ___ | ___ | Cold | Yes | Wild River ORW |
| Halls Creek | Fire Lane Road (T38N,R17E,S12,NWNW) | Fair/136 | Good/126 | ___ | could not get sample | Cold | Yes | ORW |
| Pine Creek | Roach Fire Lane (T39N,R18E,S25,SWSW) | ___ | Fair/135 | ___ | 3.45/ Excellent | Cold | Yes | ORW |
| Deadman Creek | Sand Lake Road (T39N,R18E,S1,SENW) | ___ | Good/128 | ___ | 3.65/Very Good | Cold | Yes | ORW |
| Sevenmile Creek | HWY 70 (T40N,R17E,S33,NENE) | Fair/136 * | Good/126 | 5.48/Good | ___ | Cold | Yes | ORW |
| Wakefield Creek | HWY 70 (T40N,R16E,S25,NWSW) | Good/121 * | Good/89 | 5.08/Good | ___ | Cold | Yes | ORW |
| Johnson Creek | Dream Lake Road (T40N,R15E,S28,NWSW) | Good/122 * | Good/97 | 7.45/Fairly Poor | ___ | Cold | Yes | ORW |
| Johnson Creek | HWY 70 (T40N,R15E,S21,SWSE) | Fair/154 | ___ | ___ | ___ | Cold | Yes | ORW |
| Lepage Creek | Old 69 (T39N,R19E,S6,NWNW) | ___ | Fair/140 | ___ | ___ | Cold | Yes | ___ |
| Lauterman Creek | Forest Road 2154 (T40N,R16E,S33,SWNW) | ___ | Good/105 | ___ | ___ | Cold | Yes | ORW |
| Johnson Creek | Johnson Creek Road (T39N,R18E,S23,NWNE) | ___ | Fair/146 | ___ | could not get sample | Cold | Yes | ORW |

1. Habitat Rating:
   - <70 = excellent habitat
   - 71 - 129 = good habitat
   - 130 -200 = fair habitat
   - >200 = poor habitat
   - * = average values

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 |

3. Stream Classification:
   - Cold - cold water trout stream
   - WWSF - warm water sport fishery
   - WWFF - warm water forage fishery
   - LFF - limited forage fishery

4. Stream Meeting Class:
   This indicates if the stream is or is not meeting its formal stream classification.

5. Special Resource Status:
   - ORW - Outstanding Resource Waters (Wis. Admin. Code NR102.10)
   - Wild River (Wis. Stats. 30.26)

Table 2.

PINE RIVER WATERSHED
EVENT NUTRIENT LOADING - 1993

| Location | Date | Flow cfs | $BOD_5$ mg/l | $BOD_5$ 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wakefield Creek (HWY 70) | 3/31/93 | 3.9 | 1.5 | 31.53 | 0.149 | 3.13 | 0.146 | 3.07 | 0.03 | 0.63 | 0.015 | 0.32 | 6 | 6.73 | — | — | — |
| Johnson Creek (Dream Lake Road) | 3/31/93 | 6.8 | 1.4 | 51.31 | 0.020 | 0.73 | 0.128 | 4.69 | <0.02 | — | 0.019 | 0.70 | 2 | 25.66 | — | — | — |
| Sevenmile Creek (HWY 70) | 3/30/93 | 2.3 | 1.4 | 17.36 | 0.052 | 0.64 | 0.140 | 1.74 | 0.04 | 0.50 | 0.003 | 0.04 | 26 | 0.50 | — | — | — |
| Wakefield Creek (HWY 70) | 7/19/93 | 1.3 | 1.6 | 11.21 | 0.045 | 0.32 | 0.031 | 0.22 | 0.06 | 0.42 | 0.011 | 0.08 | 9 | 0.56 | 7.3 | 21 | 8.1 |
| Johnson Creek (Dream Lake Road) | 7/19/93 | 1.7 | <1 | — | 0.017 | 0.16 | 0.032 | 0.29 | <0.02 | — | 0.005 | 0.05 | <2 | — | 3.5 * | 19 | 7.6 |
| Sevenmile Creek (HWY 70) | 7/19/93 | 1.1 | <1 | — | 0.022 | 0.13 | 0.083 | 0.49 | <0.02 | — | 0.003 | 0.02 | 2 | 0.12 | 7.5 | 21 | 8.2 |
| Halls Creek (Fire Lane Road) | 7/19/93 | 3.5 | 1.0 | 18.87 | 0.006 | 0.11 | No Detect | 0.00 | <0.02 | — | 0.005 | 0.09 | <2 | — | 9.4 | 27 | 8.8 |

* Dissolved oxygen standards violation of 6 mg/l.
Note: Samples collected during rain or snowmelt runoff.

Pine Creek

Pine Creek is a small perennial cold water stream designated as Outstanding Resource Waters. Pine Creek received a fair habitat rating. The stream substrate is mostly rubble, gravel and other stable habitat with diverse trees and shrubs protecting the banks. Stream flow was minimal at less then 0.5 cfs in October. Dissolved oxygen and temperature readings were both normal.

A macroinvertebrate sample in fall received a biotic index value of 3.45 which rates Pine Creek as excellent water quality with no apparent organic pollution.

Deadman Creek

Deadman Creek is a small perennial cold water stream designated as Outstanding Resource Waters. Deadman Creek discharges to Lepage Creek which flows into the Pine River. Deadman Creek received a good habitat rating. The predominantly sandy bottom stream has sufficient rubble and gravel areas for habitat. The banks are covered with diverse trees and shrubs and no erosion could be seen. Stream flow was minimal at less then 0.5 cfs in October. Dissolved oxygen and temperature readings were both normal.

A macroinvertebrate sample in fall received a biotic index value of 3.65 which rates Deadman Creek as very good water quality with possible slight organic pollution.

Lepage Creek

Lepage Creek is a small and narrow perennial cold water stream. Lepage Creek received a fair habitat rating. The stream bottom is mostly sand, however rubble and gravel were common. The banks are well protected and no evidence of bank erosion could be seen. Dissolved oxygen and temperature readings were both normal. This area was recently logged but has not seemed to be impacting the creek.

Sevenmile Creek

Sevenmile Creek is a small perennial cold water stream designated as Outstanding Resource Waters. Sevenmile Creek received good and fair habitat ratings. Stream substrate at the Hwy 70 crossing is predominantly silt and muck with little sand and gravel present. The stream banks are covered with trees and shrubs and therefore, bank erosion is nonexistent.

Water chemistry samples collected during spring runoff and a summer rain event showed low concentrations and loadings of nutrients and biochemical oxygen demand. Suspended solids were slightly elevated at 26 mg/l on March 30, 1993. Dissolved oxygen, temperature, and pH readings were all normal.

A macroinvertebrate sample in spring received a biotic index value of 5.48 which rates Sevenmile Creek as good water quality with some organic pollution.

Wakefield Creek

Wakefield Creek is a small perennial cold water stream designated as Outstanding Resource Waters. Wakefield Creek received good habitat ratings. Stream substrate at the Hwy 70 crossing is predominantly gravel and other stable habitat with some sand, silt and muck present. Beaver dams were recently removed downstream of Hwy 70. Wakefield Creek flows through considerable wetlands before discharging to the Pine River.

Water chemistry samples collected during snowmelt runoff and a summer rain event showed low concentrations and loadings of suspended solids and biochemical oxygen demand. Dissolved phosphorus was just slightly elevated during both spring and summer sampling periods. Dissolved oxygen, temperature, and pH readings were all normal.

A macroinvertebrate sample in spring received a biotic index value of 5.08 which rates Wakefield Creek as good water quality with some organic pollution.

Johnson Creek (near Tipler, T39N,R15E,S5,NESE)

Johnson Creek is a perennial cold water stream designated as Outstanding Resource Waters. Johnson Creek received good habitat ratings at Dream Lake Road and a fair rating at Hwy 70 crossing. Stream substrate at both locations is primarily gravel and sand with silt and muck near the banks. This small creek flows through several miles of wetlands before entering into the Pine River. Macrophytes are abundant throughout this slow moving stream.

Water chemistry samples collected during snowmelt runoff and a summer rain event showed low concentrations and loadings of suspended solids and biochemical oxygen demand. Dissolved phosphorus was slightly elevated on March 31, 1993. Temperature and pH readings were normal, however a dissolved oxygen reading of 3.5 mg/l was recorded in July. Wisconsin state standard for dissolved oxygen in cold water streams is 6 mg/l.

A macroinvertebrate sample at Dream Lake Road in spring received a biotic index value of 7.45 which rates Johnson Creek as fairly poor water quality with significant organic pollution.

The extensive wetlands probably contribute to the low dissolved oxygen level, the slightly elevated dissolved phosphorus value, and the fairly poor biotic index value.

Lauterman Creek

Lauterman Creek is a perennial cold water stream designated as Outstanding Resource Waters. Lauterman creek originates at Lauterman Lake and flows only a couple miles before discharging into the Pine River. The dark stained creek received a good habitat rating. The creek is wide and slow moving at Forest Road 2154. Dissolved oxygen and temperature readings were both normal.

Johnson Creek (near Pine River Flowage, T39N,R18E,S23,NWNE)

Johnson Creek is a perennial cold water Stream designated as Outstanding Resource Waters. Johnson Creek received a fair habitat rating. A macroinvertebrate sample could not be collected because of the predominantly sandy type substrate, although some gravel was present in the center of the stream bed. The stream at Johnson Creek Road is shallow and wide with flows of less then one cfs. Dissolved oxygen and temperature readings were both normal.

## V. CONCLUSIONS

The Florence County portion of the Pine River watershed is predominantly forested wilderness. The watershed streams are natural high quality trout streams. They do not appear to be significantly degraded or threatened by nonpoint source pollution. Based on the 1993 data and a review of existing data, I concur with the current "low" priority ranking for potential selection in the Nonpoint Source Priority Watershed Program this watershed received in the 1993 Upper Green Bay Basin Water Quality Management Plan.

## VI. REFERENCES


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

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