Middle Peshtigo and Thunder River Priority Watershed Water Quality Appraisal Monitoring Plan

Prepared by

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I. INTRODUCTION

The Middle Peshtigo and Thunder River watershed was selected as a priority watershed project in 1995 under the Wisconsin Nonpoint Source Pollution Abatement Program. Before implementation of nonpoint source pollution abatement measures, a water resources appraisal must be conducted to evaluate the condition of the water resources of the watershed. This plan provides a description of appraisal monitoring activities for the streams, lakes, and groundwater in the Middle Peshtigo and Thunder River watershed. Preliminary water resource goals and objectives will be developed from this appraisal.

The Middle Peshtigo and Thunder River watershed ranked high priority for selection based on groundwater contamination susceptibility under the nonpoint source watershed selection process. It ranked low priority for selection based on stream water quality conditions.

II. DESCRIPTION OF THE WATERSHED

The Middle Peshtigo and Thunder River watershed (Figure 1) is 176 square miles and is located in Marinette, Oconto, and Forest Counties. The watershed includes the section of the Peshtigo River from Caldron Falls dam downstream to The Outlet tributary from Lake Noquebay. It also includes all of the tributary streams to this section of the Peshtigo River system. There are 44 named lakes, 20 unnamed lakes, 3 flowages, and several wetlands located within the watershed boundary.

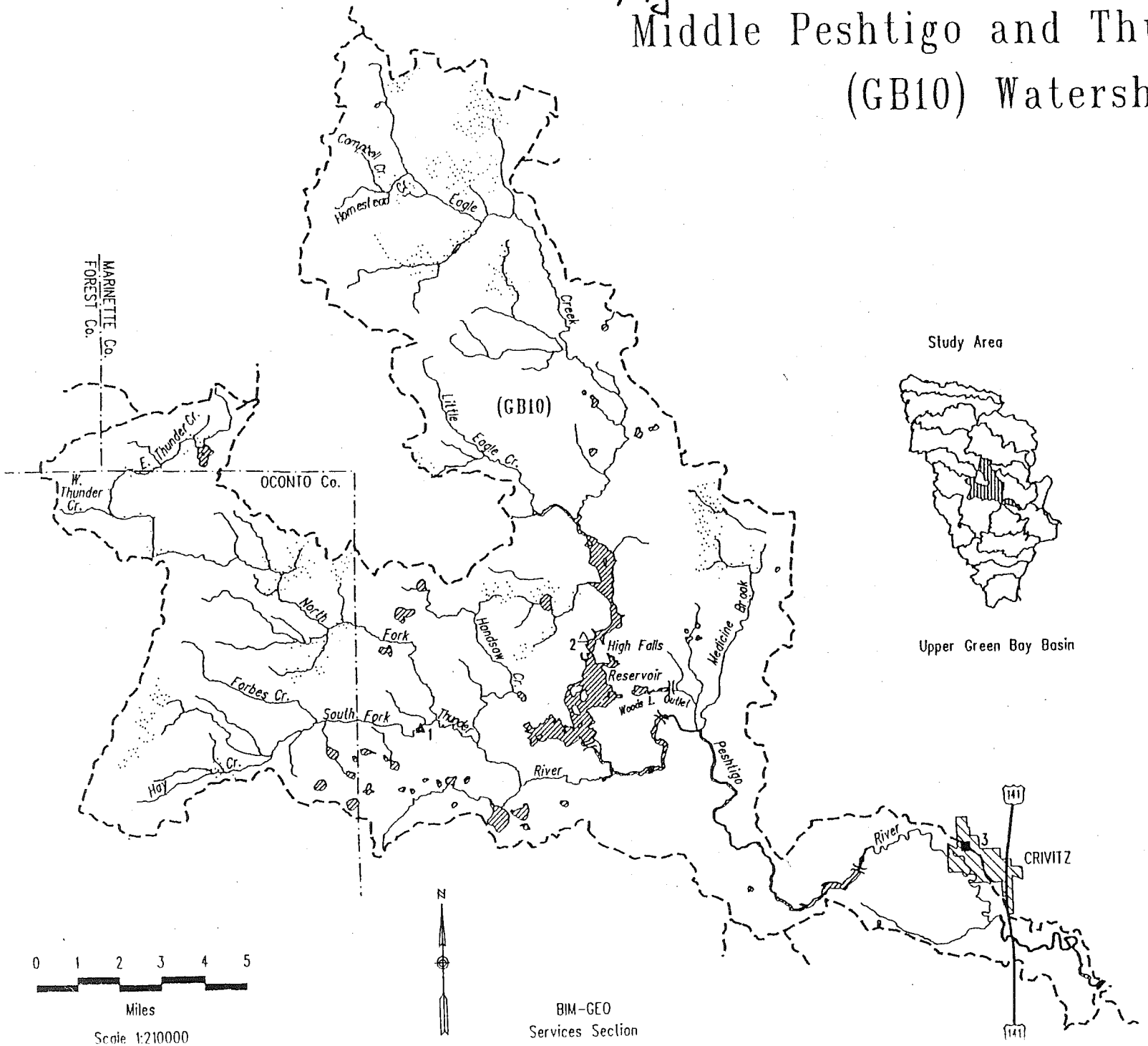
The Peshtigo River is classified as warm water sport fish except for the five mile portion below Johnson Falls dam is classified as class II trout water. Most of the tributary streams are cold water trout streams. Many are designated as outstanding or exceptional resource waters. The watershed lakes are generally in good condition with impacts primarily from riparian development and forest practices. Groundwater quality is also generally good. The village of Crivitz municipal well was abandoned a couple years ago due to nitrate contamination. A new well has since been established; however, it is now outside the Middle Peshtigo and Thunder River watershed boundaries.

III. SUMMARY OF EXISTING DATA

Appendix A contains a summary of existing water quality data for the Middle Peshtigo and Thunder River watershed. Fisheries data can be found in the fish management files located in the Marinette Area DNR office.

Figure 1.

Middle Peshtigo and Thunder Rivers (GB10) Watershed



IV. MONITORING ACTIVITIES

Water resource appraisal monitoring will be conducted in this watershed from February through September 1996. This monitoring will help determine existing and potential conditions of the water resources. The results will be summarized in an appraisal report by winter 1996. This report will include water resource goals and objectives for the Middle Peshtigo and Thunder River priority watershed. Following is a summary of appraisal monitoring activities for the watershed project.

Macroinvertebrate

Aquatic macroinvertebrate samples will be collected in spring 1996 at Forbes Creek, Little Eagle Creek, and Hay Creek. Samples will be sent to UW-Stevens Point for sorting and identification. Sample results will be evaluated using Hilsenhoff Biotic Index (HBI) and the Ephemeroptera, Plecoptera, Tricoptera (EPT) index. The HBI provides a relative measure of organic loading to streams (Hilsenhoff, 1987). The EPT is the percent Ephemeroptera, Plecoptera, Trichoptera genera out of the total number of genera in a sample. These insect orders are generally known to be intolerant of pollution.

Habitat Evaluations

Stream habitat conditions will be evaluated at the same stream sites as the macroinvertebrate samples plus at several others locations throughout the watershed. A matrix is used to numerically rank habitat characteristics from excellent to poor to assess physical factors that may limit the quantity and quality of aquatic life (Ball, 1982).

Dissolved Oxygen and Temperature Monitoring

Dissolved oxygen and temperature will be spot checked at several locations throughout the watershed. In addition, continuous dissolved oxygen and temperature meters will be placed in Eagle Creek, Little Eagle Creek, Thunder River, and Medicine Brook for two week periods in mid-summer. Wisconsin Administrative Code NR102 states that dissolved oxygen in cold water streams shall not be lowered to less than 6 mg/l so that trout populations are not adversely affected.

Water Chemistry Samples

Water samples will be collected during three runoff events in Medicine Brook and Handsaw Creek. Samples will be analyzed for ammonia, nitrates, total and dissolved phosphorus, suspended solids, and biochemical oxygen demand. Stream flow will be

collected at the same time. All samples will be collected and preserved following the Field Procedures Manual (1988).

Lake Monitoring

Water chemistry samples to determine trophic status will be taken on three lakes in the watershed. One of the three lakes monitored will be undeveloped so as to determine baseline conditions. Internal phosphorus loading will be determined using computer models. The DNR Lakes staff and the Marinette County staff will work together to conduct this monitoring and run the models.

A paleolimnological core of lake sediment in the watershed might be collected in this watershed depending upon funding available from the nonpoint source program. One representative lake would be selected and a core collected in early spring. The DNR Bureau of Research would do the core analysis.

A shoreline inventory index will be developed and conducted on as many lakes as possible in this watershed. This index will determine shoreline development and suitability of aquatic life habitat in the littoral area.

Baseline nitrate-nitrogen monitoring will be done in winter to link land use and groundwater discharge and surface water impacts. Several streams in the watershed will be sampled one time. The primary water source for streams in winter is groundwater discharge in these highly permeable soils. Very little surface runoff influences these streams in winter. The information from the streams will be combined with existing lake nitrate-nitrogen data and plotted on a map of the watershed. High values, particularly if they are clustered, will indicate excessive use of nitrogen in the area of groundwater recharge.

Marinette County staff may do monitoring near lake shores to determine specific conductivity which could be correlated to septic discharge to the lakes. Lakes will be selected as they see fit.

Groundwater Monitoring

Marinette and Oconto County Land and Water Conservation Department staff will collect well water samples during inventorying. Samples will be analyzed for nitrates. Marinette County will be allotted up to one sample per square mile in the watershed. Monitoring procedures and guidelines will be provided to the county staff by Laura Chern.

Slides

Color slides of the surface water resources will be taken throughout the watershed by DNR staff. These slides can be used for information and education purposes throughout the planning, implementation, and evaluation phases of this project.

Fish Surveys

Fish surveys will be conducted on a few stream reaches in the watershed. Survey results will be applied to the Index of Biotic Integrity (IBI) developed by Lyons and Simonson (1994) to determine species richness and composition, trophic and reproductive function, and fish abundance and condition.

V. REFERENCES

Wisconsin Department of Natural Resources, 1993. Upper Green Bay Basin Water Quality Management Plan.

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

Wisconsin Department of Natural Resources, 1988. Field Procedures Manual. Draft 2nd Edition.

Wisconsin Department of Natural Resources. Lake Michigan District Water Quality Files.

Wisconsin Department of Natural Resources. Fisheries Management Files, Marinette Area Office.

Hilsenhoff, William, 1987. An Improved Biotic Index of Organic Stream Pollution.

Lyons, John and Simonson, Tim. 1994. An Index of Biotic Integrity (IBI) for Cold Water Streams in Wisconsin.

Lyons, John. 1992. Using the Index of Biotic Integrity (IBI) to Measure Environmental Quality in Warmwater Streams of Wisconsin.

Meeting Minutes Water Quality Appraisal Workgroup
Middle Peshtigo and Thunder River Priority Watershed - 1/18/96

People present:
Mary Gansberg - DNR, Green Bay Biologist, Meeting Chair
Charlotte Haynes - DNR, Planner, Madison
Tom Milheiser - Oconto County LCD
Bill Kowalski - Marinette County LWCD
Chuck Druckrey - Marinette County LWCD
Steve Zander - Marinette County LWCD
Greg Kornely - DNR, Fisheries Mgt, Marinette
Brad Johnson - DNR, Biologist, Green Bay
Tim Rasman - DNR, Limnologist, Green Bay
Betsy Glenn - DNR, Wildlife Mgt, Green Bay
Rick Stoll - DNR, Hydrogeologist, Green Bay
By phone:
Laura Chern - DNR, Groundwater Section, Madison
Len Olson - DATCP
Member not present:
Robin McLennan - DNR, Nonpoint Coordinator, Green Bay

This was our first meeting and a lot of good topics and issues came up. This is an attempt at giving a general overview of the meeting and is not all inclusive.

1. Mary gave a general overview of the appraisal process and the responsibility of the workgroup.

2. Review of existing water quality data and information and additional monitoring proposed:

   - Mary gave a brief overview of the summary sheet and packet sent to the members and pointed out pertinent data and information sources.

   - Charlotte suggests we think of this project more as a protection project then remediation like past priority watershed projects. We will need to focus more on ordinances, recreational uses, zoning, septic problems, and information and education in general. We will need best management practices for pollution reduction and resource protection such as buffers and shoreline erosion control practices. Not to think of resource objectives as we have in the past with pollutant load reductions but how we can protect the resources from future problems. Maybe do as a pilot for other project to follow.

Groundwater

- Laura had done a search for existing well water nitrate results in the watershed. She found 26 samples collected for nitrates; 12 detects and only 4 exceeded standards. Highest level was 12 ppm. Regarding groundwater, this project will probably be protection orientated. Well samples are generally for the purpose of information and education to landowners in the watershed. Well water samples for nitrates will be taken by County staff during inventorying at no cost to the landowner. The County

will be allotted one sample per square mile in the watershed. Laura will try to get more samples if they are needed.

- Rick told us that the Crivitz municipal well was shut down a couple years ago and has since been replaced. New well is outside the watershed boundary. We can still do wellhead protection efforts, not only for this municipal well, but also local private wells.

- Bill mentioned that there are several hundred acres of irrigated cropland west of Crivitz. Mainly potatoes and sweetcorn. These farms will need nutrient/pesticide management efforts.

Lakes

- There are many lake groups and organizations in this watershed. Several have received grants for lake planning. These plans include recommendations for management actions. We need to keep these lake organizations involved in this project. Existing data collected for lake planning grants will be reviewed.

- Our monitoring efforts will focus on lakes and data collection for protection efforts. The following lake monitoring will be conducted in the watershed (more details will be in the monitoring plan).

A. Two lakes in the watershed will be monitored and the WILMs model run for each. Tim will coordinate this effort.
B. One undeveloped lake will be monitored to determine baseline conditions to compare with developed lakes. This information can be used for protecting the lakes in the future from development. Tim will follow up on this.
C. Conduct a shoreline habitat inventory. This inventory can be done by both the DNR and county staff while on the lakes. Tim will supply the guidelines and training.
D. Marinette County staff may do monitoring near lake shores to determine specific conductivity which could be correlated to septic discharge to the lakes. Chuck passed out a list of lakes in the watershed (more accurate than what was in the basin plan). He * the lakes which would be most ideal to do some type of monitoring on.
E. Baseflow nitrate-nitrite monitoring in winter to determine groundwater discharge and surface water impacts. This information will be combined with historical in-lake nitrate results to help determine potential problem areas. Tim will follow up on this.
F. Tim also suggest doing a paleolimnological core of a lake in the watershed. Tim will follow up on this to see if it is feasible for this project. Marinette County staff will help determine which lake would be best for this core.

Streams

- Mary said she could do continuous dissolved oxygen and temperature monitoring, habitat evaluations, water chemistry runoff samples, and some macroinvertebrate samples. She will develop a draft monitoring plan and distribute for comments.

Fishery

- Greg said quite a bit of fisheries data is available in this watershed especially in the High Fall, Johnson Falls, and Sandstone Rapids areas because of the FERC projects. Basically, the fishery is pretty good. Mostly class I trout streams. He said he could do some additional monitoring to supplement existing data. A fisheries management plan has been started for the Peshtigo River system.

Wildlife

- Betsy said she could see what threatened and endangered species are in this watershed. She also told us about the wetland restoration and management workshop for private landowners and local government staff being offered in May. Anyone interested contact Betsy (414-492-5928).

3. Appraisal time-frame (which was on the back of the agenda) was discussed. The appraisal process should be complete by this time next year.

4. Additions/deletions to the workgroup. It was suggested to invite someone from the U.S. Forest Service to participate in this workgroup since part of this watershed is located in the Nicolet National Forest. Mary will contact the Lakewood Ranger Station.

5. Six subwatersheds were delineated for the watershed. Chuck will get these subwatersheds drawn on the topographical maps for us.

Appendix A.

Summary of Existing Water Quality Data in the Middle Peshtigo and Thunder River Watershed

1. Upper Green Bay Basin Water Quality Management Plan - 1993.

2. Surface Water Resources of Marinette County - DNR, 1975.

3. Surface Water Resources of Oconto County - DNR, 1977.

4. Pollution Studies (reports in the Water Resources Management files):

   A. Upper Green Bay Basin Water Quality Report by Dennis Weisensel. Biotic Index samples collected in the Peshtigo River subbasin in 1979 and 1980 to determine general water quality conditions. Results found:
      Medicine Brook at High Falls Road - excellent water quality
      Eagle Creek at Eagle Road - very good water quality
      Eagle Creek at Eagle River Road - excellent water quality
      Little Eagle Creek at Eagle Road - very good water quality

   B. Monthly monitoring on the Peshtigo River at bridge below High Falls Dam in 1973. Dissolved oxygen, pH, and temperature results all okay.

5. Nonpoint source pollution basin assessment monitoring was conducted in 1993 by Mary Gansberg to rank the watershed for potential selection based on surface water quality problems. These are some of the monitoring results:

   A. Macroinvertebrate samples collected found:
      Thunder River at Caldron Falls Road - excellent water quality
      Eagle Creek at CTH C - excellent
      Medicine Brook at High Falls Road - excellent
      North Fork Thunder River at Thunder Mountain Road - excellent
      Handsaw Creek at Thunder Mountain Road - excellent
      East Thunder Creek at CTH F - excellent

   B. Habitat evaluations collected throughout the watershed found:
      Handsaw Creek - good habitat
      East Thunder Creek - fair habitat
      Little Eagle Creek - fair habitat
      Thunder River - good habitat
      Medicine Brook - good to fair habitat
      Thunder Lake Inlet - good habitat

Eagle Creek - good to fair habitat
North Fork Thunder River - excellent habitat

C. Water chemistry samples along with flows were collected during two runoff events in 1993 at Medicine Brook, Eagle Creek, and Thunder River. Only suspended solids concentrations were somewhat high in Eagle Creek at CTH C during spring runoff.

6. There is one municipal and one industrial wastewater treatment facility in the watershed. The Crivitz Sanitary District operates a three-cell aerated pond system which dischargers to the Peshtigo River. The Wisconsin DNR Thunder River Fish Hatchery discharges to the South Fork Thunder River.

7. For the FERC Hydroelectric dam relicensing projects on the Peshtigo River, extensive water quality data has been collected at the High Falls, Johnson Falls, and Sandstone Rapids projects. Water quality monitoring included water chemistry samples from all the flowages and tailwaters, continuous dissolved oxygen and temperature in the tailwaters, impoundment sediment analysis, and macrophyte surveys in the impoundments. Dissolved oxygen problems below Johnson falls and High Falls dams may require additional monitoring and/or mitigation.

8. USGS Water Resources Data Wisconsin Water Year 1994. Discontinued surface water discharge station at the Peshtigo River at High Falls ran from 1912-1957.

9. Cryptosporidium monitoring on the North Fork Thunder River at Thunder Mountain Road monthly from December 1993 to October 1994. Crypto was detected only once, Giardia detected twice, E. Coli had one elevated level, and turbidity and suspended solids levels were all low. The report says, land use in the watershed above the sample site is very pristine and dominated by deciduous and pine forest, with the upper half located in the Nicolet National Forest. The river originates from numerous wetlands bordering the river and its tributaries. Sources of pollution are limited to abundant wildlife in the area with whitetailed deer making up most of the large game population.

10. Fisheries data is extensive above and below High Falls, Johnson Falls, and Sandstone Rapids dams. These data, along with stream and lake fishery data, can be found in the Fisheries Management files in the Marinette Area DNR office.

11. This watershed ranked high priority for selection as a priority watershed based on groundwater contamination susceptibility. The Crivitz municipal well was replaced a couple years ago because of high nitrate levels. The new well is located outside the watershed boundary.