

Region <u>NER</u>	County <u>Keweenaw</u>	Report Date <u>1990</u>	Classification <u>Lff</u>
Water Body: <u>School Creek</u>			To be reclassified as <u>low SF and LFF</u> depending on reach.
Discharger: <u>Packerland Whey(?)</u>			

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
- Low-flows are present but all reports indicate the stream should be reclassified.
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
- 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) The 1987 fish kill report lists several fish and invertebrate species found (dead) in School Creek, including northern pike, bluegills, and brook and rainbow trout. The 1990 Watershed Report →
- Chemical Data (temp, D.O., etc.) The 1987 fish kill report gives temp and do. data, but following a spill. The 1990 Watershed report give DO and temp.
- Physical Data (flow, depth, etc.) The 1990 triennial review report gives a 70% of most cfs, while some areas occasionally go dry. large pools remain.
- Habitat Description The 1990 Watershed report gave School Creek a habitat rating of "good"
- Site Description/Map Some description of stream connectivity is included in the 1987 fish kill reports. Maps included in file.
- Other: _____

Historical Reports in file:

- 1987 Memo from Paul Peeters to Jeff Mack re: Fish Kill, School Creek and Keweenaw River, 5p.
- 1990 Keweenaw River Priority Watershed Data Summary Report, 11p.
- 1990 Triennial Standards Review - School Creek, Keweenaw County, 1 p. text plus forms, map. No photos

Additional Comments/How to improve report:

It appears that there are sufficient data to reclassify stream. More recent biological data may be helpful though, especially if more local farms instituted BMPs since the time these reports were written.

Triennial Standards Review
School Creek - Kewaunee Co.
March 1990
Tim Doelger

School Creek which is located near the village of Luxemburg is currently classified as a noncontinuous intermediate aquatic life stream. There was no data gathered to support this classification. The attached information documents existing conditions and shows that the stream while still impacted by NPS pollution actually contains a rather diverse and abundant population of aquatic life including warm water sport fish.

The piece of evidence most supportive of the continuous/warm water sport fish classification is the June '87 Paul Peeters (GBA - FM) memo describing an unfortunate fish kill which occurred on School Creek and the Kewaunee River in May of that year. The over 5,000 fish counted in School Creek included 77 northern pike and 137 bluegills. Also of note were rockbass, bullheads and surprisingly 1 brook trout and 1 rainbow trout. In November of 1987, fisheries management restocked both the Kewaunee River and School Creek with northern pike and smallmouth bass which indicates that School Creek is managed as a warm water fishery.

Although NPS impacts remain a problem, this stream is a sub-watershed of the Kewaunee PWS and remedial actions are ongoing which should continue to improve water quality. Of the 70 farms located in the drainage, 23 have installed some kind of best management practice (BMP). Another 13 are planned.

The potential of this stream is somewhat limited by water quantity. JSGS reports a Q₇₋₁₀ of .01 CFS and the surface water resources of Kewaunee Co. book states that in very dry years the stream may become a series of pools. Experience has shown that this is true, but that it is a short lived phenomenon. The pools are large enough to allow fish and macroinvertebrates to survive and restock segments that were temporarily dry. This maintains a year round population.

Other data of interest that is attached involves the comparison between habitat quality, water quality and biotic index numbers.

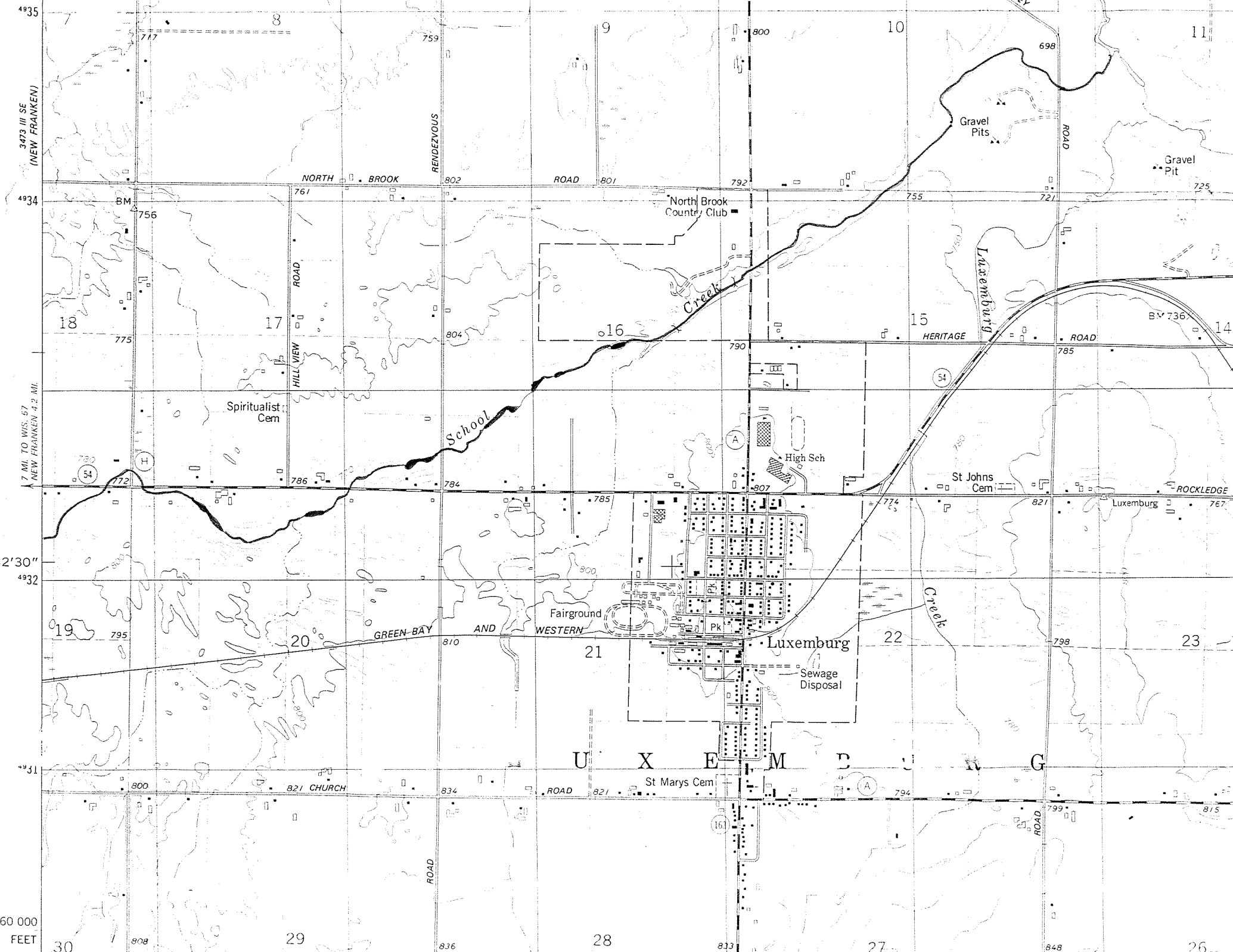
Results from the habitat rating form used by two evaluators during different times of the year are similar and document that "good" habitat is present yet biotic index values are in the poor to very poor range. Since the Hilsenoff Index is a measure of enrichment, this is understandable. Water chemistries show high levels of nutrients are present in available forms.

This nutrient availability is probably linked to agricultural activity and should improve as more BMPs are completed. It also contributes to the incredible macroinvertebrate biomass present in this stream.

In conclusions, School Creek has a much higher potential than is reflected by its current classification and it should continue to approach and meet that potential as improvements take place in the watershed.

It is recommended that School Creek be classified as continuous warm water sport fish from its confluence with the Kewaunee River upstream to the Brown County line. From the county line upstream, it should be classified as noncontinuous limited forage.

Attach.



3473 III SE
(NEW FRANKEN)

7 MI. TO WIS. 57
NEW FRANKEN 4.2 MI.

60 000
FEET

49°35

49°34

2'30"

49°32

49°31

7

18

19

30

8

17

20

29

9

16

21

28

10

15

22

27

11

14

23

26

NORTH BROOK ROAD

RENDEZVOUS

HILL VIEW ROAD

GREEN BAY AND WESTERN ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

North Brook Country Club

Spiritualist Cem

High Sch

St Johns Cem

Fairground

Luxemburg

Sewage Disposal

St Marys Cem

Gravel Pit

Gravel Pits

ROCKLEDGE

Luxemburg

L U X E M B U R G

Luxemburg Creek

Creek

School

Creek

(54)

(161)

(A)

(A)

777

759

800

698

756

761

802

801

792

755

721

725

775

804

790

785

BM 736

727

772

786

784

785

807

774

821

767

795

810

300

780

798

800

821

834

821

794

799

815

808

836

833

848

Stream SCHOOL CR Reach Location VALLEY RD - 1/2 MILE ABOVE KEWAUNEE R. Reach Score/Rating: 144/4000
 County KEWAUNEE Date 3/5/87 Evaluator Decker Classification _____

Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. 8	Some erosion evident. No significant "raw" areas. Good land mgmt. practices in area. Low potential for significant erosion. 10	Moderate erosion evident. Erosion from heavy storm events obvious. Some "raw" areas. Potential for significant erosion. 14	Heavy erosion evident. Probable erosion from an run off. 1
Watershed Nonpoint Source	No evidence of significant source. Little potential for future problem. 8	Some potential sources (roads, urban area, farm fields). 10	Moderate sources (small wetlands, tile fields, urban area, intense agriculture). 14	Obvious sources (major wetland drainage, high use urban or industrial area, feed lots, impoundment). 1
Bank Erosion, Failure	No evidence of significant erosion or bank failure. Little potential for future problem. 4	Infrequent, small areas, mostly healed over. Some potential in extreme floods. 8	Moderate frequency and size. Some "raw" spots. Erosion potential during high flow. 8	Many eroded areas. "Raw" areas frequent along straight sections and bends. 1
Bank Vegetative Protection	90% plant density. Diverse trees, shrubs, grass. Plants healthy with apparently good root system. 6	70-90% density. Fewer plant species. A few barren or thin areas. Vegetation appears generally healthy. 9	50-70% density. Dominated by grass, sparse trees and shrubs. Plant types and conditions suggest poorer soil binding. 1	<50% density. Many bare areas. Thin grass, few any trees and shrubs. 1
Lower Bank Channel Capacity	Ample for present peak flow plus some increase. Peak flow contained. W/D ratio <7. 8	Adequate. Overbank flows rare. W/D ratio 8-15. 10	Barely contains present peaks. Occasional overbank flow. W/D ratio 15-25. 14	Inadequate, overbank flow common. W/D ratio >25. 1
Lower Bank Deposition	Little or no enlargement of channel or point bars. 6	Some new increase in bar formation, mostly from coarse gravel. 9	Moderate deposition of new gravel and coarse sand on old and some new bars. 15	Heavy deposits of fine material, increased bar development. 1
Bottom Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition. 4	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools. 8	30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools. 16	More than 50% of the bottom changing nearly re long. Pools almost absent due to deposition. 1
Bottom Substrate/ Available Cover	Greater than 50% rubble, gravel or other stable habitat. 2	30-50% rubble, gravel or other stable habitat. Adequate habitat. 7	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 17	Less than 10% rubble, gravel or other stable habitat. Lack of habitat obvious. 1
Avg. Depth Riffles and Runs	Cold >1' 0 Warm >1.5' 0	6" to 1' 6 10" to 1.5' 6	3" to 6" 18 6" to 10" 18	<3" 1 <6" 1
Avg. Depth of Pools	Cold >4' 0 Warm >5' 0	3' to 4' 6 4' to 5' 6	2' to 3' 8 3' to 4' 8	<2' 1 <3' 1
Flow, at Rep. Low Flow	Cold >2 cfs 0 Warm >5 cfs 0	1-2 cfs 6 2-5 cfs 6	.5-1 cfs 8 1-2 cfs 8	<.5 cfs 1 <1 cfs 1
Pool Riffle, Run/Bend Ratio (distance between riffles ÷ stream width)	5-7. Variety of habitat. Deep riffles and pools. 4	7-15. Adequate depth in pools and riffles. Bends provide habitat. 8	15-25. Occasional riffle or bend. Bottom contours provide some habitat. 6	>25. Essentially a straight stream. Generally shallow water or shallow riffle. Poor habitat. 1
Aesthetics	Wilderness characteristics, outstanding natural beauty. Usually wooded or un-pastured corridor. 8	High natural beauty. Trees, historic site. Some development may be visible. 10	Common setting, not offensive. Developed but uncluttered area. 14	Stream does not enhance aesthetics. Condition stream is offensive. 1

Column Totals: 18 46 32 48

Column Scores E 18 +G 46 +F 32 +P 48 = 144 = Score

<70 = Excellent, 71-129 = Good, 130-200 = Fair, >200 = Poor

FIELD MEASUREMENTS

D.O. 8.5 TEMP 17 pH 7.3 AVG WIDTH 20'
AVG DEPTH 6" FLOW MEAS _____ LENGTH OF SEGMENT _____

OBSERVATIONS SCARCE (S), COMMON (C), ABUNDANT (A)

SLUDGE S MUD S MACROPHYTES S SLIMES S
FILAMENTOUS ALGAE A LITTER & DETRITUS S
PLANKTONIC ALGAE S IRON BACTERIA S TURBIDITY S
COMMENTS:

EXTERNAL IMPACTS SEVERE (S), MODERATE (M), LIGHT (L)

AGRICULTURAL M+ CHANNELIZATION L CONSTRUCTION L
STORM SEWERS L POINT SOURCES L COOLING WATER FROM PACKERLAND WHEY PRODUCTS
COMMENTS:

BIOTA HBI FBI OTHER

MACROINVERTEBRATES 7.2 _____
FISH OBSERVED MINNOWS, BLUEGILLS
WILDLIFE USES

WATER CHEMISTRY

BOD5 <1 TOT P .08 CHLORIDE _____ LEAD _____ MFFC _____
DISS P .064 CADMIUM _____ MAGNESIUM _____ HARDNESS _____
MFFS _____ TOT ~~K~~ N .4 CALCIUM _____ MANGANESE _____
COPPER _____ NH3N .1 NICKLE _____ SUSP SOLIDS <2
NO2-N+NO3-N 2.7 ZINC _____ IRON _____

CLASSIFICATION

GREAT LAKES COMMUNITY _____ WARM WATER FORAGE ✓ DURING LOW FLOWS
COLD WATER COMMUNITY _____ LIMITED FORAGE FISH _____
WARM WATER SPORT FISH ✓ LIMITED AQUATIC LIFE _____
MUCH OF THE TIME

LAKE MICHIGAN DISTRICT District Biotic Index Report

HBI 7.203 Rep1 Rep2 Rep3
 Sample ID # 881206-31-01 Waterbody Name SCHOOL CREEK
 Water Temp (Celsius) Dissolved Oxygen (mg/l)
 Sample Location: NE SE S10 T24N R23E Master Waterbody #
 Project Name TRIENNIAL REVIEW Storet Station #
 Ave. Stream Width (Ft.) at Site 20.0 Ave. Stream Depth (Ft.) at Site 0.75
 Collector DOELGER, T. Field # 01 Rep 1
 Measured Velocity (fps)
 Sorter McMULLIN, R. Est. Velocity (fps)
 Est % of sample sorted 7 Moderate (0.5-1.5)
 Taxonomist DIMICK, J. Sampled Habitat
 Location Description 50 YDS UPSTREAM OF VALLEY RD 1. Riffle

Est. Time Spent Sampling (Min.) 2

Sampling Device 1. D Frame

Substrate at Site Location (%)

0.0 Bedrock	50.0 Rubble	10.0 Sand	0.0 Clay	0.0 Muck
0.0 Boulders	40.0 Gravel	0.0 Silt	0.0 Detritus	0.0 Debris/Veg

Substrate Sampled (%) (Same as above Yes)

0.0 Bedrock	0.0 Rubble	0.0 Sand	0.0 Clay	0.0 Muck
0.0 Boulders	0.0 Gravel	0.0 Silt	0.0 Detritus	0.0 Debris/Veg

Aquatic Vegetation 80 % of Total Stream Channel at Sampling Site

Observed Instream Water Quality Indicators (Perceived WQ Good)

Not Present	Insig- nificant	Sig- nificant	Comments
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Turbidity

Chlorine or Toxic Scour

Algae

Planktonic Algae

Slimes

Iron Bacteria

3

Factors Which May Be Affecting Habitat Quality

Sludge Deposits	1
Silt and Sediment	1
Channel Ditching	1
Down/Up Stream Impoundment	1
Low Flows	3
Wetlands	1

Pollutant Sources

Livestock Pasturing	3
Barnyard Runoff	3
Cropland Runoff	3
Tile Drains	3
Septic Systems	1
Stream Bank Erosion	1
Urban Runoff	1
Construction Runoff	1

Point Source (Specify Type) 2 WHEY PROCESSING COOLING WATER
 Other (Specify)

FILE ID# 881206-31-01

*** TAXA ***	*** SPECIES ***	TAXONOMIC KEY USED	TOL VAL	ORGANISM ID	ORGANISM COUNT	REP1	REP2	REP3
PLECOPTERA								
CAPNIIDAE								
ALLOCAPNIA			*1 3.00	01010100	23	0	0	0
EPHEMEROPTERA								
HEPTAGENIIDAE								
STENACRON	INTERPUNCTATUM		*1 7.00	02060501	4	0	0	0
TRICHOPTERA								
POLYCENTROPODIDAE								
POLYCENTROPUS			*1 6.00	04130400	5	0	0	0
COLEOPTERA								
ELMIDAE								
OPTIOSERVUS			*1 4.00	07020500	3	0	0	0
AMPHIPODA								
GAMMARIDAE								
GAMMARUS	PSEUDOLIMNAEUS		*2 4.00	09010201	1	0	0	0
ISOPODA								
ASELLIDAE								
ASELLUS	INTERMEDIUS		*3 8.00	10010100	146	0	0	0
OLIGOCHAETA								
NAIDIDAE			*4	16020000	1	0	0	0
TUBIFICIDAE			*4	16030000	1	0	0	0
HIRUDINEA								
GLOSSIPHONIIDAE			*4	17020000	1	0	0	0
*** TOTALS: ***					185	0	0	0
*** BIOTIC INDEX: ***					7.203			

Taxonomic Key Code References

- *1 Hilsenhoff 1981
- *2 Holsinger 1972
- *3 Williams 1972
- *4 Klemm 1985

Table 27. Twin-Kewaunee River basin and Door County station locations and low-flow characteristics—Continued.

Station number ¹	Stream name	Station location	Drainage area (mi ²)	Date	Discharge (ft ³ /s)	Q _{7,2} (ft ³ /s)	Q _{7,10} (ft ³ /s)	Accuracy level
TK25	Maple Creek <i>AKA</i> <i>DOWLAN'S CR.</i>	NE¼NW¼ sec. 19, T. 28 N., R. 27 E., Door County, at country road, 1.0 mi south of Valmy, Wis.	6.75	Oct. 2, 1968 Oct. 13, 1972 Aug. 1, 1973 Nov. 14, 1973 Oct. 23, 1975 July 12, 1976	2 ₀ 2.13 2.61 2 ₀ 2 ₀ 2 ₀	0	0	c
TK27	Ahnapee River	NW¼NE¼ sec. 32, T. 26 N., R. 25 E., Door County, at County Trunk J, 0.3 mi west of Forestville, Wis.	32.3	Oct. 3, 1968 July 20, 1972 Oct. 12, 1972 Aug. 1, 1973 Oct. 22, 1975 July 13, 1976 Sept. 17, 1976	5.70 6.22 25.2 14.0 4.88 2.57 1.71	1.8	.90	c
TK29	Lake Michigan tributary	NE¼NE¼ sec. 20, T. 24 N., R. 25 E., Kewaunee County, at bridge on country road, 1.0 mi east of Alaska, Wis.	1.53	Oct. 12, 1972 Aug. 1, 1973 Nov. 14, 1973 Oct. 22, 1975 July 14, 1976 Sept. 15, 1976	.74 .03 .34 2.13 2 ₀ 2 ₀	0	0	c
TK1A	Kewaunee River	NW¼NW¼ sec. 13, T. 24 N., R. 23 E., Kewaunee County, at bridge on State Highway 54, 2.1 mi west of Casco,	65.6	Oct. 22, 1975 July 14, 1976 July 26, 1977	6.40 .66 .77	.81	.35	c
TK2A	School Creek	NE¼SE¼ sec. 10, T. 24 N., R. 23 E., Kewaunee County, at bridge on country road, 2.0 mi northeast of Luxemburg, Wis.	24.6	Oct. 22, 1975 July 13, 1976 Sept. 15, 1976 July 26, 1977	.92 .08 .05 .12	.05	.01	c
TK3A	Silver Creek	NE¼SW¼ sec. 28, T. 25 N., R. 25 E., Kewaunee County, at bridge on country road, 1.7 mi west of post office in Algoma, Wis.	61.3	Oct. 22, 1975 July 13, 1976 Sept. 15, 1976 July 26, 1977	4.80 .08 .16 .06	.08	.01	c

¹Based on 1971 report by Wisconsin Department of Natural Resources (DNR). Site lettered "A" was not included

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: June 11, 1987

File Ref: 3600

To: Jeff Haack

From: Paul Peeters ~~PP~~ ~~serb~~

Subject: Fish Kill, School Creek and Kewaunee River, Kewaunee County

On Saturday, May 16th I was informed by Warden Tom Wilda that there had been a fish kill in the Kewaunee River. Warden Jim Aasen and I met with Warden Tom Wilda at the Highway 54 crossing of the Kewaunee River.

At this site numbered "1" on the attached map, there were dead northern pike, carp, rock bass, several types of cyprinid minnows, and many crayfish. These fish had been dead for several days and extensive scavenging was apparent as several northern pike carcasses were pulled out of the water and almost completely consumed. In addition to the obvious mammalian scavenging, many gulls were seen in the area. At 3:10 pm, the water temperature was 21°C and the dissolved oxygen was 11.0 ppm. Warden Aasen and I later collected some dead fish from this site which are in a freezer under our control for possible samples or evidence.

Warden Aasen and I proceeded downstream to the Rockledge road crossing of the Kewaunee River labeled "2" on the attached map. At this site, I observed dead darters, northern pike, bluegill, and crayfish. I also observed live darters and cyprinids. At 3:25 PM, the water temperature was 21°C and the dissolved oxygen was 3.9 ppm. The water was quite turbid.

Warden Aasen and I then proceeded to an area near the Luxemburg treatment facility where we met with Warden Tom Wilda, Len Meyers, and yourself. By this time the source had been narrowed down to the School Creek watershed.

Warden Aasen and I went upstream in the School Creek watershed to check an unnamed creek which flows into School Creek north of the village of Luxemburg. This sight is labeled "3" on the attached map. At this sight the water was a murky whitish gray with a noticeable sheen or slick on the surface. There was an organic odor in the area. At 4:00 PM, the water temperature was 21°C and the dissolved oxygen was 0.0 ppm. No live organisms of any kind were seen in the stream.

Warden Aasen and I then checked an area of School Creek above the confluence of the unnamed creek at Rondevous Road just upstream from the "4" on the attached map. At 4:10 PM, School Creek was 23°C and had 15.2 ppm oxygen at this site. Live fish were seen at this site and no dead fish were observed.

Warden Aasen and I rejoined you and Warden Wilda at Packerland Whey on the west edge of Luxemburg. This plant is located in close proximity to the unnamed tributary to School Creek mentioned before. A large "spill" of some fluid was apparent. The area of runoff between the plant and the unnamed tributary to School Creek was heavily "polluted" with a liquid which had an organic odor.

On our return trip to Two Rivers, Warden Aasen and I checked the 3rd Highway "C" crossing of the Kewaunee River. At this site, the water temperature was 20°C and the dissolved oxygen was 16.5 ppm at 5:15 PM. There were fish rising to the surface as if feeding on insect and fishermen in the area were catching rainbow trout from a recent stocking.

On Sunday, May 17th, a four person crew was organized to count and identify dead fish. Mike Toneys and Ken Royseck counted and identified dead fish from the Highway 54 crossing of the Kewaunee River upstream, and Guy Willman and Andy Decker counted and identified dead fish in the area downstream.

Willman and Decker walked south from Rockledge Road along the Ahnapee and Western railroad grade until they reached the Kewaunee River near the confluence of Casco Creek, site "5" on the attached map. They proceeded several hundred feet downstream on the Kewaunee River and did not observe any dead fish. They walked upstream beyond the confluence of Casco Creek and began to see dead fish within a short distance. Willman and Decker counted and identified dead fish in the Kewaunee River upstream to the Highway 54 crossing, marked "1" on the attached map. Although scavenging was apparent and many gulls were seen in the area, they counted the following dead fish:

2,170 minnows (this includes dace, darters, stoneroller, as well as cyprinids), 170 rough fish (this includes carp, bullheads, suckers, and redhorse), 36 northern pike, 60 rock bass, and 36 smallmouth bass. Also seen were 1 dead muskrat, and many insect larvae and crayfish.

Mike Toneys and Ken Royseck followed the Kewaunee River upstream from Highway 54 counting dead fish past the confluence of School Creek where they immediately ran out of dead fish. They then proceeded up School Creek to the County Highway "A" crossing marked "6" on the attached map. In summary, they counted the following dead fish:

15 carp, 4,631 minnows, 740 suckers, 77 northern pike, 137 bluegills, 1 pumpkinseed, 17 darters, 165 bullheads, 9 rockbass, 1 brook trout, and 1 rainbow trout. In addition, 1 snapping turtle, thousands of crayfish and hundreds of millions of invertebrates were also dead. (In places the amphipoda, most likely Gammarus spp., were in piles a foot thick!) In School Creek no live organisms were seen in the water.

On Monday another department person, Tim Doelger, counted dead organisms upstream from county "A" on School Creek and an additional 15 carp, 3 bullheads, 100's of crayfish and millions of Gammarus spp. were seen.

The fish kill ranged from complete in School Creek to extensive in the Kewaunee River as far downstream as the confluence with Casco Creek. The area is shown in yellow highlight on the attached map.

The combined influence of reoxygenation and dilution caused by feeder creeks allowed fish in the Kewaunee River below the confluence with Casco Creek to survive the initial kill.

The following table (Table 1) summarizes all of the dead organisms observed by department personnel from the spill site downstream to the confluence of the Kewaunee River and Casco Creek. It should be recognized that these numbers represent an absolute minimum as any fish in pools deeper than three feet were probably not visible and extensive scavenging by birds and mammals were evident. The dead fish were available for scavenging for days before the count was made on Sunday, May 17th. Also available in Table 1 is the minimum assessment as per Wis. Stats. 29.65(1)

Table 1. Summary of dead organisms counted in School Creek and Kewaunee River, Kewaunee County, and the minimum assessment as per Wis. Stats. 29.65(1).

<u>Type of fish</u>	<u>Number</u>	<u>Per fish</u>	<u>Total</u>
Minnows (cyprinids, darters, dace, etc.)	6,818	-	-
Rough Fish (carp, suckers, redhorse, etc.)	937	-	-
Game fish (rock bass, gills, pumpkinseed, bullheads)	375	\$8.75	\$3,281.25
Northern Pike	113	\$8.75	\$ 988.75
Smallmouth Bass	36	\$26.25	\$ 945.00
Rainbow and Brook Trout	2	\$26.25	\$ 52.50
Muskrat	1	\$ 8.75	\$ 8.75
Snapping Turtle	1	-	-
Crayfish	1,000's	-	-
Invertebrates (especially Gammarus)	100,000,000's	-	-
Total			\$5,276.25

In investigating and reporting this fish kill, a considerable amount of man hours and expenses (mainly vehicle miles) were incurred. Accounting for just the hours and miles incurred by the fish management personnel,

there were over 550 miles driven at an average of approximately \$.30 per mile or \$165.00 and a minimum of 50 hours of department personnel. The 50 hours of department personnel was shared by the Two Rivers Warden, a Fish Manager and Fish Technician from Sturgeon Bay, a Fish LTE from Green Bay, and a Fish Manager and Fish LTE from Two Rivers. A salary average of \$9.00/m would put the personnel cost over \$450.00. Additional costs of field lunches for the fish counters and film, etc. Should be about \$50.00.

The restocking of School Creek and the Kewaunee River will be based on the acreage of water in those reaches of streams. For calculation of this acreage stream thread distances were measured from a U.S.G.S. quadrangle with a map measure and the average stream width was used. Table 2 lists the stream lengths, widths and acreage of each section.

Table 2: Stream length, width and acreage.

Stream	Length (nearest .1 mile)	Average Width (in feet)	Acreage (nearest .1 acre)
Unnamed Tributary to School Creek	.8 mile	5 feet	.5 acres
School Creek	2.1 mile	15 feet	3.8 acres
Kewaunee River	2.9 mile	25 feet	8.8 acres
Total Acreage			13.1 acres

Following Wisconsin Fish Management Stocking guidelines, I recommend stocking 3"-4" smallmouth bass at a rate of 100/acre (13.1 x 100 or 1,310) for three consecutive years and 9"-12" northern pike at a rate of 5/acre (13.1 x 5 or 66) for three consecutive years.

Other fish, such as rock bass and bluegills, should be counted on to restock from above and below the kill area and should not be stocked. State produced fish are not available for 1987 and private hatcheries will have to be utilized.

Table 3 lists the numbers of fish and estimated cost projected by a 1982 American Fisheries Society publication to stock those fish. Private hatcheries may cost more than agency hatcheries.

Table 3: Number and cost of restocking School Creek and the Kewaunee River.

Species	Size	Number Per Year	Estimated Cost Cost Per Fish	Estimated Totals
Smallmouth Bass	3"-4"	1,310	\$.91	\$1,192.10
Northern Pike	9"-12"	66	\$2.00	\$ 132.00
Total Per Year For Three Years				\$1,324.10
Total Over Three Years				\$3,972.30

The estimated cost in Table 3 (\$1,324.10/year for three years) is just that, an estimate.

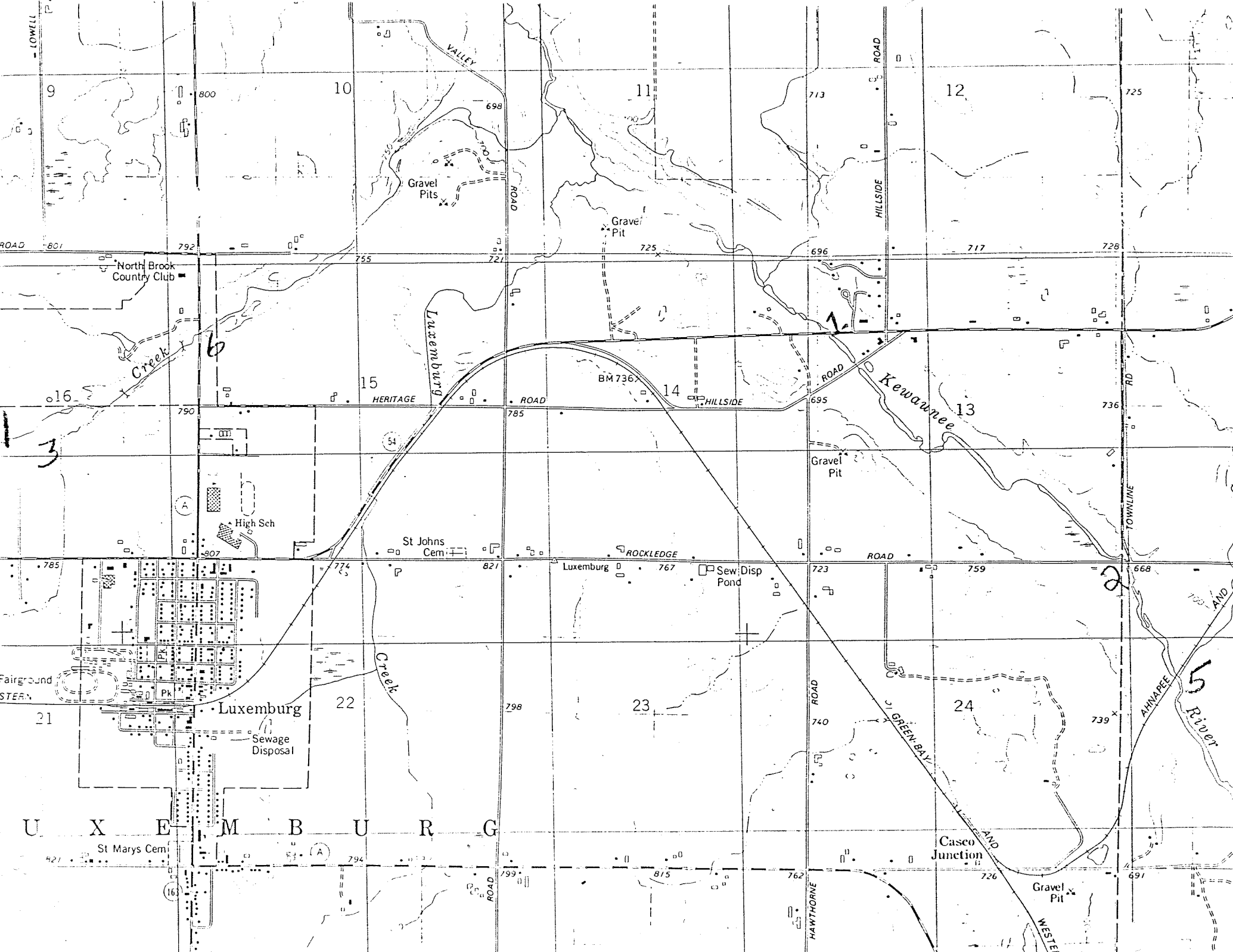
State hatcheries are already into their yearly production cycle and as previously mentioned state fish will not be available in 1987. Private hatcheries will have to be utilized and if fish are available, they will be at "fair market price", which may be somewhat higher than the 1982 AFS figures used in calculating the estimates.

A Form 9300-806L, Project Request, is attached for approval.

km

Attachment

cc: George Boronow



U X E M B U R G

Casco Junction

North Brook Country Club

High Sch

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Luxemburg

Sewage Disposal

Sew. Disp Pond

Luxemburg

ROCKLEDGE

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TOWNSHIP

HAWTHORNE

WESTSIDE

ANNAPEE AND

5 River

Luxemburg

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VALLEY

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INTERIM EVALUATION MONITORING REPORT
KEWAUNEE RIVER PRIORITY WATERSHED
by Cheryl Nachtwey

KEWAUNEE RIVER PRIORITY WATERSHED
DATA SUMMARY REPORT
by Cheryl Nachtwey
2/26/90

Data on the biological and physical characteristics of the Kewaunee River watershed project area were collected during the 1984-85 field season by the Department of Natural Resources in order to better characterize existing water quality conditions. This baseline data will be used to measure water quality improvements after installation of Best Management Practices (BMP's).

The following data was collected in the Kewaunee River watershed: biotic indices, dissolved oxygen levels, relative fish abundance, and fish habitat evaluations.

Biotic index: This sampling involved collecting and identifying aquatic arthropods from the streambed and applying the data to Hilsenhoff's biotic index. The numbers and types of organisms were used to indicate the general water quality at each of the sites. The samples were collected during the 1978 thru 1983 field seasons. Samples from 1984 were taken in replicates of three to allow for a statistical comparison of the biotic index samples collected before and after the project is completed. All samples were taken with a D frame net in riffle/run areas of the streams. Table 1, pages 3 & 4, is a summary of all the data that was collected for this survey. Figure 1, page 5, indicates each sample location and the subwatershed boundaries.

Dissolved oxygen: The dissolved oxygen (D.O.) results from 1983 show that 4 survey sites did not meet the state standard requirement of 5.0 ppm (parts per million). Two samples were taken from each of the 9 sites, one in early morning and one in early afternoon, see Table 2, page 6. Figure 2, page 7, indicates where these samples were taken.

Relative fish abundance: The Department of Natural Resources fisheries management monitored 8 sites in the Kewaunee River drainage basin during the 1984 field season for relative fish abundance. Surveys were conducted on the Kewaunee River (3 sites), Scarboro Creek (4 sites), and Casco Creek (1 site), using backpack electroshocking. Each survey site was less than a quarter mile long.

The purpose of the 1984 survey was to make collections representative of fish communities in each sampling site. The information on numbers and types of fish present was used to evaluate the stream condition and changes in water quality. Table 3, page 8, shows the totals and percentages of each species caught. By using fin clips in the first run of Casco Creek, recaptures were easily identified in the second run later that day. Figure 3, page 9, indicates each sample site location and stream classifications.

Fish habitat evaluation: This survey was based on the

Wisconsin Small Stream Classification Guidelines (DNR, 1983). This technique focuses on physical stream characteristics, such as stream flow and streambed siltation. The results of this survey can identify what type of fish community the stream is capable of supporting and what problems are preventing the stream from meeting its potential. Table 4, page 10, is the summarized data from the Stream System Habitat forms that were used to evaluate these streams. Figure 4, page 11, shows the sites where these evaluations were done.

Biotic Indices

Dissolved Oxygen

Fish Habitat Evaluations.....were done by Tim Rasman

Relative Fish Abundance.....was done by Terry Lychwick & fisheries crew.

TABLE 1. BIOTIC INDEX SURVEY SUMMARY: KEWAUNEE RIVER WATERSHED

SITE DESCRIPTION	SITE #	DATE	BI #	WATER QUALITY
CASCO CREEK:				
150' ABOVE MOUTH	1	11/08/84	1.96	VERY GOOD
" "	1	11/08/84	2.02	VERY GOOD
" "	1	11/08/84	1.94	VERY GOOD
75' ABOVE ROCKLEDGE ROAD	2	10/26/78	1.69	EXCELLENT
ROCKLEDGE ROAD	3	05/31/79	1.37	EXCELLENT
25' ABOVE ROCKLEDGE ROAD	4	11/15/84	2.01	VERY GOOD
" "	4	11/15/84	2.04	VERY GOOD
" "	4	11/15/84	2.34	GOOD
50' ABOVE CREVICE ROAD	5	10/31/78	1.90	VERY GOOD
" "	5	11/15/84	2.89	FAIR
" "	5	11/15/84	2.66	GOOD
" "	5	11/15/84	3.02	FAIR
KEWAUNEE RIVER:				
500' BELOW CTH F BRIDGE	6	10/31/78	2.03	VERY GOOD
250' ABOVE CTH F BRIDGE	7	06/04/79	3.12	FAIR
" " "	7	11/15/84	2.83	FAIR
" " "	7	11/15/84	2.79	FAIR
" " "	7	11/15/84	2.76	FAIR
100' BELOW CLYDE HILL RD	8	10/26/78	3.09	FAIR
" " "	8	05/29/79	3.19	FAIR
" " "	8	11/15/84	2.72	GOOD
" " "	8	11/15/84	2.91	FAIR
" " "	8	11/15/84	2.65	GOOD
75' BELOW CTH C AT A	9	10/26/78	3.48	FAIR
" "	9	11/15/84	3.05	FAIR
" "	9	11/15/84	2.57	GOOD
" "	9	11/15/84	3.04	FAIR
200' BELOW CASCO CK MOUTH	10	11/08/84	2.63	GOOD
" " "	10	11/08/84	2.70	GOOD
" " "	10	11/08/84	2.62	GOOD
50' BELOW ROCKLEDGE ROAD	11	10/26/78	2.27	GOOD
300' ABOVE HWY 54	12	05/29/79	2.94	FAIR
TN RD 1 MILE SE CO. A & K	13	10/26/78	3.59	POOR

TABLE 1. (CONT)

SITE DESCRIPTION	SITE	DATE	BI #	WATER QUALITY
SCARBORO CREEK:				
COUNTY HWY A BRIDGE	14	10/26/78	0.43	EXCELLENT
RIFFLE ABOVE HWY A	15	05/29/79	3.75	POOR
BELOW A STREAM NARROWS	16	10/17/80	2.52	GOOD
" " "	16	05/06/81	2.90	FAIR
" " "	16	11/07/84	2.57	GOOD
" " "	16	11/07/84	2.24	VERY GOOD
" " "	16	11/07/84	2.83	FAIR
200' BELOW HWY 163 BRIDGE	17	10/26/78	3.84	POOR
" " "	17	10/26/78	3.42	FAIR
" " "	17	10/17/80	2.82	FAIR
" " "	17	05/06/81	2.23	VERY GOOD
150' BELOW VALLEY ROAD	18	10/17/80	2.86	FAIR
" " "	18	05/06/81	3.05	FAIR
" " "	18	11/07/84	3.45	FAIR
" " "	18	11/07/84	3.52	POOR
" " "	18	11/07/84	2.96	FAIR
150' BELOW HILL ROAD	19	11/07/84	2.65	GOOD
" " "	19	11/07/84	2.60	GOOD
" " "	19	11/07/84	2.70	GOOD
40' BELOW CTH V	20	10/17/80	3.69	POOR
" " "	20	05/06/81	2.94	FAIR
" " "	20	11/07/84	3.69	POOR
" " "	20	11/07/84	3.65	POOR
" " "	20	11/07/84	4.41	VERY POOR
LITTLE SCARBORO:				
100' ABOVE CTH A	21	11/08/84	1.57	EXCELLENT
" " "	21	11/08/84	1.83	VERY GOOD
" " "	21	11/08/84	1.75	EXCELLENT
ROGERS CREEK:				
200' ABOVE MOUTH 1ST DROP	22	11/08/84	1.96	VERY GOOD
" " "	22	11/08/84	1.85	VERY GOOD
" " "	22	11/08/84	2.02	VERY GOOD
SCHOOL CREEK:				
50'-150' ABOVE VALLEY RD	23	11/16/84	4.78	VERY POOR
" " "	23	11/16/84	4.90	VERY POOR
" " "	23	11/16/84	4.74	VERY POOR

Figure 1. Biotic Index Sample Sites.

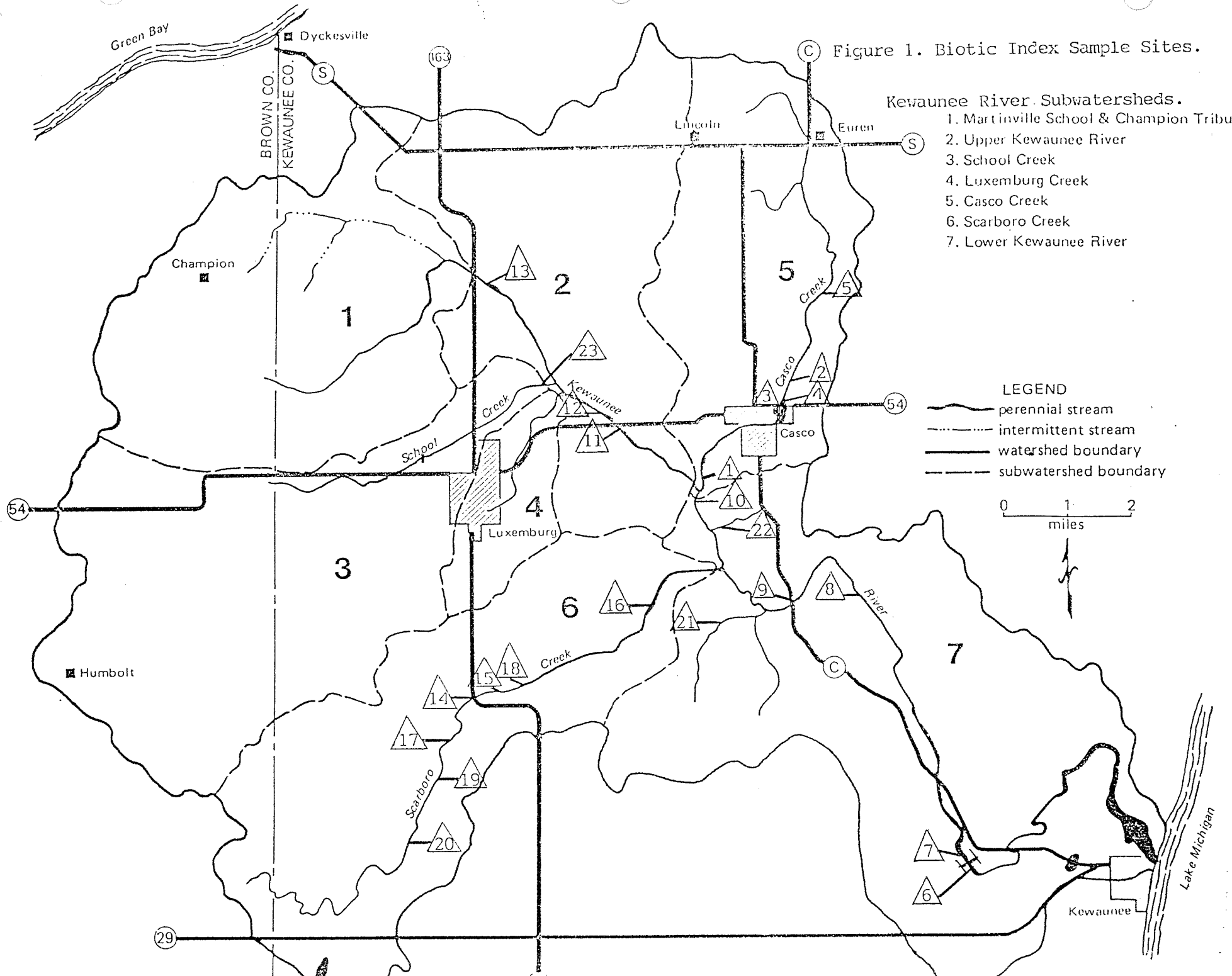


TABLE 2. DIURNAL DISSOLVED OXYGEN
KEWAUNEE RIVER & ITS TRIBUTARIES

SITE DESCRIPTION	SITE #	DATE	TIME	DOppm	TEMP. C
KEWAUNEE RIVER:					
COUNTY HWY F	1	08/25/83	06:32	7.6	20
" "	1	08/25/83	14:30	11.6	23
ROCKLEDGE ROAD	2	08/25/83	05:54	4.4	19
" "	2	08/25/83	13:45	8.0	20
RIVER ROAD	3	08/25/83	05:39	5.2	19
" "	3	08/25/83	13:25	4.8	21
CTY K FROG STATION	4	08/25/83	05:20	4.1	18
" " "	4	08/25/84	13:00	4.0	19
SCARBORO CREEK:					
HILL ROAD	5	08/25/83	06:14	5.7	16
" "	5	08/25/83	14:09	8.5	19
VALLEY ROAD	6	08/25/83	06:06	5.4	19
" "	6	08/25/83	14:00	6.0	22
SCHOOL CREEK:					
COUNTY HWY A	7	08/25/83	05:10	5.7	19
" "	7	08/25/83	12:50	8.4	20
CHAMPION TRIBUTARY:					
COUNTY HWY K	8	08/25/83	05:27	3.4	19
" "	8	08/25/83	13:05	4.7	20
LOWELL ROAD	9	08/25/83	05:32	5.6	19
" "	9	08/25/83	13:10	8.3	21

Figure 2. Dissolved Oxygen Sample Sites.

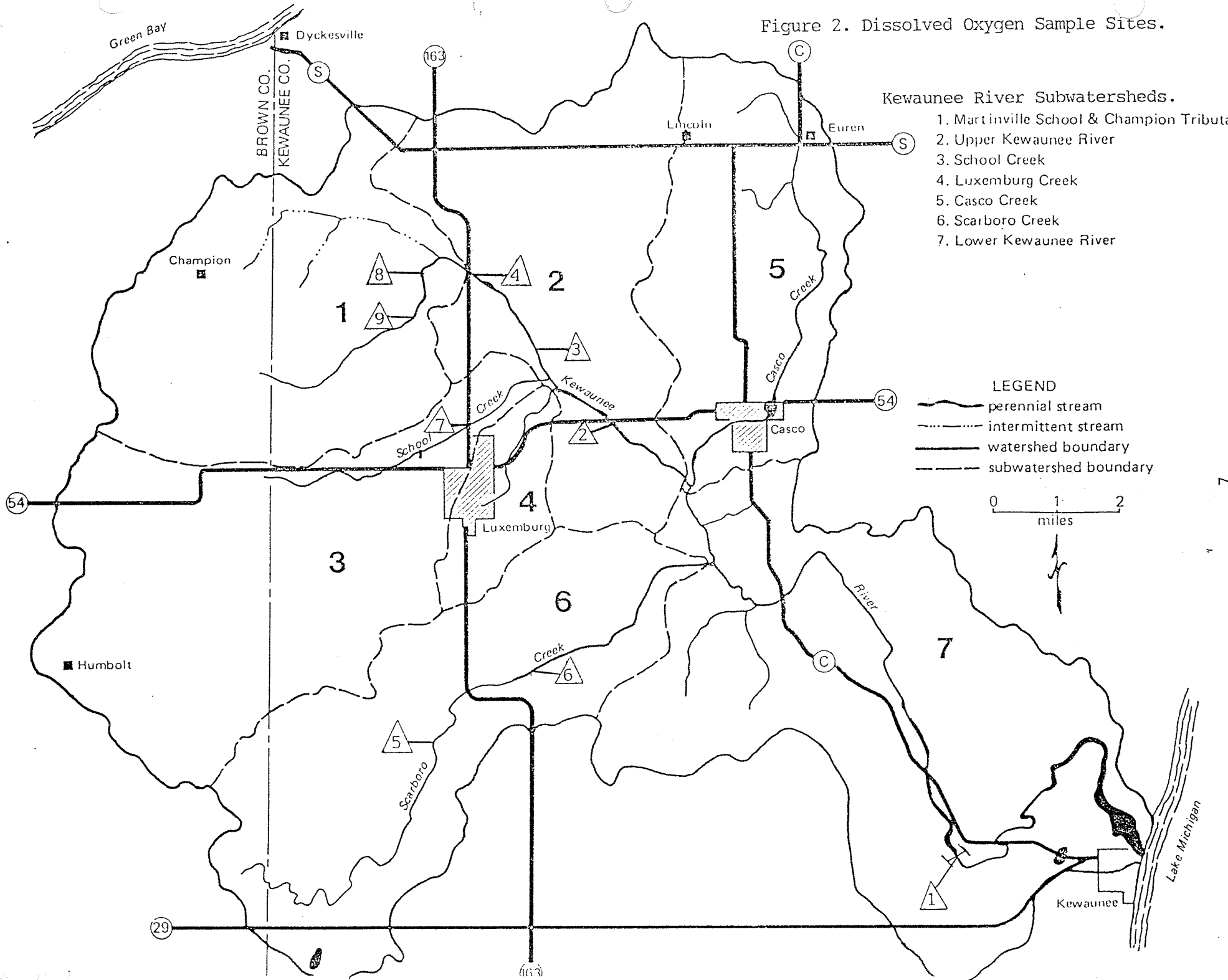


TABLE 3. RELATIVE FISH ABUNDANCE IN THE KEWAUNEE RIVER & ITS TRIBUTARIES

SITE DESCRIPTION	CASCO CREEK MOUTH		SCARBORO CREEK				KEWAUNEE RIVER			
	RUN # 1	RUN # 2	BELOW HILL RD	BELOW HWY V	BELOW HWY A	BELOW VALLEY RD	BELOW CLYDES BRIDGE	BELOW HWY 54	BELOW CASCO CREEK	
DATE	5/10/84	05/10/84	06/29/84	06/29/84	06/29/84	06/29/84	07/02/84	07/02/84	07/02/84	
SITE #	1	1	2	3	4	5	6	7	8	
TEMPERATURE C	-	-	16.5	18	17	19	22	22	20	
SPECIES	TOTAL	%	TOTAL	%	TOTAL	%	TOTAL	%	TOTAL	%
BROWN TROUT	1	0.7	22	(9*) 37.1	5	4.7				
BROOK TROUT	23	16.4	37	(16*) 60.0			6	3.0		
RAINBOW TROUT	62	44.3					6	3.0		
CENTRAL MUDMINNOW			10	9.3	11	4.6	1	0.6	1	0.5
NORTHERN PIKE		1	2.9						1	0.5
REDSIDE DACE			1	0.9	7	2.9	7	3.4	3	10.7
BLACK NOSE DACE			1	0.9			57	28.1	28	15.8
SHORT NOSE DACE					5	2.1			9	32.1
N. REDBELLY DACE									7	3.2
BLUNT NOSE DACE			1	0.9	34	14.2	23	11.3	1	3.6
UNKNOWN DACE "A"			3	2.8	17	7.1	7	4.0		
UNKNOWN DACE "B"			1	0.9	15	6.3	9	4.4	1	3.6
CREEK CHUB	20	14.3					11	5.4	17	7.9
HORN HEAD CHUB			26	24.3	103	42.9	20	9.9	4	14.3
COMMON SHINER	2	1.4					17	9.6	1	3.6
WHITE SUCKER	2	1.4					13	6.4	49	22.7
BLACK BULLHEAD			10	9.3	13	5.4	18	8.8	30	13.9
BROOK STICKLEBACK			26	24.3	21	8.8	23	11.3	1	3.6
ROCK BASS							2	1.1	1	0.5
PUMPKINSEED			1	0.9	8	3.3			6	2.8
BLUE GILL			9	8.4			24	13.6		
LONGEAR SUNFISH									4	1.9
UNKNOWN SUNFISH									36	16.7
JOHNNY DARTER	2	1.4								
MOTTLED SCULPIN	28	20.0							31	14.4
TOTAL	140	35 (25*)	107	240	203	177	28	216	347	

* RECAPTURES

Figure 3. Fish Abundance Survey Sites.

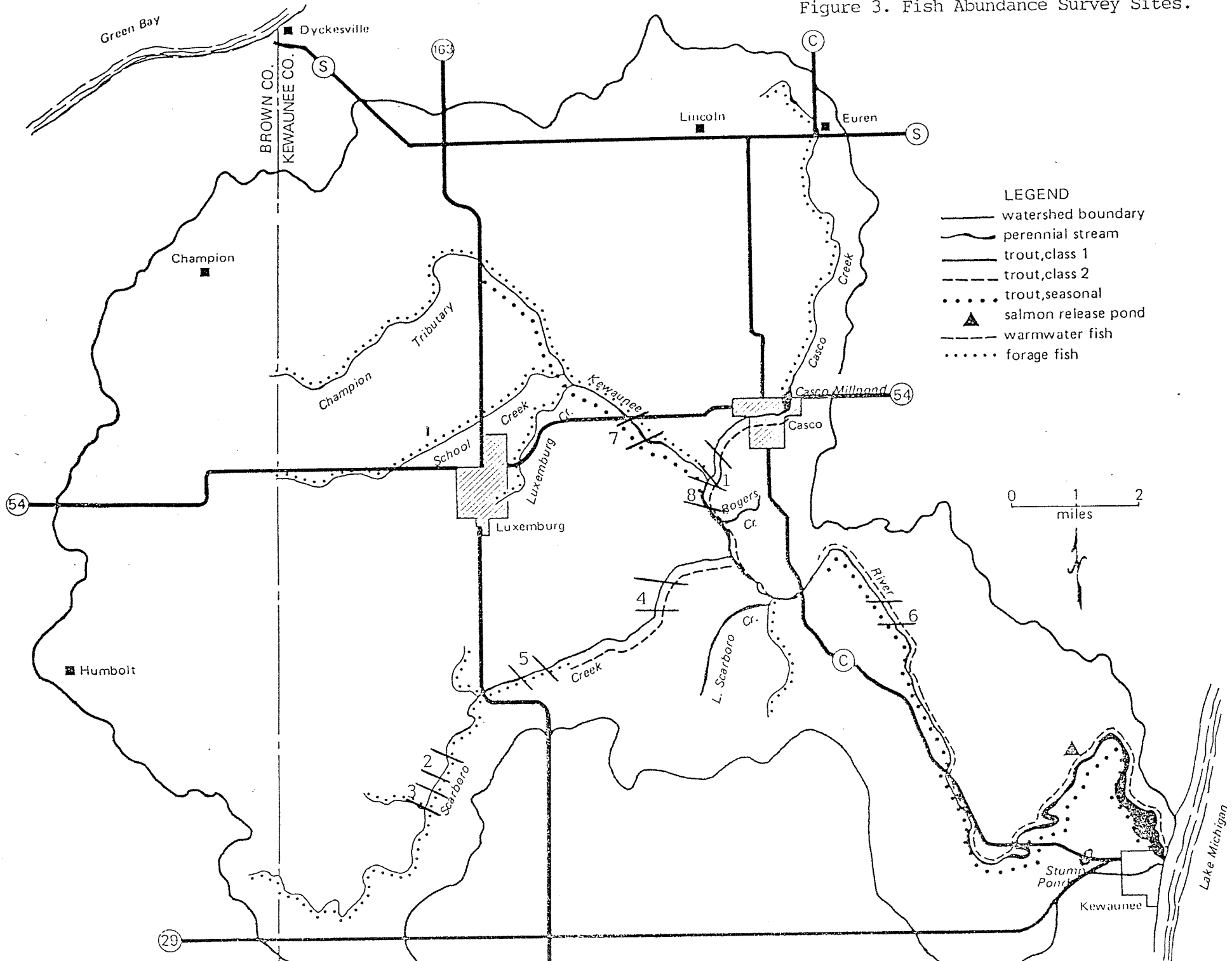


TABLE 4. STREAM HABITAT RATINGS: KEWAUNEE RIVER & ITS TRIBUTARIES

REACH LOCATION	SITE #	DATE	REACH SCORE	CLASS RATING
KEWAUNEE RIVER:				
100 YARDS ABOVE CTH F	1	11/15/84	87	GOOD
100' ABOVE CLYDE HILL RD	2	11/15/84	96	GOOD
75' BELOW CTH C	3	11/15/84	130	FAIR
200 YARDS BELOW CASCO CREEK	4	11/08/84	114	GOOD
ROCKLEDGE RD TO CASCO CREEK	5	11/16/84	122	GOOD
SCARBORO CREEK:				
CTH A TO MOUTH	6	06/08/83	90	GOOD
200 YARDS BELOW VALLEY RD	7	11/07/84	103	GOOD
0.82 MILES BELOW VALLEY RD	8	07/29/83	81	GOOD
200' BELOW HILL ROAD	9	11/07/84	127	GOOD
0.5 MILE BELOW CTH V	10	07/28/83	132	FAIR
4.5 MILES BELOW CTH V	11	07/28/83	74	GOOD
CASCO CREEK:				
ABOVE ROCKLEDGE ROAD	12	11/15/84	88	GOOD
50' ABOVE CREVICE ROAD	13	11/15/84	120	GOOD
SCHOOL CREEK:				
250' ABOVE VALLEY ROAD	14	11/16/84	104	GOOD

Figure 4. Stream Habitat Evaluation Sites.

