

Region SEK County Sheboygan Report Date 1994/5/2001 Classification LFF  
 Water Body: Black River  
 Discharger: Oostburg WWTP

**If stream is classified as Limited Forage Fish (LFF) or Limited Aquatic Life (LAL), check any of the following Use Attainability Analysis factors that are identified in the classification report:**

- Naturally occurring pollutant concentrations prevent the attainment of use
- Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met
- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
- Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or operate such modification in a way that would result in the attainment of the use
- Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, (flow) depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses primarily a wetland area year-round -- marsh-like state incapable of sustaining a balanced fish + aquatic life comm.
- Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact

**Supporting Evidence in the report (include comments on how complete/thorough data is)**

- Biological Data (fish/invert)
- OR  Chemical Data (temp, D.O., etc.)
- Physical Data (flow, depth, etc.)
- Habitat Description
- Site Description/Map
- Other:

**Historical Reports in file:**

- May 2001 - Water Resources of the Black River Watershed - S. Balarneau
- 1994 - Sheboygan River Basin Monitoring Report - T. Aartila
- 9/1979 - J. Kutz
- 8/1976 - B. Lucas / P. Weisenel

**Additional Comments/How to improve report:**

- There is no e Phase 1 LFF is justified in 1979 report.
- It appears as though segment should be FAL in Phase 2. There is no clearly documented reporting indicating that this is the case.

Date 2/11/2002

Facility Name Oostburg WWTP

Phase 2

Receiving Water Black River

Evaluated by Aartila (1994) Galameau (2001)

This stream classification is not included in the revised code because (select one):

The discharger is no longer at this location.

A new classification has resulted in a full fish and aquatic life designation.  
New survey date 1994 Please provide copy of new classification report.  
2001 Phase II stream

This receiving water should be added to the database and to the code. Specify information, as it should be included in code.

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Other (please explain)

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## **WATER RESOURCES OF THE BLACK RIVER WATERSHED**

(Excerpt from Water Resources of the Sheboygan River Basin, WDNR Publ# WR-669-01, May 2001)

### ***BLACK RIVER AT LM 93.8 - OVERVIEW***

T14N R23E Sec. 2 SENE

Stream Length = 11.4

WBIC = 50300

The Black River is the major waterway in this watershed. The Black River originates near the Village of Oostburg and flows west then north through Kohler-Andrae State Park along Lake Michigan before emptying into Lake Michigan in the City of Sheboygan. The river's average gradient drops 8.5 feet per mile in its 11.4 mile length. The primary land use in this watershed is natural lowlands with adjacent agricultural lands. Residential areas surround the river's very upper and lower reaches. The Oostburg Wastewater Treatment Plant is a permitted point source discharger to the upper reaches of the Black River.

### ***BLACK RIVER, SEGMENT 1 (RM 0-1.6)***

This reach of the Black River, extending upstream from the mouth to Indian Mound Road has poor to fair water quality. This segment of the river is primarily composed of low-flow wetlands, dominated by the introduced plant pest, purple loosestrife. The purple loosestrife severely out-competes native vegetation in the wetlands (Katsma, 1998). The Jerving Conservancy, located at the estuary with Lake Michigan, was once a highly valued bird migratory bird site, but is now being severely degraded by the overgrowth of purple loosestrife. The macroinvertebrate community has many tolerant taxa that are limited by poor habitat. Streambed sedimentation contributed by upstream sources of polluted runoff is moderate. Fish diversity is poor, but provides seasonal fishing opportunities during the spawning runs of smelt, trout and salmon.

### ***BLACK RIVER, SEGMENT 2 (RM 1.6-11.0)***

This reach extends from Indian Mound Road through the length of Kohler-Andrae State Park to the headwaters in Oostburg. Water quality is poor, with polluted runoff causing excessive sedimentation. As a result, habitat for fish, macroinvertebrates and periphyton is poor. The headwaters area receives wastewater from the Oostburg sewage treatment plant. The historical stream classification for the Black River split the stream into two segments. The upper 9.4 river miles was classified as limited aquatic life and the lower 1.6 river miles as limited forage fish (the recent stream classification eliminates this segmentation WDNR 1995). A review of historical fish surveys identifies 20 species in the Black River (Fago 1985). Trout and salmon (coho salmon, chinook salmon, rainbow trout, brook trout) from Lake Michigan are also found in the stream during their seasonal spawning runs.

WDNR personnel conducted fish surveys in 1994, 1999 and 2000 on the Black River. Only three species (two tolerant, one very tolerant according to Ball 1982) were collected from the Black River in 1994 compared with the 20 species collected in the past (Table 14). WDNR personnel recently conducted fish surveys on the Black River in 1999, upstream of Indian Mound Road (river mile 1.6) and in 2000, downstream of CTH KK (Table 14). Stream habitat and available fish cover in these two areas of the Black River was rated as fair (Table 15). Bottom substrate primarily consists of sand and the riparian buffer is mainly wetlands and woodlands. Agricultural and residential land use in the watershed contributes to poor water quality conditions.

**Table 1. Black River Fish Community Assessments.**

| Fish Species                   | Ball Tolerance <sup>1</sup> | Lyons IBI Tolerance <sup>2</sup> | Historical Fish Collections (Fago) | Upstream of Minderhaud Rd. at RM 10.0 8/9/1994 | Upstream of CTH KK at RM 7.7 8/9/1994 | Downstream of CTH KK At RM 7.5 7/12/2000 | Upstream of Indian Mound Road at RM 1.8 8/16/1999 |
|--------------------------------|-----------------------------|----------------------------------|------------------------------------|--|---------------------------------------|--|---|
| Black Bullhead                 | Sport                       |                                  | X                                  |  |                                       |  | X   |
| Black Crappie                  | Sport                       |                                  | X                                  |  |                                       |  |   |
| Bluegill                       | Sport                       |                                  | X                                  |  |                                       |  | X   |
| Bluntnose Minnow               | Tolerant                    | Tolerant                         | X                                  |  |                                       |  | X   |
| Brassy Minnow                  |                             |                                  | X                                  |  |                                       | X  |   |
| Brook Stickleback              | Tolerant                    |                                  | X                                  | X  | X                                     | X  |   |
| Brook Trout                    | Sport                       | Intolerant                       | X                                  |  |                                       |  |   |
| Brown Bullhead                 | Sport                       |                                  | X                                  |  |                                       |  |   |
| Central Mudminnow              | Very Tolerant               | Tolerant                         | X                                  | X  | X                                     | X  | X   |
| Chinook Salmon                 |                             |                                  | X                                  |  |                                       |  |   |
| Coho Salmon                    | Sport                       |                                  | X                                  |  |                                       |  |   |
| Common Carp                    | Very Tolerant               | Tolerant                         | X                                  |  |                                       |  |   |
| Creek Chub                     | Tolerant                    | Tolerant                         |                                    |  |                                       | X  | X   |
| Fathead Minnow                 | Very Tolerant               | Tolerant                         | X                                  |  |                                       |  | X   |
| Golden Shiner                  | Tolerant                    | Tolerant                         | X                                  |  |                                       |  | X   |
| Green Sunfish                  | Sport                       | Tolerant                         |                                    |  |                                       | X  | X   |
| Johnny Darter                  | Tolerant                    |                                  |                                    |  |                                       |  | X   |
| Largemouth Bass                | Sport                       |                                  | X                                  |  |                                       |  | X   |
| Mirror Carp- (Carp Subspecies) | Very Tolerant               | Tolerant                         |                                    |  |                                       |  | X   |
| Northern Pike                  | Sport                       |                                  | X                                  |  |                                       |  | X   |
| Pumpkinseed                    | Sport                       |                                  |                                    |  |                                       |  | X   |
| Rainbow Trout                  | Sport                       |                                  | X                                  |  |                                       |  |   |
| Rock Bass                      | Sport                       | Intolerant                       | X                                  |  |                                       |  | X   |
| White Sucker                   | Tolerant                    | Tolerant                         | X                                  | X  | X                                     | X  | X   |
| Yellow Bullhead                |                             | Tolerant                         |                                    |  |                                       |  | X   |
| Yellow Perch                   | Sport                       |                                  | X                                  |  |                                       |  |   |

<sup>1</sup> Ball (1982)

<sup>2</sup> Lyons (1992)

**Table 2. Hilsenhoff Biotic Index (HBI) and Index of Biotic Integrity (IBI) for the Black River, 1994, 1999 and 2000.**

| Black River Sample Sites | HBI <sup>1</sup> |                      | IBI <sup>2</sup> |                      |
|--------------------------|------------------|----------------------|------------------|----------------------|
|                          | Avg. Score       | Water Quality Rating | Score            | Water Quality Rating |
| At River Mile 10.0       |                  |                      | 12               | Very Poor            |
| At River Mile 7.7        | 6.29             | Fair                 | 20               | Poor                 |
| At River Mile 7.5        | n/a              |                      | 16               | Poor                 |
| At River Mile 1.8        | 5.69             | Fair                 | 35               | Fair                 |

<sup>1</sup> Hilsenhoff Biotic Index (1987)

<sup>2</sup> Lyons (1992)

### Sediment Quality

A sediment sample was collected in 1994, at a site between CTH A and the Oostburg WWTP outfall in the headwaters of the Black River as part of the Sheboygan River Basin Sediment Survey. The results for total PCBs were consistent with what the Department finds at control sites as a result of atmospheric deposition (0.05 ug/g). The PAHs, (acenaphthene, acenaphthylene, anthracene, benzo (A) anthracene, benzo (B) fluoranthene, benzo (K) fluoranthene, benzo (GHI) perylene, benzo (A) pyrene, benzo (E) pyrene, chrysene, dibenzo (A,H) anthracene, fluoranthene, fluorene, indeno (1,2,3-CD) pyrene, perylene, phenanthrene, and pyrene) came back as no detect (<160 ng/g). The metals data show values for cadmium, chromium, copper, lead, mercury, nickel and zinc consistent with the concentrations observed in urban impacted streams and do not require specific management activities at this time (WDNR 1999).

## Black River Watershed

### INTRODUCTION

#### **Background**

The Black River originates near the Village of Oostburg and flows west then north through Kohler-Andrae State Park before emptying into Lake Michigan in the city of Sheboygan (Figure 1). In the course of its 11 mile length the river has an average gradient of 8.5 feet per mile. Other major streams in this watershed are Barr Creek (Lake Michigan tributary west of Cedar Grove; length = 3.0 miles) and Fisherman Creek (Black River tributary in the southwestern portion of the City of Sheboygan; length = 2.0 miles) (Figure 1).

The primary land use in this watershed is natural lowlands with adjacent agricultural lands draining to them. The lower section of the Black River and the majority of Fisherman Creek are impacted by urban nonpoint source pollution while rural nonpoint pollution dominates the upper reaches of the Black River and all of Barr Creek. The villages of Oostburg and Cedar Grove WWTPs are permitted point source dischargers to the upper reaches of the Black River and Barr Creek respectively. Six other point source dischargers are located in the watershed with 2 discharging to Lake Michigan, 1 to the Black River, 1 to Fisherman Creek (Thomas Industries non-contact cooling water) and 2 to Barr Creek (WDNR 1988, WDNR 1994).

#### **Historical Water Quality**

##### Black River

The historical stream classification for the Black River split the stream into two segments. The upper 9.4 river miles was classified as limited aquatic life and the lower 1.6 river miles as limited forage fish (new classification eliminates this segmentation). Twenty species have been historically identified in the Black River with Central Mudminnows and the Brook Stickleback dominant and 4 (Coho Salmon, Chinook Salmon, Rainbow Trout, Brook Trout) seasonal species (Table 5) (Fago 1986). The macroinvertebrate community is limited to tolerant species.

Poor water quality in this stream is due to point source (Oostburg WWTP) and nonpoint source (agricultural and urban runoff) pollution in conjunction with very slow current due to low gradient in the wetland areas of the stream. These land uses have resulted in sedimentation of the stream bottom creating poorer substrate detrimental to the streams intolerant biological organisms (WDNR 1980, 1988, 1994).

##### Fisherman Creek

Fisherman Creek is classified as a warm water forage fish community. Twelve fish species were identified historically with 3 species (Rainbow, Brown and Brook Trout) being seasonal residents from Lake Michigan (Table 6) (WDNR 1985). No historical macroinvertebrate data is available from this stream.

There are numerous sources which contribute to the degradation of water quality in Fisherman Creek. Nonpoint source contributors include; fly ash tailings pond (Edgewater Power Plant), Town of Wilson landfill leachate, and other urban nonpoint pollution sources (yard wastes, storm water runoff, etc.). A section of the stream was dredged and relocated in 1991 in an attempt to solve flooding "problems" along Camelot Blvd., but development in the headwaters and the urban impacts on the stream continue

to cause very flashy flows during rain events resulting in severe streambank erosion and flooding (in its lower reaches). In 1992, while attempting to control a fire, E & K Hazardous Waste Services caused a large-scale fish kill in Fisherman Creek with runoff from the site. Other pollution sources include; a cooling water discharge from Thomas Industries that may be thermally impacting aquatic organisms in the upper sections of Fisherman Creek while the Conoco Refinery site is also a potential pollution contributor to the creek (WDNR 1988, 1994).

#### Barr Creek

Barr Creek is classified as a limited forage fish community. Eight fish species (white sucker and fathead minnow dominant) were collected historically with one species (Rainbow Trout) being a seasonal resident from Lake Michigan (Table 7) (Fago 1986). The macroinvertebrate community is dominated by very tolerant species (Asellus and Oligochaeta). The streams poor water quality is the result of both point (three permitted point source dischargers) and nonpoint pollution sources. These sources impact the stream by causing turbidity, sedimentation, ammonia toxicity, dissolved oxygen sags and potential pesticide/herbicide toxicity (WDNR 1980, 1988, 1994).

### **MONITORING ACTIVITIES - 1994**

Condition Monitoring activities were conducted in the Black River Watershed to collect; ambient water chemistry data, fish community data for Fisherman Creek, nonpoint source pre-appraisal and stream classification (triennial standards review) for the Black River and Barr Creek. In addition a sediment survey was conducted to develop baseline sediment quality for the watershed and assess the impact of the Edgewater Power Plant fly ash tailings pond on Fisherman Creek.

#### **Sites/Samples**

This watershed contained 14 sampling sites. Three sites on the mainstem of the Black River, two on the mainstem of Barr Creek, one on an unnamed tributary to Barr Creek, seven on the mainstem of Fisherman Creek and one on an unnamed tributary to Fisherman Creek (Table 1). Samples collected in the Black River Watershed included: water chemistry samples (4 sites), fish surveys (6 sites), macroinvertebrate HBI samples (7 sites) and sediment collections (5 sites) (Table 2 and 3).

### **MONITORING RESULTS - 1994**

Daily rainfall totals during the 1994 sampling season were collected at the climatological station in Plymouth, WI (Figure 2 (introduction)). While these numbers are not representative of the exact totals at the watershed sampling sites, several sampling dates (July 5, July 19, August 3, and September 27) occurred on or a few days after periods of significant rainfall events (0.5 inches or greater). These large rainfall events at the Plymouth station were assumed to influence flow levels in these streams. This assumption is verified by notable increases in water chemistry parameters on these dates (Figures 2 & 3).

#### **Black River**

##### Water Chemistry

Water chemistry samples were collected at CTH KK (BR-2). Results showed that the Black River had the highest geometric mean concentrations in the watershed for total phosphorus (1.12mg/l), soluble

reactive phosphorus (0.94mg/l), total solids (809mg/l) and nitrate/ite (5.2mg/l). Bacteria (731 /100ml) and TKN (1.18mg/l) concentrations were also high (Tables 3 & 4).

#### Macroinvertebrate Collections

Macroinvertebrates were collected at CTH KK (BR-2) and had an average HBI score of 6.29. This is a fair water quality rating indicative of fairly substantial organic pollution (Hilsenhoff 1987) (Table 8).

#### Fish Community

Fish collections were conducted at CTH KK (BR-2). Only 3 species (2 tolerant, 1 very tolerant) (Ball 1982) were taken from the Black River in 1994 compared with the 20 species identified by Fago's 1986 publication. The IBI score for this site was 27 indicative of poor biotic integrity (Lyons 1992)(Table 5). Few fish species and an overabundance of tolerant species are the causes of this poor rating.

#### Habitat Survey

Both the Ball form and the Simonson et al. form were used to rate the habitat quality at BR-2. The results were 201 - poor (Ball) and 43 - fair (Simonson et al.) (Table 8). The stream system habitat rating score (Ball 1982) was 201 indicative of poor habitat quality while the fish habitat rating score (Simonson et al. 1994) had a score of 43 indicating fair fish habitat.

#### Sediment Inventory

Sediment collections were taken between CTH A and the Oostburg POTW outfall on the Black River. The samples are currently being analyzed for relative concentrations of numerous parameters (Table 9). Results will be received in Fall 1995.

#### **Fisherman Creek**

##### Water Chemistry

Water chemistry samples were taken at one site upstream of CTH EE (FMC-7). The results for all parameters had the lowest geometric mean concentrations within the entire watershed with the exception of bacteria (MFFCC) (max. = 85000 /100ml , geo. mean = 1351 /100ml) which was the highest recorded in the watershed and in the entire basin (Table 4).

#### Macroinvertebrate Collections

Macroinvertebrate samples were collected from the Indian Meadows trailer park (FMC-1), downstream of CTH OK (FMC-3), upstream of CTH KK (FMC-4) and downstream of CTH KK (FMC-5). Average HBI values ranged from 7.29 (fairly poor) downstream of CTH OK to 6.38 (fair) downstream of CTH KK. These results are indicative of fairly substantial to substantial organic pollution (Hilsenhoff 1987) (Table 8). Collections from FMC-1 were made in Fall 1994 and results are expected in the Fall 1995.

#### Fish Community

Fish were collected from Fisherman Creek at FMC-1, FMC-3 and FMC-4. Fifteen species were identified including; 3 sport fish, 2 intolerant, 7 tolerant and 3 very tolerant species (Ball 1982). An IBI was calculated for each site and ranged from 5 (very poor) at FMC-3 to 25 (poor) at FMC-4 (Table 8). Fisherman Creeks fish community biotic integrity was limited by few species in the upstream reaches, an overabundance of tolerant species and very few insectivores, carnivores, or lithophilic spawners. The increase in the IBI score at the downstream site is due to an increased

percentage of insectivorous fish and intolerant species.

#### Habitat Survey

Fish habitat quality in Fisherman Creek ranged from 20 (poor) at FMC-1 to 47 (fair) at FMC-4 (Table 8).

#### Sediment Inventory

Sediment collections were taken from N. Hiawatha Circle in Indian Mounds trailer park (FMC-2), upstream of the fly ash tributary confluence (FMC-6) and in an unnamed tributary to Fisherman Creek (fly ash tributary) (FMC-8). The samples are currently being analyzed for relative concentrations of numerous parameters (Table 9). Results will be received in Fall 1995.

#### **Barr Creek**

##### Water Chemistry

Water chemistry samples were taken from Barr Creek at Walvoord Rd (BRC-1) and Sauk Trail Rd (BRC-2). The water chemistry data collected at these sites could not be directly compared to each other (upstream to downstream) without eliminating the results from the sample dates (July 5 and July 19) on which there was no flow at Walvoord Rd. The standing water sampled at the upstream site (BRC-1) on these dates was not representative of the pollution effects on the Barr Creek Watershed. Only results collected during flowing conditions at both BRC-1 and BRC-2 were used to compile Table 4 and Figures 2 & 3.

With the above stipulation, comparisons between upstream (BRC-1) and downstream (BRC-2) sites can be made. The downstream site showed considerably higher geometric mean concentrations for nutrients (total phosphorus (0.135mg/l, 1.01mg/l), soluble reactive phosphorus (0.025mg/l, 0.76mg/l), TKN (1.27mg/l, 1.56mg/l), nitrate/ite (0.625mg/l, 1.82mg/l), ammonia (0.052mg/l, 0.097mg/l)), bacteria (152 /100ml, 885 /100ml) and total solids (503mg/l, 807mg/l) than were obtained from the upstream site.

##### Macroinvertebrate Collections

Macroinvertebrate samples were collected at Walvoord Rd (BRC-1) and Sauk Trail Rd (BRC-2). The resulting HBIs ranged from 7.05 (fairly poor) at BRC-1 (upstream site) to 6.00 (fair) at the downstream site (BRC-2) (Table 8). Scores in these ranges are indicative of fairly substantial to substantial organic pollution (Hilsenhoff 1987).

##### Fish Community

Fish collections were made at Sauk Trail Rd (BRC-2) using backpack electroshocking equipment. Five tolerant fish species were collected with two species, white sucker and brook stickleback, were the most abundant (Table 7). The Lyons IBI rating for this site was equal to 20 indicating a poor biotic integrity (Table 8). The fish community consists of only a few species and an overabundance of tolerant species.

##### Habitat Survey

The habitat rating score for Barr Creek at Sauk Trail Rd (BRC-2) was equal to 38 indicating fair fish habitat quality (Table 8).

##### Sediment Inventory

Sediment collections were taken from an unnamed tributary to Barr Creek upstream of CTH D (BRC-3). The samples are currently being analyzed for relative concentrations of numerous parameters (Table 9). Results will be received in Fall 1995.

## **DISCUSSION**

### **Black River**

1994 water chemistry results indicated poor water quality for the Black River. High geometric mean values for nutrients, solids and bacteria including the highest concentrations of total phosphorus, soluble reactive phosphorus, total solids and nitrates/ites in the watershed. Discharge values also fluctuated greatly throughout the sampling season with high spring runoff numbers and low summer low-flow values.

The 1994 fish collections found limited fish diversity (3 species) as compared to the historical collections (20 species) (Fago 1986). This is significant because the stream's habitat is considered fair and capable of supporting a much more diverse fish community. The greatest contributing factors to this lack of diversity is the poor water quality including potentially high levels of BOD, ammonia and/or low levels of dissolved oxygen. The actual causes remain unknown at this time.

Macroinvertebrate samples had an HBI rating (6.29) which is indicative of fairly substantial organic pollution which correlates with the poor water quality indicated by the water chemistry results.

Since the Black River lies essentially in a rural setting, 1994 monitoring results indicate two contributors to its degraded water quality. They are point source discharges and rural (agricultural) nonpoint source pollution. Point source dischargers (WWTP etc.) are cited because of the nature of the fluid that they add to the stream (high concentrations of nutrients, bacteria and solids). Nonpoint pollution sources are suspected because of spikes in nutrients, bacteria and solids after rain events in the watershed.

### **Fisherman Creek**

Using the 1994 water chemistry data, Fisherman Creek would seem to have better water quality when compared to both Barr Creek and the Black River with the exception of bacteria and stream discharge. Bacteria (MFFCC) counts were the highest in watershed (geometric mean = 1351 / 100ml and maximum = 85000 / 100ml) and discharges showed high spring numbers and very low summer low-flow values (0 cfs).

Fish habitat quality was poor in the upper reaches of fisherman creek primarily due to stream channel modifications through Indian Meadows Trailer Park but improved in the lower reaches where natural channel reaches remained. The poor habitat quality and the urban water quality impacts (high ambient temperatures and flashy flows) have severely impacted the streams biotic community. The limited fish diversity and poor HBI scores attest to this.

Macroinvertebrate collections yielded an intriguing set of HBI ratings. Scores improved from 7.29 (FMC-3), to 6.63 (FMC-4), to 6.38 (FMC-5) moving away from the thermal discharge (Thomas Industries) in the headwaters of Fisherman Creek. Longitudinal loadings of a stream often causes pollution to increase when moving downstream unless a severe impact is being placed on the stream in

its upper reaches. It would seem that poor instream habitat or the effects of the thermal discharge are limiting the invertebrate community.

The majority of the Fisherman Creek watershed consists of urban land use. Urban nonpoint source pollution (stormwater runoff) is cited for contributing to the lower water and habitat quality in the stream. Increased levels of various chemical parameters after rain events indicate that runoff is the major contributor to flow in Fisherman Creek. This runoff carries bacteria, nutrients and solids to the stream as indicated by their increased values after rain storms. The thermal discharge may also be degrading water quality in the stream by raising the ambient water temperature which in turn stresses the biological community.

### **Barr Creek**

1994 water chemistry data indicated that Barr Creek has poor water quality based on the high concentrations (geometric mean values) of nutrients (total phosphorus = 1.01mg/l), solids (total solids = 807mg/l) and bacteria (geo. mean = 885 / 100ml and maximum = 40000 / 100 ml). When comparing the upstream (BRC-1) site to the downstream (BRC-2) site a definite longitudinal increase in the concentration of the various water chemistry parameters is noted.

Macroinvertebrate collections showed fairly poor to fair ratings including the best score (6.00 - BRC-2) in the Black River watershed.

The majority of Barr Creek lies in a rural setting with some urban land use (Cedar Grove) impacts. Based upon 1994 monitoring results rural (agricultural) nonpoint pollution sources and point source dischargers (WWTPs etc.) are cited as being the major contributors to the degraded water quality in the stream. The nature of these sources and the pollutants that they contain add to the longitudinal water chemistry parameter concentration increases noted earlier.

## **Stream Classifications**

### **Black River**

The Black River was historically classified in two segments; the upper segment was classified as limited aquatic life while the lower segment was classified as limited forage fish. This reclassification survey removes the split classification and classifies this stream as limited forage fish. Currently this stream is not achieving it's potential and a impact assessment survey is planned for the next basin year (1999).

### **Barr Creek**

Barr Creek is currently classified as a limited forage fish stream containing five species of fish. This stream like the Black River is currently not achieving it's biological potential and additional survey work will be conducted during the next basin year (1999).

### **Fishermans Creek**

Fishermans Creek is classified as a warm water forage fish community. This stream contains a very diverse forage fish community and seasonal runs of Lake Michigan trout and salmon.

## CONCLUSIONS

**Table 10 Basin Plan Recommendations and 1994 Accomplishments in the Sheboygan River Basin:  
Black River Watershed**

| Basin Plan Recommendations <sup>1</sup>  | 1994 Basin Monitoring Accomplishments |
|--|---------------------------------------|
| Triennial standards review on Barr Creek   | Yes                                   |
| Triennial standards review and classification on the Black River   | Yes                                   |
| Determine if the upgrade on the Oostburg WWTP has had a positive impact on water quality in the Black River. | YES                                   |
| Conduct a thorough fish community assessment of Fisherman's Creek  | Yes                                   |
| Conduct a post-stream relocation survey to assess the impacts of channel relocation                          | Yes                                   |

<sup>1</sup>1994 Sheboygan River Basin Water Quality Management Plan

All 1994 Basin Plan recommendations have been addressed with the exception of the water quality impact determination of the Oostburg WWTP. Sufficient data has been collected to evaluate the other four basin plan recommendations.

### Recommendations

- 1) Further assessment of the Black River is warranted to better define or identify the cause (s) of the reduced fish community diversity.
- 2) The thermal impact on Fisherman Creek needs to be assessed more completely. In addition, Thomas Industries has relocated their discharge to a detention pond that may lower water temperatures before they reach Fisherman Creek and any changes resulting from this should be identified.

## References

- Ball, Joe. 1982. Stream Classification Guidelines for Wisconsin. Technical Bulletin No. 133. Wisconsin Department of Natural Resources. Madison, Wi.
- Fago, Don. 1986. Distribution and Relative Abundance of Fishes in Wisconsin. Sheboygan River Basin. Wisconsin Department of Natural Resources, Madison, Wi.
- Hilsenhoff, William. 1987. An improved biotic index of organic stream pollution. Great Lakes Entomol. 20(1):31-39.
- Lyons, John. 1992. Using the index of biotic integrity (IBI) to measure environmental quality in warmwater streams of Wisconsin. Gen. Tech. Rep. NC-149. St. Paul, Mn. U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 51p.
- Simonson, Timothy D., J. Lyons, and P. Kanehl. 1993. Guidelines for evaluating fish habitat in Wisconsin streams. Gen. Tech. Rep. NC-164. St. Paul, Mn. U.S. Department of Agricultural, Forest Service, North Central Forest Experiment Station. 36 p.
- Wisconsin Department of Natural Resources. 1995. Sheboygan River Basin Water Quality Management Plan. Milwaukee, Wi.
- \_\_\_\_\_. 1988. Sheboygan River Basin Areawide Water Quality Management Plan. Milwaukee, Wi.
- \_\_\_\_\_. 1985. Fisherman Creek Water Resources File, Milwaukee, Wi.
- \_\_\_\_\_. 1980. Sheboygan River Basin Areawide Water Quality Management Plan. Milwaukee, Wi.

**Table 1. Black River Watershed Sample Site Locations.**

| Stream                               | SITE INFORMATION |   |                        |                         |        |
|--------------------------------------|------------------|---|------------------------|-------------------------|--------|
|                                      | Site             | Site Description  | Township Location      | Latitude/Longitude      | STORET |
| Black River                          | BR-1             | Upstream of Minderhaud Rd   | T14N R23E sec. 31 SWNE | 43° 38' 06"/87° 47' 29" |        |
|                                      | BR-2             | At CTH KK   | T14N R23E sec. 32 SESE | 43° 37' 58"/87° 45' 33" | 603341 |
|                                      | BR-3             | Between CTH A and Oostburg POTW outfall                           |                        | 43° 37' 57"/87° 47' 59" | 603411 |
| Barr Creek                           | BRC-1            | Downstream of Walvoord Rd   | T13N R22E sec. 13 SESE | 43° 35' 22"/87° 48' 14" | 603336 |
|                                      | BRC-2            | At Sauk Trail Rd  | T13N R22E sec. 24 NESE | 43° 34' 38"/87° 48' 02" | 603337 |
| Unnamed Tributary to Barr Creek      | BRC-3            | Upstream of CTH D   | T13N R22E sec. 25 NWNW | 43° 34' 17"/87° 48' 57" | 603412 |
| Fisherman Creek                      | FMC-1            | Upstream of horse pasture through trailer park to railroad tracks | T14N R23E sec. 04 NENE | 43° 42' 57"/87° 44' 30" |        |
|                                      | FMC-2            | N. Hiawatha Circle in Indian Meadows Mobile Home Park             | T14N R23E sec. 04 NENE | 43° 43' 02"/87° 44' 36" | 603408 |
|                                      | FMC-3            | Downstream of CTH OK  | T14N R23E sec. 03 SWNW | 43° 42' 28"/87° 44' 11" |        |
|                                      | FMC-4            | Upstream of CTH KK  | T14N R23E sec. 03 SENE | 43° 42' 28"/87° 43' 17" |        |
|                                      | FMC-5            | Downstream of CTH KK  | T14N R23E sec. 02 NWSW | 43° 42' 42"/87° 43' 00" |        |
|                                      | FMC-6            | Upstream of the Fly Ash Tributary Confluence (Approx. 300ft)      | T14N R23E sec. 02 NESW | 43° 42' 29"/87° 42' 49" | 603409 |
|                                      | FMC-7            | 800ft upstream of CTH EE, below confluence with Unnamed Tributary | T14N R23E sec. 11 NW   | 43° 42' 26"/87° 42' 43" | 603342 |
| Unnamed Tributary to Fisherman Creek | FMC-8            | Tributary from Fly Ash site                                       | T14N R23E sec. 02 NESW | 43° 42' 29"/87° 42' 46" | 603410 |

**Table 2. Sample Collections From The Black River Watershed**

| SITE  | # OF WATER SAMPLES COLLECTED |        | # OF FISH COLLECTIONS |        | # OF MACRO-INVERTEBRATES COLLECTIONS |        |          |        | # OF SEDIMENT COLLECTIONS  |        |
|-------|------------------------------|--------|-----------------------|--------|--------------------------------------|--------|----------|--------|----------------------------|--------|
|       | Proposed                     | Actual | Proposed              | Actual | Spring                               |        | Fall     |        | Proposed                   | Actual |
|       |                              |        |                       |        | Proposed                             | Actual | Proposed | Actual |                            |        |
| BR-1  |                              |        |                       | 1      |                                      |        |          |        | Minimum of 2 per watershed |        |
| BR-2  | 18                           | 16     |                       | 1      | 3                                    | 3      |          |        |                            |        |
| BR-3  |                              |        |                       |        |                                      |        |          |        |                            | 1      |
| BRC-1 | 18                           | 11     |                       |        | 3                                    | 3      |          |        |                            |        |
| BRC-2 | 18                           | 16     |                       | 1      | 3                                    | 3      |          |        |                            |        |
| BRC-3 |                              |        |                       |        |                                      |        |          |        |                            | 1      |
| FMC-1 |                              |        |                       | 1      |                                      |        | 5        | 5      |                            |        |
| FMC-2 |                              |        |                       |        |                                      |        |          |        |                            | 1      |
| FMC-3 |                              |        |                       | 1      | 5                                    | 5      | 5        | 5      |                            |        |
| FMC-4 |                              |        |                       | 1      | 5                                    | 5      | 5        | 5      |                            |        |
| FMC-5 |                              |        |                       |        | 5                                    | 5      | 5        | 5      |                            |        |
| FMC-6 |                              |        |                       |        |                                      |        |          |        | 1                          |        |
| FMC-7 | 18                           | 16     |                       |        | 3                                    | 0      |          |        |                            |        |
| FMC-8 |                              |        |                       |        |                                      |        |          |        | 1                          |        |

**Table 3. Black River Watershed Water Chemistry Parameters**

| PARAMETER                   | SITE |       |       |       |
|-----------------------------|------|-------|-------|-------|
|                             | BR-2 | BRC-1 | BRC-2 | FMC-7 |
| BOD <sub>5</sub>            | X    | X     | X     | X     |
| CHLOR A (corrected)         | X    | X     | X     | X     |
| CHLOR A (uncorrected)       | X    | X     | X     | X     |
| PHEOPHYTIN                  | X    | X     | X     | X     |
| HARDNESS                    | X    | X     | X     | X     |
| CALCIUM                     | X    | X     | X     | X     |
| MAGNESIUM                   | X    | X     | X     | X     |
| AMMONIA                     | X    | X     | X     | X     |
| NITRATE/ITE                 | X    | X     | X     | X     |
| TKN                         | X    | X     | X     | X     |
| TOTAL PHOSPHORUS            | X    | X     | X     | X     |
| SOLUBLE REACTIVE PHOSPHORUS | X    | X     | X     | X     |
| TOTAL SOLIDS                | X    | X     | X     | X     |
| TOTAL VOLATILE SOLIDS       | X    | X     | X     | X     |
| SUSPENDED SOLIDS            | X    | X     | X     | X     |
| VOLATILE SUSPENDED SOLIDS   | X    | X     | X     | X     |
| TURBIDITY                   | X    | X     | X     | X     |
| TEMPERATURE                 | X    | X     | X     | X     |
| DISSOLVED OXYGEN            | X    | X     | X     | X     |
| SATURATION                  | X    | X     | X     | X     |
| pH                          | X    | X     | X     | X     |
| % CLOUDS                    | X    | X     | X     | X     |
| CONDUCTIVITY                | X    | X     | X     | X     |
| GAGE HEIGHT                 |      |       |       |       |
| BACTERIA                    | X    | X     | X     | X     |
| DISCHARGE                   | X    | X     | X     | X     |

**Table 4. Black River Watershed Water Chemistry Results**

| Parameter                   | Value Type     | Black River Watershed      |                             |                                    |                      |
|-----------------------------|----------------|----------------------------|-----------------------------|------------------------------------|----------------------|
|                             |                | Barr Creek @ Walvoord Road | Barr Creek @Sauk Trail Road | Fisherman Creek Upstream of CTH EE | Black River @ CTH KK |
| Total Phosphorus            | minimum        | 0.063                      | 0.1                         | 0.02                               | 0.2                  |
|                             | maximum        | 0.6                        | 2.17                        | 0.18                               | 2.44                 |
|                             | geometric mean | 0.135                      | 1.01                        | 0.09                               | 1.12                 |
| Soluble Reactive Phosphorus | minimum        | 0.006                      | 0.051                       | 0.005                              | 0.15                 |
|                             | maximum        | 0.06                       | 2.08                        | 0.10                               | 1.96                 |
|                             | geometric mean | 0.025                      | 0.76                        | 0.035                              | 0.94                 |
| Total Solids                | minimum        | 304                        | 354                         | 206                                | 346                  |
|                             | maximum        | 598                        | 1190                        | 502                                | 1370                 |
|                             | geometric mean | 503                        | 807                         | 331                                | 809                  |
| Suspended Solids            | minimum        | 2                          | 5                           | 2                                  | 2                    |
|                             | maximum        | 86                         | 20                          | 31                                 | 83                   |
|                             | geometric mean | 13.4                       | 9.7                         | 9                                  | 10.6                 |
| TKN                         | minimum        | 0.4                        | 0.68                        | 0.29                               | 0.6                  |
|                             | maximum        | 4.1                        | 2.80                        | 1.2                                | 3.7                  |
|                             | geometric mean | 1.27                       | 1.56                        | 0.48                               | 1.18                 |
| Nitrate/ite                 | minimum        | 0.056                      | 0.04                        | 0.45                               | 1.9                  |
|                             | maximum        | 4.02                       | 4.53                        | 1.19                               | 12.6                 |
|                             | geometric mean | 0.625                      | 1.82                        | 0.60                               | 5.2                  |
| Bacteria                    | minimum        | 10                         | 20                          | 100                                | 50                   |
|                             | maximum        | 6300                       | 40000                       | 85000                              | 57000                |
|                             | geometric mean | 152                        | 885                         | 1351                               | 731                  |
| BOD                         | minimum        | 1.7                        | 12                          | 1                                  | 1                    |
|                             | maximum        | 41                         | 1.2                         | 4.6                                | 4.3                  |
|                             | geometric mean | 3.54                       | 4.0                         | 2.0                                | 2.16                 |
| Chlorophyll a               | minimum        | 1.47                       | 0.73                        | 0.72                               | 0.63                 |
|                             | maximum        | 1220                       | 90.9                        | 13.2                               | 343                  |
|                             | geometric mean | 13.33                      | 9.0                         | 2.2                                | 3.52                 |
| Ammonia                     | minimum        | 0.032                      | 0.027                       | 0.027                              | 0.022                |
|                             | maximum        | 0.152                      | 0.865                       | 0.516                              | 0.256                |
|                             | geometric mean | 0.052                      | 0.097                       | 0.069                              | 0.056                |
| Discharge                   | minimum        | 0.01                       | 0.00                        | 0.00                               | 0.14                 |
|                             | maximum        | 2.46                       | 8.84                        | 2.35                               | 8.32                 |
|                             | Average        | 0.364                      | 1.16                        | 0.801                              | 1.16                 |

**Table 5. 1994 Black River Fish Community Assessment**

| Fish Species      | Ball Tolerance <sup>1</sup> | Lyons IBI Tolerance <sup>2</sup> | Fago 1986 | 1994 Fish Collections |
|-------------------|-----------------------------|----------------------------------|-----------|-----------------------|
| Central Mudminnow | Very Tolerant               | Tolerant                         | X         | X                     |
| White Sucker      | Tolerant                    | Tolerant                         | X         | X                     |
| Brook Stickleback | Tolerant                    |                                  | X         | X                     |
| Brassy Minnow     |                             |                                  | X         |                       |
| Golden Shiner     | Tolerant                    | Tolerant                         | X         |                       |
| Fathead Minnow    | Very Tolerant               | Tolerant                         | X         |                       |
| Black Bullhead    | Sport Fish                  |                                  | X         |                       |
| Northern Pike     | Sport Fish                  |                                  | X         |                       |
| Bluntnose Minnow  | Tolerant                    | Tolerant                         | X         |                       |
| Coho Salmon       | Sport Fish                  |                                  | X         |                       |
| Chinook Salmon    | Sport Fish                  |                                  | X         |                       |
| Rainbow Trout     | Sport Fish                  |                                  | X         |                       |
| Brook Trout       | Sport Fish                  | Intolerant                       | X         |                       |
| Common Carp       | Very Tolerant               | Tolerant                         | X         |                       |
| Brown Bullhead    | Sport Fish                  |                                  | X         |                       |
| Rock Bass         | Sport Fish                  | Intolerant                       | X         |                       |
| Bluegill          | Sport Fish                  |                                  | X         |                       |
| Largemouth Bass   | Sport Fish                  |                                  | X         |                       |
| Black Crappie     | Sport Fish                  |                                  | X         |                       |
| Yellow Perch      | Sport Fish                  |                                  | X         |                       |

<sup>1</sup> Ball (1982)

<sup>2</sup> Lyons (1992)

**Table 6. 1994 Fisherman Creek Fish Community Assessment**

| Fish Species      | Ball Tolerance <sup>1</sup> | Lyons IBI Tolerance <sup>2</sup> | 1985 WDNR Files | 1994 Fish Collections |
|-------------------|-----------------------------|----------------------------------|-----------------|-----------------------|
| Brook Stickleback | Tolerant                    |                                  | X               | X                     |
| Creek Chub        | Tolerant                    | Tolerant                         | X               | X                     |
| White Sucker      | Tolerant                    | Tolerant                         | X               | X                     |
| Central Mudminnow | Very Tolerant               | Tolerant                         | X               | X                     |
| Green Sunfish     | Sport Fish                  | Tolerant                         | X               | X                     |
| Johnny Darter     | Tolerant                    |                                  |                 | X                     |
| Sand Shiner       | Tolerant                    |                                  |                 | X                     |
| Common Carp       | Very Tolerant               | Tolerant                         |                 | X                     |
| Golden Shiner     | Tolerant                    | Tolerant                         | X               |                       |
| Common Shiner     | Tolerant                    |                                  | X               | X                     |
| Bluntnose Minnow  | Tolerant                    | Tolerant                         | X               | X                     |
| Bullhead Minnow   | Tolerant                    |                                  | X               |                       |
| Hornyhead Chub    | Intolerant                  |                                  |                 | X                     |
| Bluegill          | Sport Fish                  |                                  |                 | X                     |
| Fathead Minnow    | Very Tolerant               | Tolerant                         |                 | X                     |
| Longnose Dace     | Intolerant                  |                                  |                 | X                     |
| Rainbow Trout     | Sport Fish                  |                                  | X               |                       |
| Brown Trout       | Sport Fish                  |                                  | X               |                       |
| Brook Trout       | Sport Fish                  | Intolerant                       | X               | X                     |

<sup>1</sup> Ball (1982)

<sup>2</sup> Lyons (1992)

**Table 7. 1994 Barr Creek Fish Community Assessment**

| Fish Species      | Ball Tolerance <sup>1</sup> | Lyons IBI Tolerance <sup>2</sup> | Fago 1986 | 1994 Fish Collections |
|-------------------|-----------------------------|----------------------------------|-----------|-----------------------|
| Rainbow Trout     | Sport Fish                  |                                  | X         |                       |
| Brassy Minnow     |                             |                                  | X         |                       |
| Fathead Minnow    | Very Tolerant               | Tolerant                         | X         | X                     |
| Black Bullhead    | Sport Fish                  |                                  | X         |                       |
| Central Mudminnow | Very Tolerant               | Tolerant                         | X         | X                     |
| Lake Chub         |                             |                                  | X         |                       |
| White Sucker      | Tolerant                    | Tolerant                         | X         | X                     |
| Creek Chub        | Tolerant                    | Tolerant                         |           | X                     |
| Brook Stickleback | Tolerant                    |                                  | X         | X                     |

<sup>1</sup> Ball (1982)

<sup>2</sup> Lyons (1992)

**Table 8. Hilsenhoff Biotic Index (HBI), Index of Biotic Integrity (IBI), and Habitat Quality results for the Black River Watershed**

| Stream          | SITE  | HBI <sup>1</sup> |                      | IBI <sup>2</sup> |                         | Habitat           |        |                              |        |
|-----------------|-------|------------------|----------------------|------------------|-------------------------|-------------------|--------|------------------------------|--------|
|                 |       | Avg. Score       | Water Quality Rating | Score            | Biotic Integrity Rating | Ball <sup>3</sup> |        | Simonson et al. <sup>4</sup> |        |
|                 |       |                  |                      |                  |                         | Score             | Rating | Score                        | Rating |
| Black River     | BR-1  |                  |                      |                  |                         |                   |        |                              |        |
|                 | BR-2  | 6.29             | Fair                 | 27               | Poor                    | 201               | Poor   | 43                           | Fair   |
| Barr Creek      | BRC-1 | 7.05             | Fairly Poor          |                  |                         |                   |        |                              |        |
|                 | BRC-2 | 6.00             | Fair                 | 20               | Poor                    |                   |        | 38                           | Fair   |
| Fisherman Creek | FMC-1 |                  |                      | 12               | Very Poor               |                   |        | 20                           | Poor   |
|                 | FMC-3 | 7.29             | Fairly Poor          | 5                | Very Poor               |                   |        | 45                           | Fair   |
|                 | FMC-4 | 6.63             | Fairly Poor          | 25               | Poor                    |                   |        | 47                           | Fair   |
|                 | FMC-5 | 6.38             | Fair                 |                  |                         |                   |        |                              |        |

<sup>1</sup> Hilsenhoff Biotic Index (1987)

<sup>2</sup> Lyons (1992)

<sup>3</sup> Ball (1982)

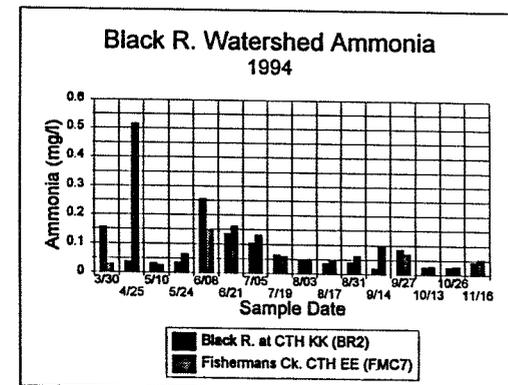
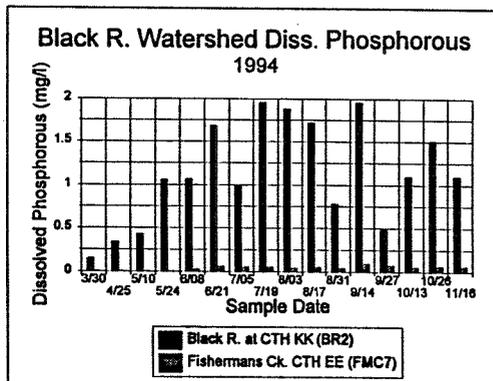
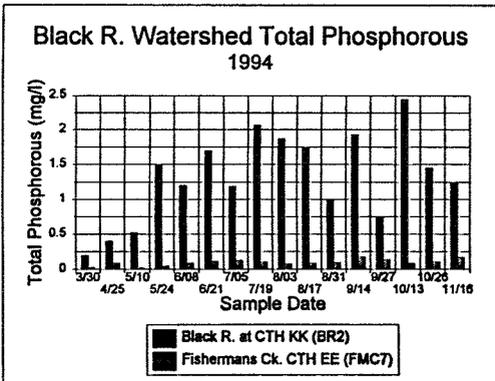
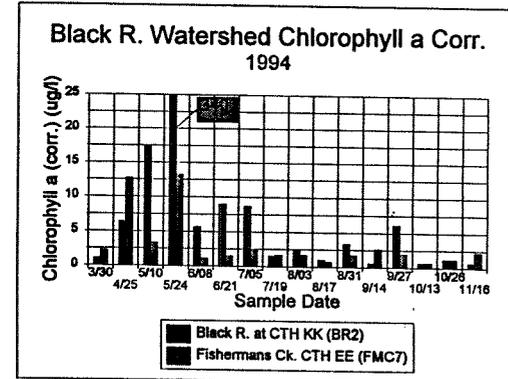
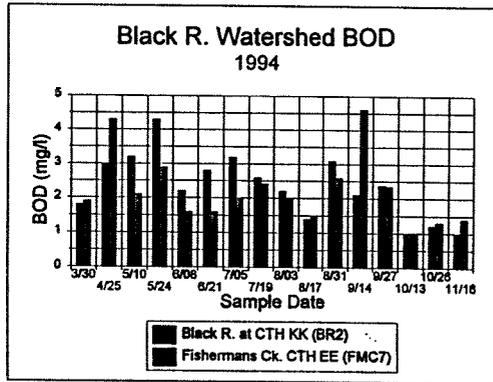
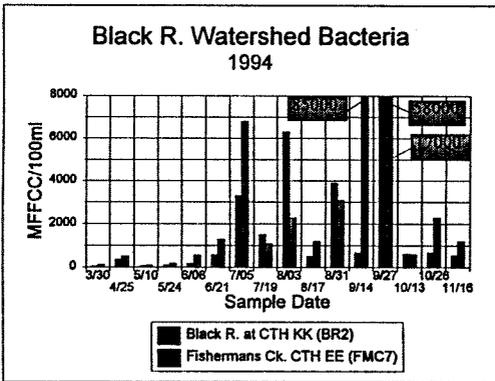
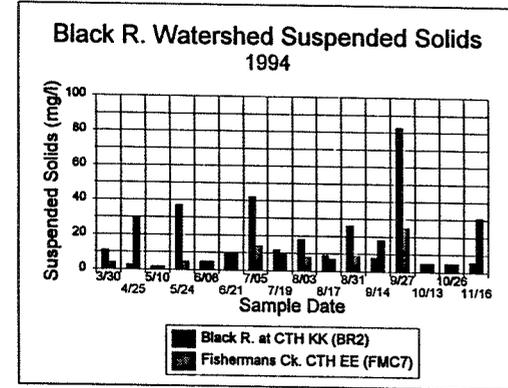
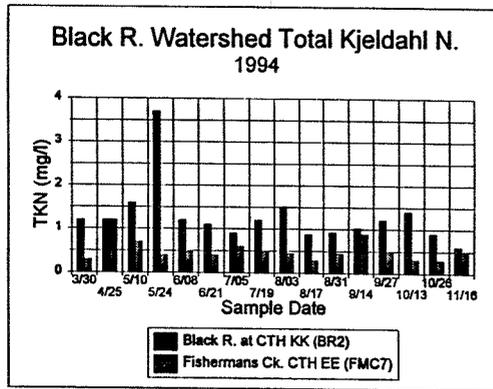
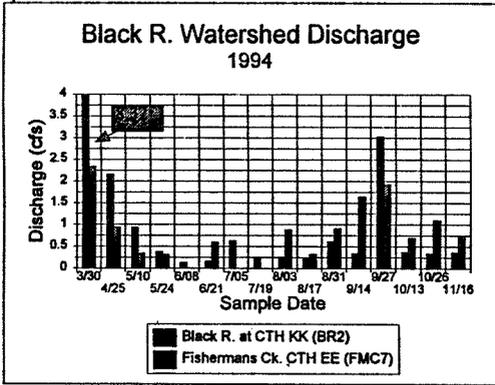
<sup>4</sup> Simonson et al. (1994)

**Table 9. Sediment Survey Results - Black River Watershed**

| Parameters                  |                          | Sites |       |       |       |       |
|-----------------------------|--------------------------|-------|-------|-------|-------|-------|
|                             |                          | BR-3  | BRC-3 | FMC-2 | FMC-6 | FMC-8 |
| Total Organic Carbon (ug/g) |                          |       |       |       |       |       |
| Particle Size               | % Solids                 |       |       |       |       |       |
|                             | % Sand                   |       |       |       |       |       |
|                             | % Silt                   |       |       |       |       |       |
|                             | % Clay                   |       |       |       |       |       |
|                             | Soil Texture             |       |       |       |       |       |
| PCBs (total) (ug/g)         |                          |       |       |       |       |       |
| PAHs (ng/g)                 | Acenaphthene             |       |       |       |       |       |
|                             | Acenaphthylene           |       |       |       |       |       |
|                             | Anthracene               |       |       |       |       |       |
|                             | Benzo (A) Anthracene     |       |       |       |       |       |
|                             | Benzo (B) Fluoranthene   |       |       |       |       |       |
|                             | Benzo (K) Fluoranthene   |       |       |       |       |       |
|                             | Benzo (GHI) Perylene     |       |       |       |       |       |
|                             | Benzo (A) Pyrene         |       |       |       |       |       |
|                             | Benzo (E) Pyrene         |       |       |       |       |       |
|                             | Chrysene                 |       |       |       |       |       |
|                             | Dibenzo (A,H) Anthracene |       |       |       |       |       |
|                             | Fluoranthene             |       |       |       |       |       |
|                             | Fluorene                 |       |       |       |       |       |
|                             | Indeno (1,2,3-CD) Pyrene |       |       |       |       |       |
|                             | Perylene                 |       |       |       |       |       |
|                             | Phenanthrene             |       |       |       |       |       |
|                             | Pyrene                   |       |       |       |       |       |
| Metals (mg/kg)              | Arsenic                  |       |       |       |       |       |
|                             | Boron                    |       |       |       |       |       |
|                             | Cadmium                  |       |       |       |       |       |
|                             | Chromium                 |       |       |       |       |       |
|                             | Copper                   |       |       |       |       |       |
|                             | Nickel                   |       |       |       |       |       |
|                             | Lead                     |       |       |       |       |       |
|                             | Zinc                     |       |       |       |       |       |
| Ammonia ( )                 |                          |       |       |       |       |       |

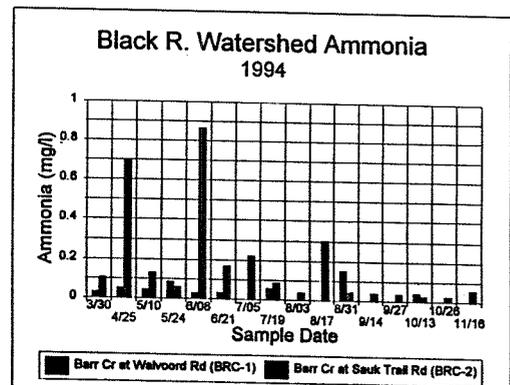
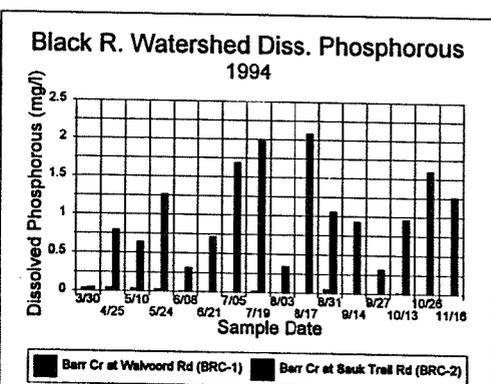
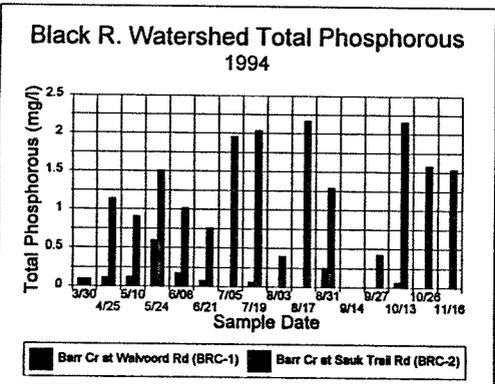
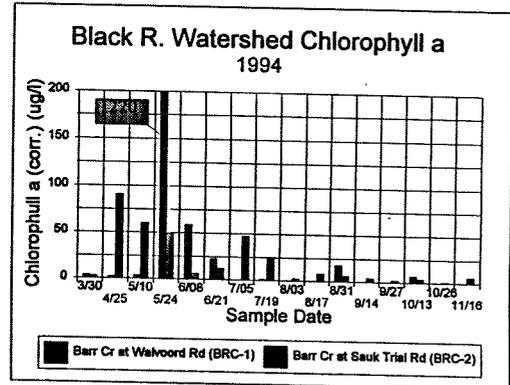
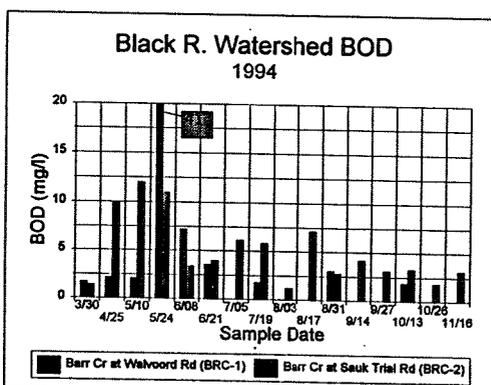
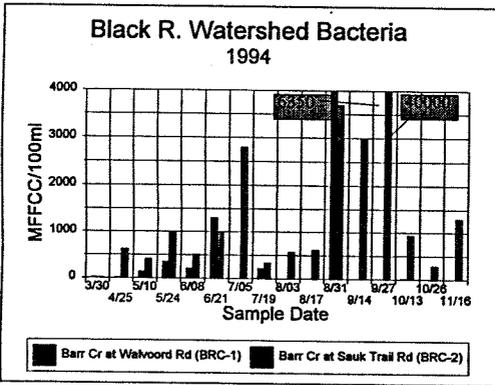
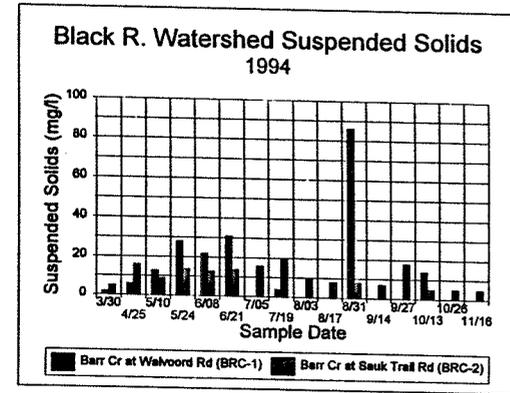
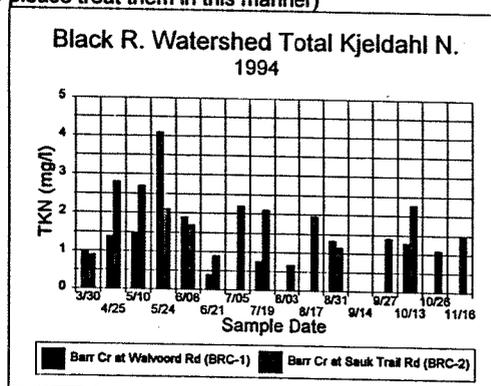
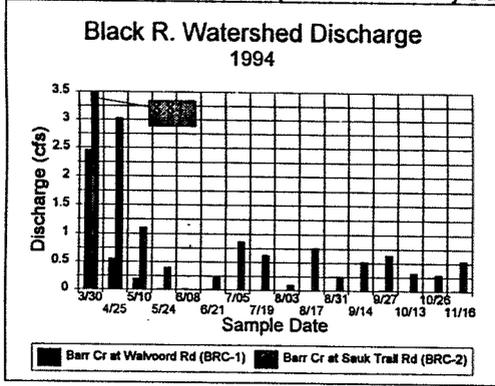


**Figure 2. Black River and Fisherman Creek Water Chemistry Results**  
 (No direct correlations can be made between these sites.)



**Figure 3. Barr Creek Water Chemistry Results**

(BRC-1 should be zero for all parameters on July 5 and July 19 please treat them in this manner)



DATE: Sept 11, 1979

STREAM: Black River

DISCHARGER: Oostburg STP

COUNTY Sheboygan

CLASSIFICATION RECOMMENDATION

The Black River shall be classified as follows:

- 1) From head waters to Wilson-Lima Road - non-continuous, marginal
- 2) From Wilson-Lima Road to Indian Mound Road - continuous, marginal
- 3) Indian Mound Rd. to the mouth - continuous, intermediate

The section of stream from Wilson-Lima Road to the mouth is primarily in a wetland area and contains water year-round, primarily in a standing water, marsh-like state. For this reason the Black R. is incapable of sustaining balanced fish and aquatic life communities

ADDITIONAL COMMENTS

STP discharge ~ 1.5 cfs

ATTACHMENTS

USGS map

REFERENCES USED

Low flow characteristics of Wisconsin streams at sewage-treatment plants and industrial plants USGS Water Res. Invest.

79-31

CC: Mark Tuzler (Central Office)

Frank Schultz (SED)

WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
 STREAM CLASSIFICATION WORKSHEET

Receiving Watercourse : Black River  
 District : Southeast  
 Location : SE 1/4, SE 1/4, Sec 36, T 14 N, R 23 E,  
 Sheboygan Co.  
 Major Basin : Lake Michigan  
 Discharger : Oostburg STP  
 Flow (Design & Actual) : Design - 0.80 MGD  
 Type of Treatment : Secondary - Trickling Filter

| Recommended No. | Reach | Classification Location               |
|-----------------|-------|---------------------------------------|
|                 | 1     | Above STP outfall                     |
|                 | 2     | CTA "A"                               |
|                 | 3     | Sauk Trail Rd                         |
|                 | 4     | Wilson-Lima Rd                        |
|                 | 5     | Terry Andrae State Park entrance road |
|                 | 6     | Kohler State Park entrance road       |
|                 | 7     | Indian Mound Rd.                      |

Date of Field Observations : Sept 11, 1979

Personnel : Joe Kurz Class : ES-4

Other Persons Contacted : None

Noted by WQES :

Date :

STREAM CLASS REACHES

| PHYSICAL FEATURE  |  | 1              | 2            | 3            | 4             | 5             | 6                  | 7                |
|---|--|----------------|--------------|--------------|---------------|---------------|--------------------|------------------|
| Watershed Character<br>(maps or observations)                         | Size (sqmi)                                      |                |              |              |               |               |                    |                  |
|   | Vegetation Type                                  |                |              |              |               |               |                    |                  |
|   | Predominant Land Use                             | Agricultural   | Agricultural | Agricultural | Marshland     |               |                    | Some residential |
|   | Wetland Type                                     |                |              |              | shallow marsh | shallow marsh | shallow marsh      |                  |
| Hydrologic Features<br>(indicate if estimates or actual measurements) | Width (ave)                                      | ~ 5'           | ~ 2'         | ~ 6'         | ~ 15'         | ~ 30'         | ~ 30'              | ~ 10'            |
|   | Depth (ave/max)                                  | Ave - 1'       | —            | 8" / 1'      | —             | —             | —                  | Ave 1.5'         |
|   | Velocity (est)(fps)                              | —              | —            | ~ 0.1 fps    | —             | —             | —                  | < 0.1 fps        |
|   | Flow (cfs)                                       | standing water | —            | < 0.5 cfs    | stagnant      | stagnant      | stagnant ~ 1.5 cfs |                  |
|   | Pools or Refuges for Fish<br>No. observed, depth |                |              |              |               |               |                    |                  |
| % Bottom Type   | Silt   | 100%           | 100%         | —            | —             | —             | —                  | 40%              |
|   | Sand   |                |              |              |               |               |                    | 10%              |
|   | Gravel   |                |              |              |               |               |                    |                  |
|   | Rubble   |                |              |              |               |               |                    |                  |
| Other   |  |                |              |              |               |               | Detritus 50%       |                  |
| Control Structures or Obstructions                                    | None ← →   |                |              |              |               |               |                    |                  |
| Irretriv. Channel Alterations   | None ← →   |                |              |              |               |               |                    |                  |
| Discharge<br>Q <sub>710</sub>   |  | 0              | 0            | 0            | 0             | 0             | 0                  | 0                |

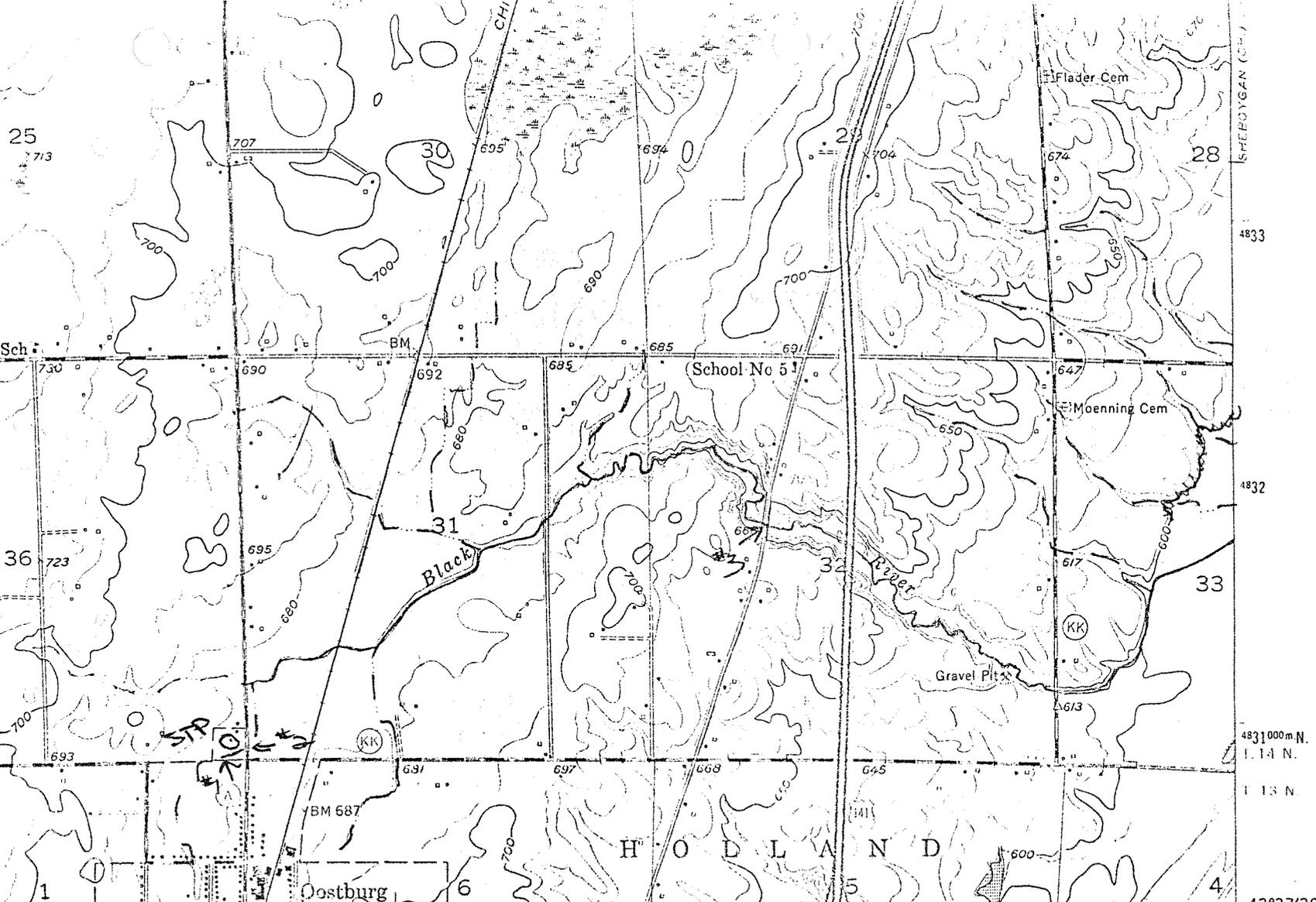


BIOLOGICAL CHARACTERISTICS

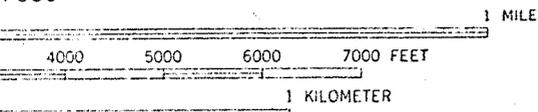
STATIONS ON RECEIVING WATER

|                        |  | 1   | 2       | 3  | 4                                  | 5          | 6          | 7  |               |
|------------------------|--|---|---------|--|------------------------------------|------------|------------|--|---------------|
| Bank Vegetation        |  | trees & shrubs  | grasses | wooded   | wetland vegetation types           |            |            |  |               |
| Aquatic Macrophytes    |  | None  | None    | None   | heavy growth                       | 100% cover | 100% cover | 30-100% cover  |               |
|                        |  |   |         |  | Lemna<br>Ceratophyllum<br>Nymphaea |            |            | in area<br>Same<br>Same                                |               |
| Invertebrates          |  | None observed   |         | Asellus very abt.<br>no other species observed | -                                  | -          | -          | Asellus very abt. plus other tolerant organisms common |               |
| Phytoplankton (algae)  |  | None observed   |         | very heavy filamentous algae                   | -                                  | -          | -          | very little sampled in 1978                            |               |
| periphyton             |  |   |         |  |                                    |            |            |  |               |
| Fish Observed          |  | ← None observed →   |         |  |                                    |            |            | carp kill in 1978                                      | None observed |
| Fishery Classification |  | Very limited fishery value.<br>Lake Michigan migrant species in downstream reach. |         |  |                                    |            |            |  |               |





LS #62-5001 435 R. 22 E. R. 23 E. 436 47'30" 437  
 NE CEDAR GROVE - 1:24.000  
 4000



INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1974  
 CEDAR GROVE 6 MI. 439000m.E. 87°45'

ROAD CLASSIFICATION

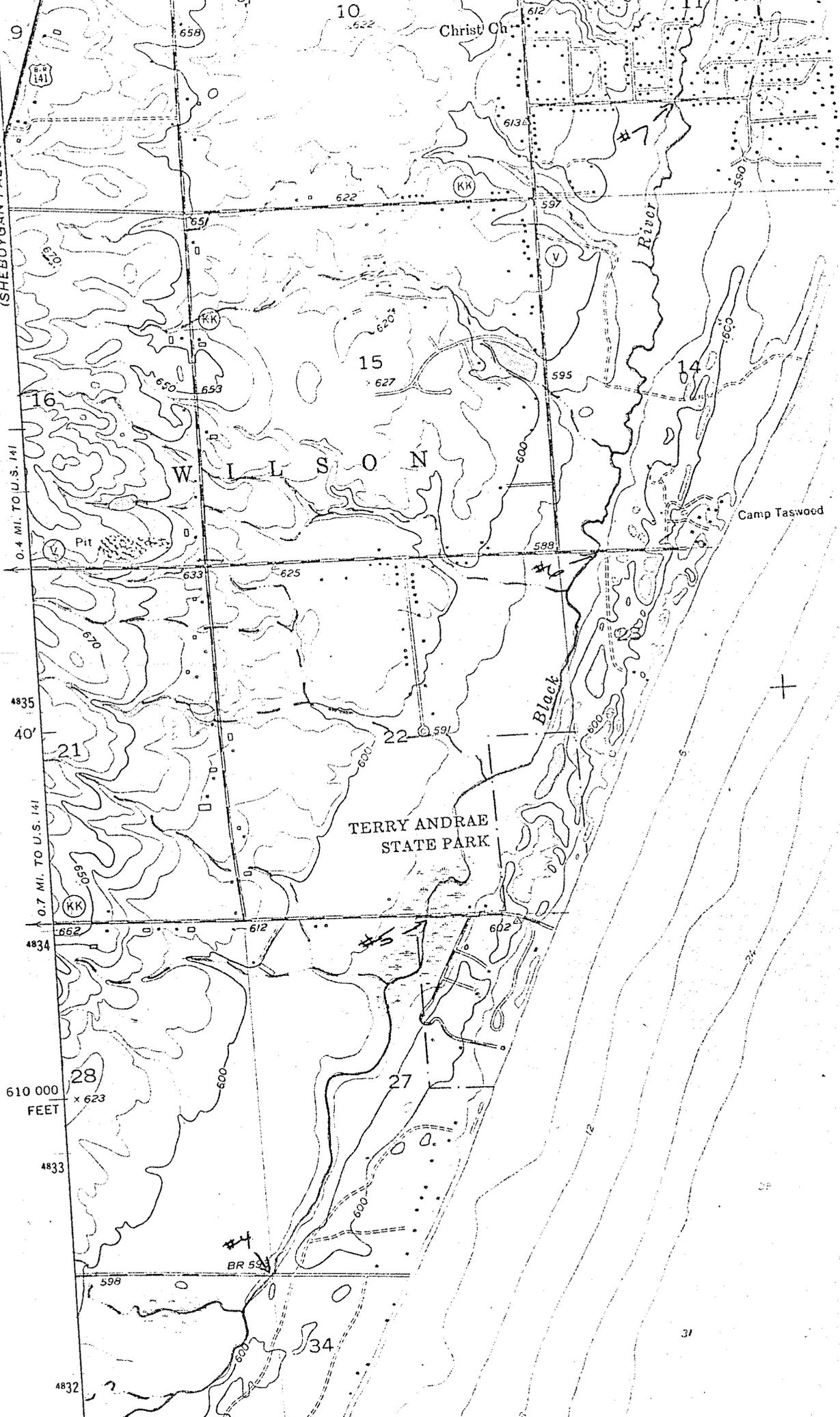
- Heavy-duty Light-duty
- Medium-duty Unimproved dirt
- U. S. Route State Route

SHEBOYGAN FALLS, WIS.  
 NE/4 SHEBOYGAN FALLS 15' QUADRANGLE  
 N4337.5—W8745/7.5

1954

3471' N  
 1,62,500  
 (SHEBOYGAN SOUTH)

3471 III NE  
(SHEBOYGAN FALLS)  
PORT WASHINGTON 2  
COSTBURG 6.1 MI.



0.4 MI. TO U.S. 141

0.7 MI. TO U.S. 141

610 000  
FEET  
x 623

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Christ Ch

W I L S O N

TERRY ANDRAE  
STATE PARK

Camp Taswood

Black  
River

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August 31, 1976

Survey Date: May 19, 1976

Oostburg, Sheboygan County

The Oostburg STP discharges its effluent to the Black River which has a Q7, 10 of 0 above the outfall. The river flows east through agricultural land and then north through Terry Andrae and J. M. Kohler State Parks before draining into Lake Michigan south of the City of Sheboygan.

The sluggish flow provided by the very low gradient limits fishery use. Numerous intermittent streams in the area of the state parks influence the river. The fishery in this downstream area consists of northern pike and panfish with a seasonal trout and salmon run.

Recommendation:

Non-continuous marginal use from STP outfall to Wilson-Lima Road.  
Non-continuous, intermediate aquatic life from Wilton-Lima Road to Lake Michigan.

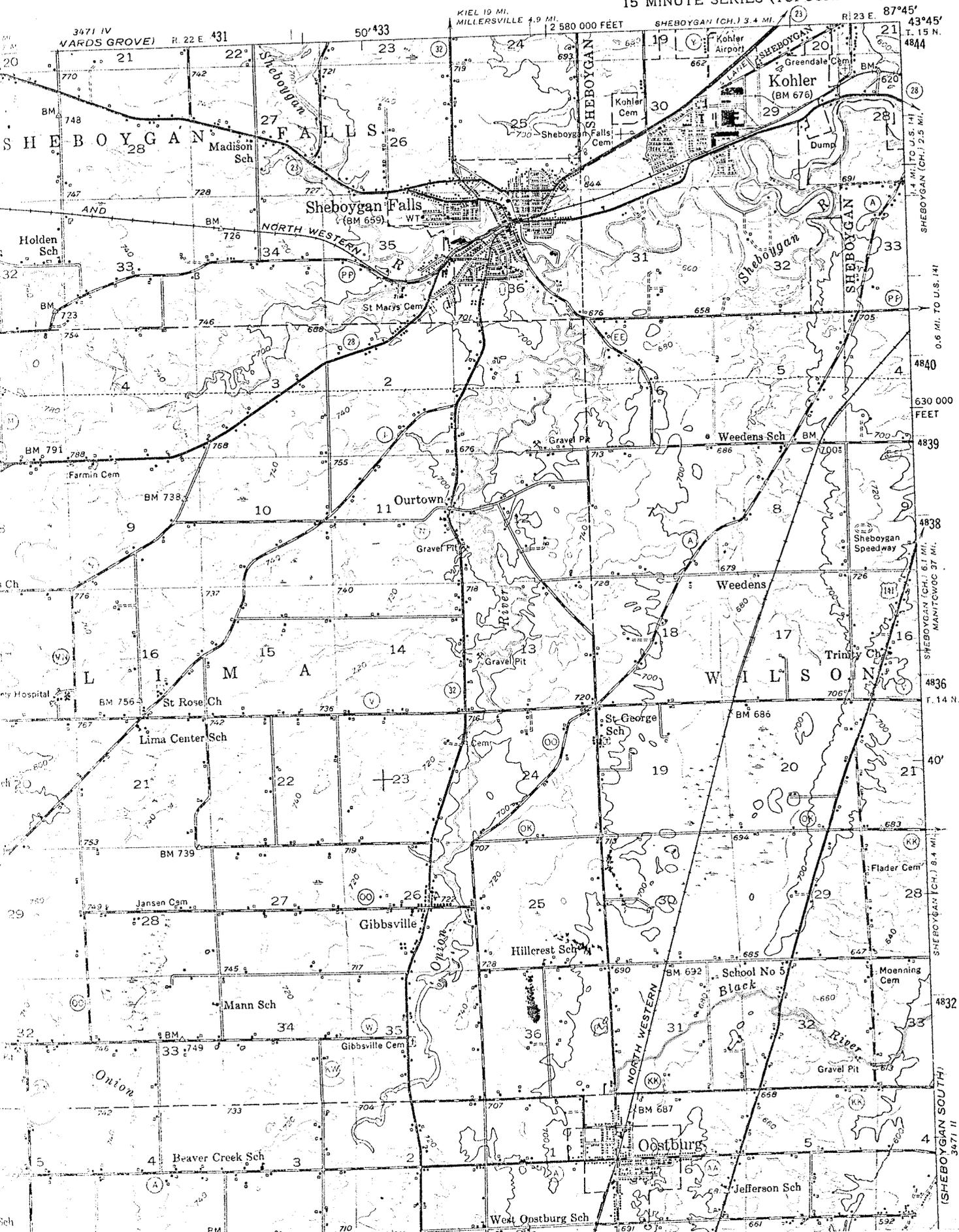


Robert B. Lucas



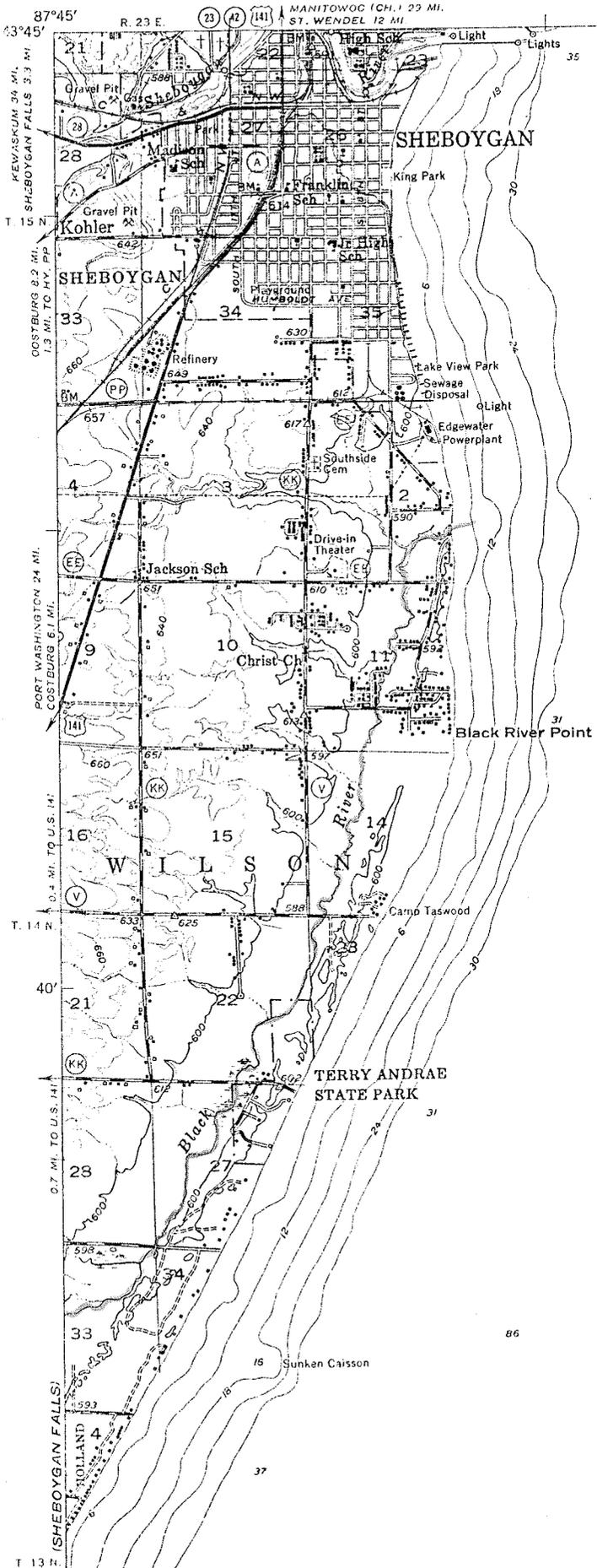
SHEBOYGAN FALLS QUADRANGLE  
WISCONSIN  
15 MINUTE SERIES (TOPOGRAPHIC)

3471 I  
SHEBOYGAN  
NORTH



(SHEBOYGAN SOUTH)  
3471 II

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY



— Intermediate aquatic life I  
— Marginal uses

M  
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G

MEAN LAKE ELEVATION 580

Oostburg

#3 Black River - Upstream,  
Near CTH "EE", 1 Mile  
South of City of Sheboygan



#4 Black River - Downstream,  
same location



Oostburg



#1

Outfall - Oostburg STP



#2

Black River - Downstream, 50 ft.  
below outfall