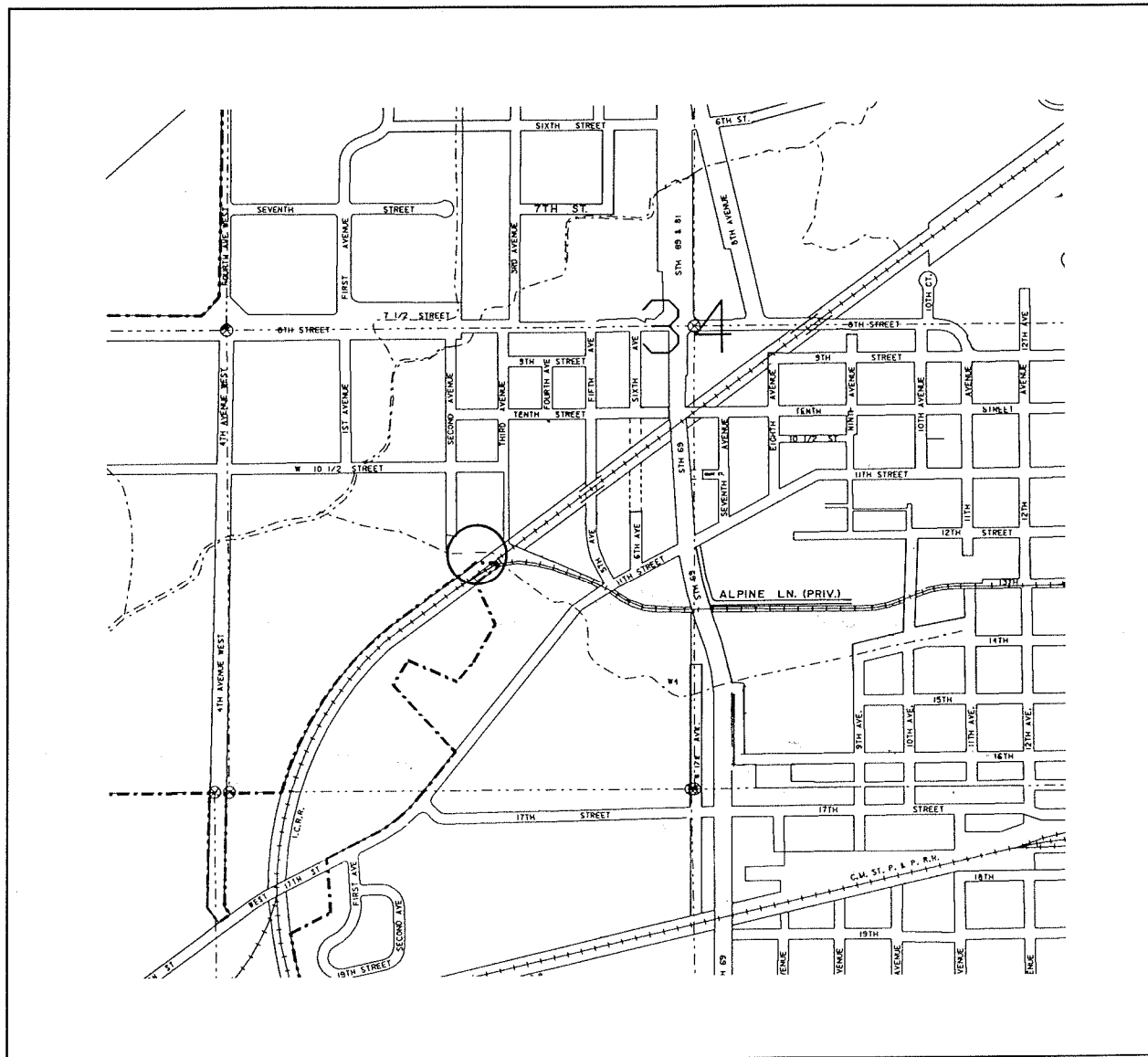


USE CLASSIFICATION OF THUNDER BRANCH Monroe, Wisconsin

December, 1994



Thunder Creek sampling site: *circle* = fish, macroinvertebrates, flow & H₂O chemistry survey.

Prepared by

David Marshall

WDNR Southern District Water Resources Management

RESOURCE DESCRIPTION AND CLASSIFICATION SUMMARY

Thunder Branch is briefly listed in the *unnamed stream* section of *Surface Water Resources of Green County* (1980, WDNR). In that report, the stream is described as "clear, very hard, alkaline, polluted and completely ditched". The description characterizes a stream that has been permanently altered by city development. A good portion of Thunder Branch had been tiled beneath the city. The stream emerges a short distance above the STH 69 bridge and flows less than one-half mile to the confluence with Honey Creek. During dry periods, cooling water discharges and assisted groundwater drainage (sump pumps, etc.) comprise most of the stream flow.

A preliminary stream classification survey was performed in 1981 and the **Intermediate Surface Waters (Limited Forage Fish)** category under NR 104 was recommended. A complete chemical and biological assessment was not performed at that time but a few observations were made. The water clarity was described as "excellent" but fish were not observed. Only a few invertebrates, including crayfish, were collected but the low diversity and numbers indicated an unbalanced benthic community.

On November 30, 1994, a rapid bioassessment survey was performed on the stream to finalize the use classification. The stream was again described as very clear, but this time scores of forage fish were found. The stream was approximately four degrees Centigrade warmer than Honey Creek and reflected the cooling water discharges. The warmer water in Thunder Branch was apparently attracting fish. Macroinvertebrate scarcity and low diversity again reflected an unbalanced benthic community. The few species found indicated "fair" water quality based on the Family-Level Biotic Index (FBI).

Based on the unnatural stream morphology, unnatural water sources and unbalanced aquatic communities found in the stream, the use classification of Thunder Branch is **Limited Forage Fish** and the water quality criteria contained in NR 104.02(3 a) will apply.

RAPID BIOASSESSMENT METHODS

Fisheries: Pulse DC battery powered backpack stream shocker was used for a distance of 284'.

Macroinvertebrates: A d-frame net was used to sample invertebrates, which were identified to the Family level in the field to calculate the FBI (Hilsenhoff, 1988)

Flow: A Swoffer Model 2100 digital flow meter was used to measure stream discharge within survey reach.

Dissolved oxygen / temperature: A YSI Model 58 was used to collect this information in the field.

Water chemistry analysis (lab): Water samples were collected and submitted to the State Laboratory of Hygiene for analysis of the following parameters: pH, conductivity, suspended solids, Tot. P, Tot. Kjell.-N, NH₃, NO₂+NO₃, COD, chloride, hardness, Fe, Cu, As, Zn, Pb, Cd, Cr, Ni.

File review: Surface Water Resources of Green County (1980, WDNR), Preliminary stream classification (1981), water chemistry data from Storet Station numbers: 233083, 233084, 233085, 233088.

RESULTS

Fisheries: Six species and 119 individuals were collected within the stream segment that encompassed 284 feet between the 2nd Avenue bridge and the railroad trestle. Most of the fish were concentrated in the clear deep pools ($\leq 3'$). High numbers of small fish in the pools made collection difficult and resulted in poor sampling efficiency. Consequently, the number of fish sampled was probably much lower than the number of fish present. No fish were found within the extremely shallow riffles with shifting sand and fine gravel. Based on *Stream Classification Guidelines for Wisconsin* (unpublished - Ball, 1981), four of the species sampled are considered pollution tolerant while the other two species are intolerant.

In addition to the electrofishing survey, countless fish were also observed at the 11th Street bridge and downstream of the 2nd Avenue bridge. The relative warmth of Thunder Branch may have created a magnet for migrating fish, particularly in the deeper pools and runs. Thunder Branch was approximately four degrees Centigrade warmer than Honey Creek, potentially creating a thermal attractant similar to power plant discharges. Although Honey Creek was not shocked to determine relative fish abundance, no fish were observed at two bridges above Thunder Branch. If Thunder Branch does indeed create a fish magnet, there is potential danger for significant fish loss if toxic or strong organic substances are spilled. Based on previous observations, Thunder Creek probably does not create thermal advantage during the warm months.

Macroinvertebrates: A riffle was sampled for approximately 10 minutes near the 2nd Avenue bridge. During that relatively long sampling period, only four invertebrate species were found that apply to the FBI methodology. Low diversity and low numbers indicate unbalanced benthic community in the stream. The FBI indicated "fair" water quality and may reflect fairly low organic enrichment to a stream dominated by noncontact cooling water discharges and groundwater. Unnatural thermal regime is probably the main factor limiting benthic diversity.

Table 1: THUNDER BRANCH FISHERIES and MACROINVERTEBRATE DATA

November 30, 1994

Fisheries

Common Name	Scientific Name	Number	W. Q. Indication
creek chub	<i>Semotilus atromaculatus</i>	35	tolerant
s. redbelly dace	<i>Phoxinus erythrogaster</i>	2	intolerant
central stoneroller	<i>Campostoma oligolepis</i>	8 (adults)	intolerant
central stoneroller	<i>Campostoma oligolepis</i>	8 (juveniles)	intolerant
common shiner	<i>Notropis cornutus</i>	18	tolerant
bluntnose minnow	<i>Pimephales notatus</i>	2	tolerant
white sucker	<i>Catostomus commersoni</i>	46	tolerant

119

Macroinvertebrates

Common Name	Family Name	#	FBI value	# X FBI value
scuds	Gammaridae	37	4	148
dance flies	Empididae	19	6	114
black flies	Simulidae	11	6	66
midges	Chironomidae	9	6	54
snails	Physidae	2	-	-
leeches		2	-	-
		76 FBI inverts.		382

FBI (value / #) = 5.03 or "Fair" water quality.

Table 2: STREAM DISCHARGE DATA

Stream: Thunder Branch Segment Location: RR trestle Date: 11-30-94

County: Green Sampling Gear: Swoffer Mod. 2100 D. O. 9.5 mg/l

Temp. 11.5 C % Macrophytes: 0 Substrate: mostly sand and gravel

Project: Stream classification survey

Dist. from bank (ft.)	Depth (ft.)	0.2 depth vel. (fps)	0.8 depth vel. (fps)	0.6 depth / ave. fps	Flow (cfs)
1	.35			.1	.035
2	.82			.12	.098
3	1.0			.18	.18
4	1.0			.11	.11
5	.9			.25	.225
6	.72			.32	.23
7	.42			.08	.034
8	.5			0	0
Tot. width					Tot. cfs
8					.91

Comments: Stream substrate was composed mostly of shifting sand and gravel. Water clarity was excellent and had a "spring-like" appearance. The deeper poles appeared to be scoured and there was no evidence of soft sediment deposits.

Table 3: *SURFACE WATER RESOURCES OF GREEN COUNTY*, THUNDER BRANCH INFORMATION
STREAM 34 - 10

Location	T2N R7E Sec 34	Fishery	none
Surface Acres	0.3	Sample date	9-13-74
Length	0.6 miles	pH (su)	7.5
Gradient	33 ft. / mile	Alkalinity (mg/l)	325
Ave. width	4 ft.	Conduct. (umhos)	999
Ave. depth	0.3 ft.	Description	clear

Table 4: THUNDER BRANCH STORET DATA
Stations: 233083-233085 & 233088

Site	Date	Temp	D. O.	BOD ₅	pH	MFFCC
12th St.	4-26-75	13.0	7.3	3.7	8.0	
12th St.	5-5-75	21.0	7.8	11(BOD ₆)	7.6	8400
12th St.	7-22-75	22.0	5.7	9.8	7.6	14000
12th St.	11-4-75	20.2	7.8	13.0	8.0	200000
12th St.	2-4-76	13.0		2.5	8.0	
18-IN	7-22-75	24.0		15.0	7.8	20
5th Ave	5-5-75	21.0	9.0	4.3	8.2	3000
5th Ave	7-22-75	25.0	12.0	5.2	8.0	2600
5th Ave	11-4-75	19.0	7.2	4.1	8.0	7900
RR br.	5-5-75	23.0	8.2	3.7(BOD ₆)	7.8	510
RR br.	7-22-75	25.0	11.2	3.3	8.0	5300
RR br.	11-4-75	20.0	6.4	3.7	8.0	8600

**Table 5: Thunder Branch Water Chemistry
Analysis for 11-30-94
Storet Number 233088**

Cadmium, AA furnace	0.02 ug/l
Calcium, ICP	75 mg/l
Chloride, automated	65.8 mg/l
Chromium, AA furnace	0.6 ug/l
COD low level, colorimetric	10 mg/l
Conductivity, 25° C	815 umhos/cm
pH	8.05 su
Alkalinity	304 mg/l
Copper, AA furnace	3.4 ug/l
Hardness, calculation method	360 mg/l
Lead, AA furnace	ND
Magnesium, ICP	43 mg/l
Ammonia-N	ND
Nitrate + Nitrite-N	2.49 mg/l
Total Kjeldahl Nitrogen	0.3 mg/l
Nickel, ICP	ND
Total Phosphorus	0.04 mg/l
Suspended solids	ND
Zinc, ICP	ND

State Laboratory of Hygiene Environmental Science Section

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN
DNR - Southern District

Date: August 6, 1981

File Ref: 3430/3200



To: Central Office

From: Douglas Morrisette 

AUG 10 1981

Subject: Stream classification of Thunder Creek located in the City of Monroe,
Green County

An abbreviated stream classification survey was performed on Thunder Creek on July 20, 1981. At that time the flow was estimated between 1-2 cfs. Water clarity was excellent and the substrate consisted of rocks, gravel, sand and silt. At the STH 69 bridge dissolved oxygen levels were measured with the Winkler Method at 10.1 and 10.3 mg/l. It is doubtful that a diurnal dissolved oxygen swing occurs in Thunder Creek because aquatic vegetation is not abundant. Benthic macroinvertebrates collected at this location revealed an unbalanced aquatic community. Fish were not seen at all, though a few crayfish were observed.

The headwaters of Thunder Creek have been tiled beneath the city. At the intersection of 14th Street and 12th Avenue, Thunder Creek emerges from under the city through a large screened culvert. The flow is contributed from two sources: groundwater beneath the city and cooling water discharges. Jeff Stuart, the City Engineer, revealed the stream maintains continuous flow year round. From the culvert to the STH 69 bridge, the stream has been ditched and the substrate is rock and gravel. Below STH 69 to the confluence with Honey Creek, stream morphology and flow characteristics appeared similar to Honey Creek.

Based on the survey conducted by Dave Marshall, Madison Area Water Quality Biologist, it is my opinion that Thunder Creek should be classified continuous intermediate fish and aquatic life. However, in the future additional sampling may be required to justify the classification if the issuance of a controversial discharge permit is involved.

DWM:dr

cc: → D. Marshall
T. Bainbridge
C. Brynildson
B. Barbier - GEF II, WW/2

NOTED:

Date

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