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A REPORT FROM

*The State Hygienic  
Laboratory*




MEDICAL LABORATORIES BUILDING

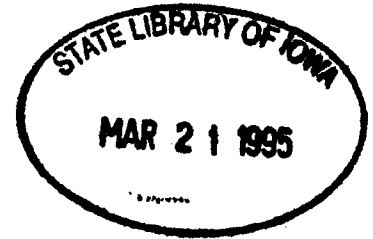
THE UNIVERSITY OF IOWA

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Water Quality Survey  
of the  
Catfish Creek Basin

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#79-9

Prepared for the Iowa Department of Environmental Quality by the University of Iowa, University Hygienic Laboratory.

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December 6, 1978

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## ABSTRACT

On August 7-9, 1978, personnel of the University Hygienic Laboratory performed a water quality survey of Catfish Creek in eastern Dubuque County. The purpose of the survey was to determine the ambient water quality.

Results of the chemical and bacteriological analyses are reflective of conditions associated with summer flows. Dissolved oxygen concentrations ranged from 7.5 - 14.6 mg/l, which is well above that needed to support aquatic life (>5.0 mg/l). Ammonia nitrogen concentrations were well within the limits set by the Iowa Water Quality Standards. The elevated levels of chlorides and fecal coliforms observed during the survey suggests nonpoint runoff to Catfish Creek from both urban and agricultural environments.

Analysis of the biological community reflected water quality similar to that indicated by the chemical and bacteriological analyses. Although there was some indication of minor localized problems due to land use patterns, the macroinvertebrate communities indicated a stable and healthy environment at most stations.

## INTRODUCTION

On August 7-9, 1978, personnel of the University Hygienic Laboratory performed a water quality survey of the Catfish Creek basin in eastern Dubuque County. The purpose of this survey was to investigate ambient water quality during late summer.

Catfish Creek drains 70.6 square miles of eastern Dubuque County known locally as Swiss Valley (see Figure 1). Agricultural land use in the basin is primarily for pasture with limited row-crop production in the headwater region. The northeastern portion of the basin receives surface runoff from part of the Dubuque metropolitan area. Catfish Creek has four major tributaries (the South, Middle, and North Forks of Catfish Creek, and Granger Creek). Two segments of Catfish Creek have been classified for water use; the mouth to Point A on Figure 1 is Class B (warm), and Point A to Point B on Figure 1 is Class B (cold). Portions of the four tributaries are also designated as Class B (warm) waters. Catfish Creek has also been designated as an "anti-degradation" stream from Swiss Valley Park upstream to its source (including Stations 1 and 2) in the Iowa Water Quality Standards. This designation means that:

"(a) Existing designated water uses will be maintained and protected. No further water quality degradation which would interfere with or become injurious to water uses designated in this chapter will be allowed.

(b) Those existing high quality waters...which exceed the water quality levels described in this chapter as necessary to protect existing water uses will be maintained at or above existing water quality, except when, after full satisfaction of the

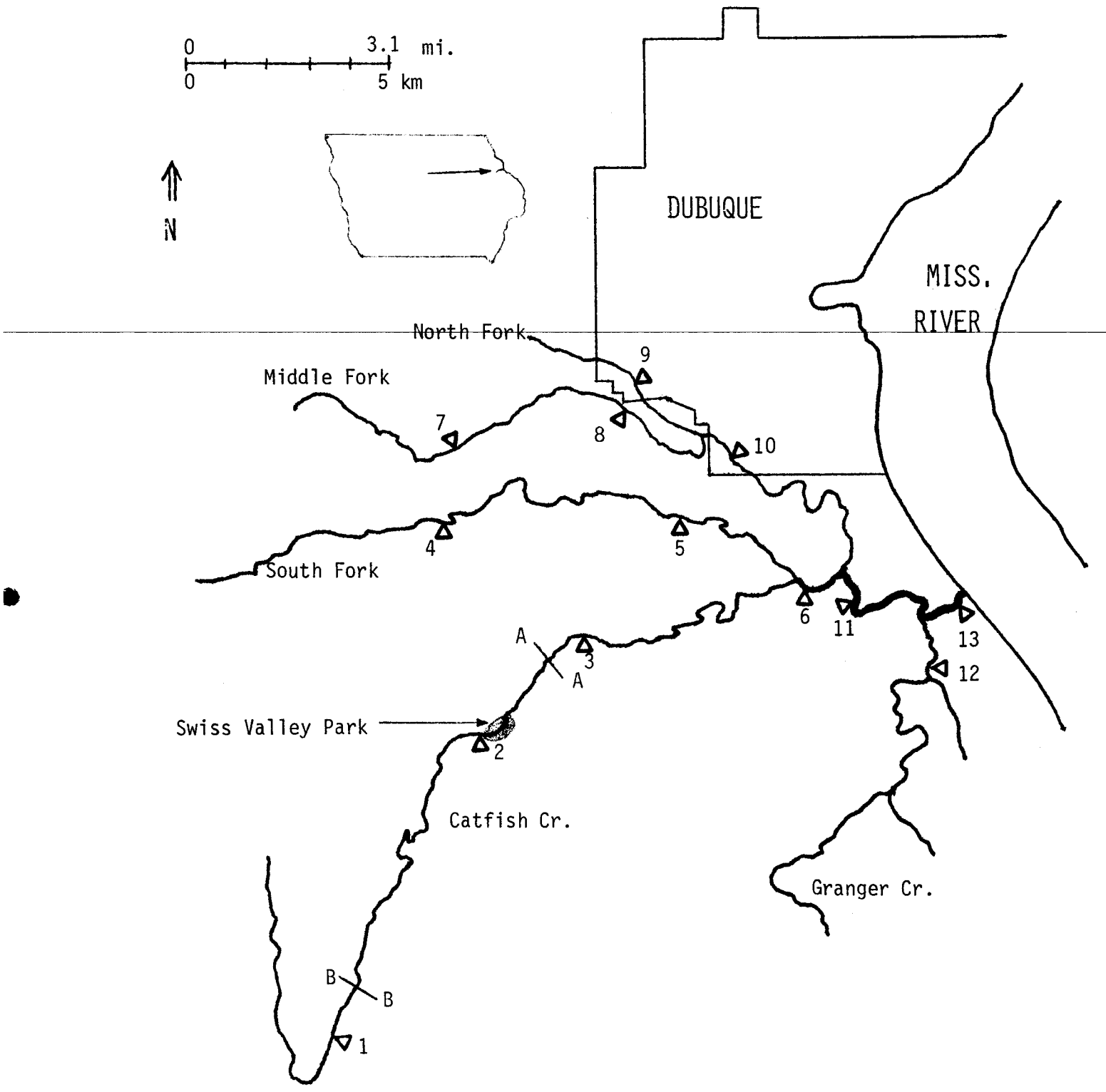


Figure 1. Catfish Creek Sampling Stations

intergovernmental co-ordination and public participation provisions of the continuing planning process, it is determined that there is a need to lower water quality because of necessary and justifiable economic or social development." (1).

Information obtained from the Iowa Department of Environmental Quality (IDEQ) indicates there are no known point source waste dischargers located within the basin.

The United States Geological Survey (USGS) does not have a stream gaging station in the Catfish Creek basin; therefore, a seven day-ten year low flow value (7Q10) could not be calculated. Flows of 9.5 cubic feet per second were measured during this survey at Station #11.

Background water quality data on Catfish Creek are lacking, since no previous water quality surveys have been performed.

Approximate sampling locations are indicated on Figure 1 and Table 1.

TABLE 1  
Catfish Creek Sampling Locations

Station

1	Catfish Creek	Dubuque Co. Rd. D-41 Br.	T88N, R1E, Sec. 36
2	Catfish Creek	Dubuque Co. Rd. Br.	T88N, R2E, Sec. 20
3	Catfish Creek	Dubuque Co. Rd. Br.	T88N, R2E, Sec. 9
4	South Fork Catfish Creek	Dubuque Co. Rd. Br.	T88N, R1E, Sec. 1
5	South Fork Catfish Creek	Dubuque Co. Rd. D29 Br.	T89N, R2E, Sec. 34
6	Catfish Creek	Dubuque Co. Rd. Br.	T88N, R2E, Sec. 1W
7	Middle Fork Catfish Creek	Dubuque Co. Rd. Br.	T89N, R1E, Sec. 25-30
8	Middle Fork Catfish Creek	Dubuque Co. "Old" Hwy. 20 Br.	T89N, R2E, Sec. 27W
9	North Fork Catfish Creek	Dubuque University St. Br.	T89N, R2E, Sec. 27E
10	Middle Fork Catfish Creek	Dubuque Fremont St. Br.	T89N, R2E, Sec. 35
11	Catfish Creek	Dubuque Rockdale Rd. Br.	T88N, R2E, Sec. 1E
12	Granger Creek	Dubuque Co. Hwy 52 Br.	T88N, R3E, Sec. 6W
13	Catfish Creek	Dubuque Co. Rd. Br.	T88N, R3E, Sec. 6E

## RESULTS AND DISCUSSION

### Chemical and Bacteriological

Selected chemical and bacteriological data from Catfish Creek are presented in Table 2. The complete chemical data are presented in Appendix #1.

Sample collection, preservation, and analytical procedures were as listed in Standard Methods (2) and "Methods for Chemical Analysis of Water and Wastes" (3).

Catfish Creek, which is a stocked trout stream, had high temperatures observed during the survey (23.5 to 27.5°C). These temperatures are in excess of that reported to be optimal for trout growth and development (personnel of the Iowa Conservation Commission hatchery at Manchester stated that this optimal temperature varied by species, but is commonly considered to be 21°C). Since the hatchery personnel will not stock trout (brook, brown, or rainbow) in streams with water temperatures above 21°C, Catfish Creek was not stocked from June through August. Stocking was resumed on September 1 when the water temperature had dropped below 21°C.

The dissolved oxygen (DO) concentrations ranged from 8.1 at Station 9 to 14.6 at Station 13 and were well above values needed to support aquatic life (>5.0 mg/l). No violations of the Iowa Water Quality Standards were noted.

The algal (phytoplankton) activity in Catfish Creek was generally low with chlorophyll-a concentrations less than 8 mg/l. Algal activity



TABLE 2

SELECTED WATER QUALITY MEASUREMENTS FROM CATFISH CREEK, DUBUQUE CO.  
 (All units are mg/l unless otherwise noted)  
 August 8, 1978

	Catfish Creek						S. Fork		Mid. & N. Fork				Granger Cr.
	#1	#2	#3	#6	#11	#13	#4	#5	#7	#8	#9	#10	#12
Time	1405	1430	1450	1530	1600	1700	1505	1750	1345	1330	1315	1740	1720
Temperature (°C)	23.5	25	26.5	26	25	26	24.5	26.5	27.5	25	26	25	24.5
Dissolved Oxygen	11.0	10.9	12.1	12.7	10.0	14.6	13.2	12.6	11.4	10.5	8.1	12.1	10.3
Fecal coliform bacteria (#/100 ml)	840	590	210	150	460	370	410	810	560	210	770	160	1600
Nitrogen Series													
Organic	0.8	0.32	.43	.52	1.2	1.5	.43	.51	0.8	.85	.24	.32	.94
Ammonia	.05	.03	.03	.09	0.1	.04	.04	.04	.06	.03	.06	.03	0.1
Nitrate	2.2	1.4	0.9	0.3	0.4	0.6	1.2	0.3	0.1	<0.1	0.1	0.1	0.9
Filtrable Phosphate	.08	.04	.04	.07	0.9	.08	.05	.05	.05	.06	.06	.07	0.2
pH	8.6	8.3	8.4	8.45	8.1	8.5	8.5	8.35	8.3	7.95	8.6	8.5	8.1
BOD	2	<1	1	1	2	7	1	2	2	4	1	1	4
TOC	12	7	9	8	8	13	6	7	9	10	7	7	9
Specific Conductance (micromhos)	500	530	540	530	580	480	560	580	600	800	650	770	600
Chlorides	13	7	7	9.5	15	15	9	13	12	56	66	59	18
Chlorophyll A	4	4	4	5	13	58	4	8	22	24	4	7	25

did affect the DO concentrations to a moderate extent. In an attempt to determine the degree of this effect, a diurnal DO survey was conducted. The results of this survey (see Table 3) indicated that the algal effect varied in degree from minor at Station 6 (Catfish Creek) to pronounced at Station 3 (Middle Fork Catfish Creek). All stations sampled did show that the DO concentrations were highest in the late afternoon (due to maximum photosynthetic oxygen production) and lowest in the early morning (due to the lack of photosynthetic oxygen production and continued oxygen depletion through respiratory processes by aquatic organisms).

The fecal coliform bacteria concentrations reflected normal variations, ranging from 150 bacteria/100 ml at Station 6 (Catfish Creek) to 1600 bacteria/100 ml at Station 12 (Granger Creek). Fecal coliform bacteria concentrations in streams flowing through pastureland may fluctuate widely due to warm blooded animal wastes. No violations of the Iowa Water Quality Standards were noted.

The concentrations of organic, ammonia, and nitrate were low. Organic nitrogen concentrations ranged from 0.24 mg/l at Station 9 (North Fork) to 1.5 mg/l at Station 13 (Catfish Creek). Ammonia nitrogen ranged from 0.03 mg/l at Stations 2, 3, 8 and 10 to 0.1 mg/l at Stations 11 and 12. Nitrate nitrogen concentrations dropped from 2.2 mg/l at Station 1 (Catfish Creek) to 0.3 mg/l at Station 6 (Catfish Creek), possibly due to the uptake of nitrates by the algal community at the downstream station.

The chlorophyll-a concentrations (an indirect measure of algal activity) ranged from 4 mg/l at Stations 1, 2, 3, 4, and 9 to 58 mg/l at Station 13. Station 13 was located in a large pooled area, which

Table 3  
DIURNAL DISSOLVED OXYGEN CONCENTRATION (as mg/l)  
CATFISH CREEK  
AUGUST 8-9, 1978

Station #	2145-2350	0630-0815	1315-1750	Average
2	10.6	8.5	10.9	10.0
3	8.9	8.1	12.1	9.7
5	9.2	8.0	12.6	9.9
6	7.5	8.0	12.7	9.4
8	13.4	6.5	10.5	10.1
10	11.2	9.0	12.1	10.8
11	9.4	7.3	10.0	8.9
12	7.8	7.2	10.3	8.4
13	11.9	11.2	14.6	12.5
Average	10.0	8.2	11.8	

gives algae (phytoplankton) time to multiply in an environment which is favorable to algal growth.

Except for pH and chloride levels, other chemical parameters were within normal ranges.

The pH of the entire reach was found to be elevated, possibly due to the photosynthetic activity of the periphyton. Although these pH levels (7.9 to 8.6) are probably due to natural causes, they are approaching the upper limits for many kinds of aquatic life.

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Background concentrations (5-15 mg/l) of chloride were found in the mainstem of Catfish Creek and several tributaries. The chloride concentrations found at those stations susceptible to urban runoff (Stations 8, 9, and 10) were several times higher (56 to 66 mg/l) than background levels. Related parameters, e.g. specific conductance and total filtrable (dissolved) solids also demonstrated a similar response at Stations 8, 9, and 10. The increase in the concentrations of these parameters was probably not due to organic enrichment, i.e. sewage, since other parameters (TOC, nitrogen series, phosphates, etc) failed to show an associated response. The speculation arises that the higher concentrations may be due to the recharging and flushing of residential water softener units.

At the request of the regional office of the IDEQ, water samples were taken at the mouth of Catfish Creek in an attempt to assess the presence and extent of any backflow from the Mississippi River into the Catfish Creek channel. The sampling was based on the assumption that any Mississippi River water present in the Catfish Creek channel would differ in water quality from the creek water. A comparison of

the extensive chemical analyses performed on the samples collected at Stations 11 and 13 failed to show any differences between the samples. This similarity plus visual observation indicated very little (if any) back-flow from the Mississippi River was occurring during the survey.

### Biological

An investigation of some of the biological aspects of water quality in the Catfish Creek basin was conducted along with the chemical parameters.

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The collection methods used in the biological survey included the Surber square foot sampler (2) and the kick-net.

The Surber sampler was used in the manner listed in Standard Methods (2). Sampling a known area of stream bottom allows the collector to determine the densities of the macroinvertebrates collected.

The kick-net sampler is a fine mesh (1 mm mesh) heavy duty dip net with a four foot handle. This sampler is worked vigorously along the banks and through any bottom substrates inaccessible to the Surber sampler. The debris in the net is then sorted for macroinvertebrates. The kick-net is used as an adjunct to the Surber sampler in an effort to obtain an accurate macroinvertebrate community estimate.

Stations 4 and 7 (on the upper reaches of the South and Middle Forks of Catfish Creek) were not sampled due to extreme low flow. Station 13 (Catfish Creek) was not sampled due to deep water. Stations 2, 3, and 11 (all on Catfish Creek) were each sampled twice (July 12 and August 7) because of their stream use classification. Each sampling effort consisted of a composite of three Surber samples and approximately 15 minutes of kick-net sampling. All biological identifications and densities are in Appendix 2.

The macroinvertebrate communities of Catfish Creek (Stations 1, 2, 3, 6, and 11) for the most part reflect the high water quality shown by the chemical analyses. Stations 1, 3, and 11 show some minor constituents (leeches and sludgeworms) which usually indicate some degree of organic (sewage) enrichment. However, in this situation they are probably more reflective of the localized organic enrichments associated with pastures and also, of the natural productivity of the stream. Station 2, located in the "anti-degradation" and Class B (cold) water reach of Catfish Creek was most noteworthy, supporting a very healthy population of potential fish-food organisms (macroinvertebrates).

Some of the tributaries of Catfish Creek show unusual biological characteristics. The composition of the macroinvertebrate community in Granger Creek (Station 12) reflects the enrichment of the water most probably by the addition of pastureland runoff. This enrichment of the aquatic ecosystem has caused marked changes in the densities of many of the common organisms (the average total density for the other stations was 513 organisms/m<sup>2</sup> vs. 1756/m<sup>2</sup> at Station 12). In addition, several predators, e.g. the leech Helobdella stagnalis and the alderfly larvae Sialis sp., were collected from Granger Creek. These predators are more commonly associated with environments more severely degraded by organic enrichment (4). The condition of the macroinvertebrate community at Station 12 indicated that water quality may have been more degraded than indicated by the chemical analysis.

The macroinvertebrate communities of the North and Middle Forks of Catfish Creek (Stations 8, 9, and 10) also reflected minor perturbation. The chemical analysis indicated relatively high chloride concentrations

compared to other streams in the basin. The macroinvertebrate community sampled at Station 9 (North Fork of Catfish Creek) on July 12, 1978 supported population levels and organisms indicative of a stressed environment. Probably the most obvious result of this stress was the complete absence of any caddisfly larvae (order Trichoptera). Caddisfly larvae were collected at all other stations in the Catfish Creek basin and were usually quite common (densities  $>50$  organisms/m<sup>2</sup>). The community was almost entirely composed of mayfly nymphs (Baetis sp.) and midge larvae (family Chironomidae). This imbalance indicates that a serious water quality problem probably had existed for some time at Station 9. Similar (although not as severe) problems also existed at Stations 8 and 10 (Middle Fork of Catfish Creek). Since all three stations receive surface runoff from part of the Dubuque metropolitan area, they are susceptible to many more types of perturbation than those stations on the mainstem of Catfish Creek.

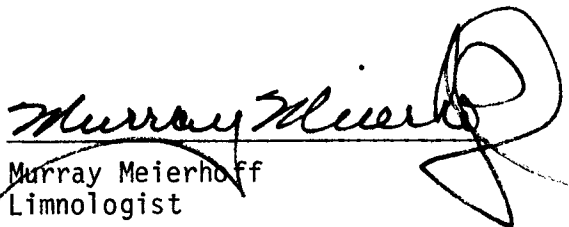
## CONCLUSIONS

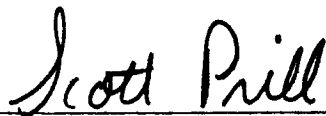
A water quality survey of Catfish Creek was conducted during August, 1978. Results of the survey indicate above average water quality with no violations of the Iowa Water Quality Standards observed. The North and Middle Forks of Catfish Creek had elevated chloride ion concentrations as compared to "background" concentrations found at other stations.

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These elevated concentrations may have been caused by urban runoff from part of the Dubuque metropolitan area. The chemical and biological analyses from Station 12 indicated that Granger Creek was probably receiving moderate amounts of organic enrichment from pastureland runoff.

The macroinvertebrate communities at most stations reflected a stable and fairly healthy environment. The high natural summer water temperatures of Catfish Creek has limited Catfish Creek as a cold water fishery, with very little trout stocking taking place during the summer.

  
Murray Meierhoff  
Limnologist

  
Scott Prill  
Limnologist



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APPENDIX 1  
CHEMICAL ANALYSIS DATA FROM CATFISH CREEK

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WATER QUALITY REPORT  
METALS

STATE HYGIENIC LABORATORY, Des Moines Branch  
The University of Iowa  
515:281-5371

-16-

Town Source Specific Location	Catfish Creek Dubuque Co. Rd., T88N, R2E, Sec. 20	Catfish Creek Dubuque Co. Rd., T88N, R2E, Sec. 20	Catfish Creek Dubuque Co. Hwy 61 bridge T88N, R2E, Sec. 1E
Date Collected	8/08/78	8/08/78	8/08/78
Date Received	8/09/78	8/09/78	8/09/78
Lab Number	973	974	983
METALS ANALYSIS (as mg/l unless designated otherwise)			
Arsenic	<0.01	<0.01	<0.01
Barium	<0.1	<0.1	<0.1
Cadmium	<0.01	<0.01	<0.01
Chromium, Total	<0.01	<0.01	<0.01
Chromium, Hexavalent			
Copper	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01
Mercury	<0.001	<0.001	<0.001
Nickel	<0.1	<0.1	<0.1
Selenium	<0.01	<0.01	<0.01
Silver	<0.01	<0.01	<0.01
Zinc	<0.01	<0.01	<0.01

REMARKS:

COLLECTOR  
REPORT TO

Limnology Division  
UHL  
Des Moines Branch

Date Reported **SEP 26 1978**

W.J. Hausler Jr., Ph.D.  
Director

WATER QUALITY REPORT  
METALS

STATE HYGIENIC LABORATORY, Des Moines Branch  
The University of Iowa  
515:281-5371

-17-

Town Source Specific Location	Catfish Creek Dubuque Co. Rd. Bridge T88N, R3E, Sec. 6E		
Date Collected Date Received Lab Number	8/08/78 8/09/78 985		
METALS ANALYSIS (as mg/l unless designated otherwise)			
Arsenic	<0.01		
Barium	<0.1		
Cadmium	<0.01		
Chromium, Total	<0.01		
Chromium, Hexavalent			
Copper	<0.01		
Lead	<0.01		
Mercury	<0.001		
Nickel	<0.1		
Selenium	<0.01		
Silver	<0.01		
Zinc	<0.01		

REMARKS:

COLLECTOR  
REPORT TO

Limnology Division  
UHL  
Des Moines Branch

Date Reported **SEP 26 1978**

W.J. Hausler Jr., Ph.D.  
Director

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch  
H.A. WALLACE BUILDING  
DES MOINES, IOWA 50309 -18-

Town Source Specific Location	Catfish Creek Dubuque Co. Rd. D41, T88N, R1E, Sec. 36	Catfish Creek Dubuque Co. Rd., T88N, R2E, Sec. 20	Catfish Creek Dubuque Co. Rd. T88N, R2E, Sec. 20
Date Collected	8/08/78	8/08/78	8/08/78
Date Received	8/09/78	8/09/78	8/09/78
Lab Number	972	973	974
Collection Time	1405	<b>FIELD DATA</b> 1430	1430
pH			
Temperature	23.5 <sup>o</sup> C	25.0 <sup>o</sup> C	25.0 <sup>o</sup> C
Dissolved Oxygen			
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	840	590	4900
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	500	530	530
MBAS (as LAS)			
pH (units)	8.6	8.3	8.3
Alkalinity: P	4.8	none	none
T	227	258	261
NITROGEN: Organic N	0.80	0.32	0.44
Ammonia N	0.05	0.03	0.01
Nitrite N			
Nitrate N	2.2	1.4	1.4
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	352	346	340
Fixed	226	252	252
Volatile	126	94	88
Filtrable Residue T	340	324	322
F	218	238	240
V	122	86	82
Nonfiltrable Residue T	12	22	18
F	8	14	12
V	4	8	6
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.08	0.04	0.04
Total P	0.09	0.04	0.04
Dissolved Oxygen	11.0	10.9	10.9
BOD	2	<1	1
COD	23	15	11
Grease or Oil			
Turbidity (JTU)	4.4	7.4	7.5
Total Hardness (as CaCO <sub>3</sub> )			
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	13	7.0	8.0
Sulfate (SO <sub>4</sub> <sup>-</sup> )			
Total Organic Carbon	12	7	6
Chlorophyll a	4 µg/L	4 µg/L	4 µg/L

REMARKS:

COLLECTOR  
REPORT TO

Limnology Division  
UHL  
Des Moines Branch

W.J. HAUSLER, JR., Ph.D.  
DIRECTOR

SEP 26 1978

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch  
H.A. WALLACE BUILDING  
DES MOINES, IOWA 50309

-19-

Town Source Specific Location	Catfish Creek Dubuque Co. Rd., T88N, R2E, Sec. 9	S fork Catfish Creek Dubuque Co. Rd., T88N, R1E, Sec. 1	South fork Catfish Creek Dubuque Co. Rd. D29 bridge T89N, R2E, Sec. 34
Date Collected	8/08/78	8/08/78	8/08/78
Date Received	8/09/78	8/09/78	8/09/78
Lab Number	975	976	977
Collection Time	1450	1505	1750
pH			
Temperature	26.5 <sup>o</sup> C	24.5 <sup>o</sup> C	26.5 <sup>o</sup> C
Dissolved Oxygen			
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	210	410	810
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	540	560	580
MBAS (as LAS)			
pH (units)	8.4	8.5	8.35
Alkalinity: P	1.8	4.2	1.4
T	260	271	263
NITROGEN: Organic N	0.43	0.43	0.51
Ammonia N	0.03	0.04	0.04
Nitrite N			
Nitrate N	0.9	1.2	0.3
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	354	358	390
Fixed	244	174	246
Volatile	110	184	144
Filtrable Residue T	332	330	366
F	230	152	228
V	102	178	138
Nonfiltrable Residue T	22	28	24
F	14	22	18
V	8	6	6
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.04	0.05	0.05
Total P	0.04	0.05	0.07
Dissolved Oxygen	12.1	13.2	12.6
BOD	1	1	2
COD	14	11	21
Grease or Oil			
Turbidity (JTU)	8.4	3.3	7.9
Total Hardness (as CaCO <sub>3</sub> )			
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	7.0	9.0	13
Sulfate (SO <sub>4</sub> <sup>-2</sup> )			
total Organic Carbon	9	6	7
lorophyll a	4 µg/L	4 µg/L	8 µg/L

REMARKS:

COLLECTOR  
REPORT TO

Limnology Division  
UHL  
Des Moines Branch

W.J. HAUSLER, JR., Ph.D.  
DIRECTOR

SEP 26 1978

**WATER QUALITY REPORT**

**STATE HYGIENIC LABORATORY, Des Moines Branch  
H.A. WALLACE BUILDING  
DES MOINES, IOWA 50309**

-20-

<b>Town Source</b> <b>Specific Location</b>	Catfish Creek Dubuque Co. Rd. Br., T88N, R2E, Sec 1W	Middle fork Catfish Cr. Dubuque Co. Rd. Br., T89N, R1E, Sec. 25/30	Middle fork Catfish Creek Dubuque Co. "old" Hwy 20 Br. T89N, R2E, Sec. 27W
<b>Date Collected</b> <b>Date Received</b> <b>Lab Number</b>	8/08/78 8/09/78 978	8/08/78 8/09/78 979	8/08/78 8/09/78 980
<b>Collection Time</b> <b>pH</b> <b>Temperature</b> <b>Dissolved Oxygen</b>	1530  26.0°C	1345  27.5°C	1330  25.0°C
<b>FIELD DATA</b>			
<b>Fecal Coliform/100 ml</b>	150	560	210
<b>BACTERIOLOGICAL EXAMINATION</b>			
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
<b>Conductance (micromhos)</b> <b>MBAS (as LAS)</b> <b>pH (units)</b> <b>Alkalinity: P</b> <b>T</b>	530  8.45 4.6 255	600  8.3 none 274	800  7.95 none 301
<b>NITROGEN: Organic N</b> <b>Ammonia N</b> <b>Nitrite N</b> <b>Nitrate N</b>	0.52 0.09  0.3	0.80 0.06  0.1	0.85 0.03  <0.1
<b>Nitrate as NO<sub>3</sub></b>			
<b>RESIDUE: Total</b> <b>Fixed</b> <b>Volatile</b>	460 356 104	356 254 102	572 344 228
<b>Filtrable Residue T</b> <b>F</b> <b>V</b>	432 334 98	332 238 94	512 326 186
<b>Nonfiltrable Residue T</b> <b>F</b> <b>V</b>	28 16 12	24 16 8	60 18 42
<b>Settleable Matter (ml/l)</b>			
<b>PHOSPHATE: Filtrable P</b> <b>Total P</b>	0.07 0.08	0.05 0.07	0.06 0.12
<b>Dissolved Oxygen</b> <b>BOD</b>	12.7 1	11.4 2	10.5 4
<b>COD</b>	38	24	25
<b>Grease or Oil</b> <b>Turbidity (JTU)</b>	 6.5	 9.7	 13
<b>Total Hardness (as CaCO<sub>3</sub>)</b> <b>Calcium (Ca<sup>++</sup>)</b> <b>Magnesium (Mg<sup>++</sup>)</b>			
<b>Chloride (Cl<sup>-</sup>)</b> <b>Sulfate (SO<sub>4</sub><sup>-2</sup>)</b>	9.5  	12  	56  
<b>Total Organic Carbon</b> <b>Chlorophyll a</b>	8 5 µg/L	9 22 µg/L	10 24 µg/L

REMARKS:

COLLECTOR  
REPORT TO

Limnology Division  
UHL  
Des Moines Branch

W.J. HAUSLER, JR., Ph.D.  
DIRECTOR

**WATER QUALITY REPORT**

**STATE HYGIENIC LABORATORY, Des Moines Branch  
H.A. WALLACE BUILDING  
DES MOINES, IOWA 50309**

-21-

<b>Town Source Specific Location</b>	Dubuque N fork Catfish Creek Dubuque Co. Hwy 20 Br., T89N, R2E, Sec. 27E	Dubuque Middle fork Catfish Cr. Dubuque Co. Rd. Br., T89N, R2E, Sec. 35	Catfish Creek Dubuque Co. Hwy 61 bridge T88N, R2E, Sec. 1E
<b>Date Collected</b>	8/08/78	8/08/78	8/08/78
<b>Date Received</b>	8/09/78	8/09/78	8/09/78
<b>Lab Number</b>	981	982	983
<b>Collection Time</b>	1315	1740	1600
<b>pH</b>		<b>FIELD DATA</b>	
<b>Temperature</b>	26.0°C	25.0°C	25.0°C
<b>Dissolved Oxygen</b>			
<b>BACTERIOLOGICAL EXAMINATION</b>			
<b>Fecal Coliform/100 ml</b>	770	160	460
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
<b>Conductance (micromhos)</b>	650	770	580
<b>MBAS (as LAS)</b>			
<b>pH (units)</b>	8.6	8.5	8.1
<b>Alkalinity: P</b>	7.8	3.8	none
<b>T</b>	213	270	257
<b>NITROGEN: Organic N</b>	0.24	0.32	1.2
<b>Ammonia N</b>	0.06	0.03	0.10
<b>Nitrite N</b>			
<b>Nitrate N</b>	0.1	0.1	0.4
<b>Nitrate as NO<sub>3</sub></b>			
<b>RESIDUE: Total</b>	390	552	384
<b>Fixed</b>	276	364	284
<b>Volatile</b>	114	186	100
<b>Filtrable Residue T</b>	380	528	346
<b>F</b>	274	346	256
<b>V</b>	106	182	90
<b>Nonfiltrable Residue T</b>	10	22	38
<b>F</b>	2	18	28
<b>V</b>	8	4	10
<b>Settleable Matter (ml/l)</b>			
<b>PHOSPHATE: Filtrable P</b>	0.06	0.07	0.90
<b>Total P</b>	0.06	0.07	1.5
<b>Dissolved Oxygen</b>	8.1	12.1	10.0
<b>BOD</b>	1	1	2
<b>COD</b>	24	15	23
<b>Grease or Oil</b>			
<b>Turbidity (JTU)</b>	1.7	4.5	19
<b>Total Hardness (as CaCO<sub>3</sub>)</b>			
<b>Calcium (Ca<sup>++</sup>)</b>			
<b>Magnesium (Mg<sup>++</sup>)</b>			
<b>Chloride (Cl<sup>-</sup>)</b>	66	59	15
<b>Sulfate (SO<sub>4</sub><sup>-</sup>)</b>			
<b>Total Organic Carbon</b>	7	7	8
<b>Chlorophyll a</b>	4 µg/L	7 µg/L	13 µg/L

REMARKS:

COLLECTOR  
REPORT TO

Limnology Division  
UHL  
Des Moines Branch

W.J. HAUSLER, JR., Ph.D.  
DIRECTOR

SEP 26 1978



**WATER QUALITY REPORT**

**STATE HYGIENIC LABORATORY, Des Moines Branch**  
**H.A. WALLACE BUILDING**  
**DES MOINES, IOWA 50309**

-22-

Town Source Specific Location	Granger Creek Dubuque Co. Hwy 52 Br., T88N, R3E, Sec. 6W	Catfish Creek Dubuque Co. Rd. Br., T88N, R3E, Sec. 6E	Catfish Creek 24 hour composite
Date Collected Date Received Lab Number	8/08/78 8/09/78 984	8/08/78 8/09/78 985	NS 8/09/78 986
Collection Time pH Temperature Dissolved Oxygen	1720 24.5°C	<b>FIELD DATA</b> 1700 26°C Surface, 23°C Bottom	
Fecal Coliform/100 ml	1600	<b>BACTERIOLOGICAL EXAMINATION</b> 370	730
Conductance (micromhos) MBAS (as LAS)	600	<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b> 480	560
pH (units) Alkalinity: P T	8.1 none 276	8.5 2.2 208	8.45 4.0 263
NITROGEN: Organic N Ammonia N Nitrite N Nitrate N	0.94 0.10 0.9	1.5 0.04 0.6	0.32 0.18 0.4
Nitrate as NO <sub>3</sub>			
RESIDUE: Total Fixed Volatile	426 306 120	388 298 90	452 278 174
Filtrable Residue T F V	362 254 108	360 288 72	358 216 142
Nonfiltrable Residue T F V	64 52 12	28 16 12	94 62 32
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P Total P	0.20 0.23	0.08 0.53	0.12 0.26
Dissolved Oxygen BOD	10.3 4	* 7	8
COD	22	25	40
Grease or Oil Turbidity (JTU)	22	13	35
Total Hardness (as CaCO <sub>3</sub> ) Calcium (Ca <sup>++</sup> ) Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> ) Sulfate (SO <sub>4</sub> <sup>-2</sup> )	18 9	15 13	18
Total Organic Carbon Chlorophyll a	9 25 µg/L	13 58 µg/L	

REMARKS: \*Surface DO 14.6 mg/L  
 Bottom DO 13.9 mg/L

COLLECTOR  
 REPORT TO

Limnology Division  
 UHL  
 Des Moines Branch

W.J. HAUSLER, JR., Ph.D.  
 DIRECTOR

SEP 26 1978

APPENDIX 2. SUMMARIES OF BIOLOGICAL  
COLLECTIONS FROM CATFISH CREEK, DUBUQUE, CO.

July - August 1978  
(all numbers are per square meter)

Station 1: Catfish Cr. Dubuque Co. Rd D-41 T88N, R1E, Sec. 36  
A small trickle over rocks and gravel in a wooded area.

7-12-78

Platyhelminthes  
Turbellaria  
Tricladida  
Dugesia sp.

+\*

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Annelida

Hirudinea

Erpobdellidae

Erpobdella punctata

21.6

Glossiphoniidae

Helobdella stagnalis

+

Mollusca

Gastropoda

Pulmonata

Physa sp.

43.1

Pelecypoda

Sphaeriidae

Musculium sp.

+

Arthropoda

Insecta

Ephemeroptera

Baetis sp.

64.7

Stenacron sp.

237.1

Trichoptera

Cheumatopsyche sp.

183.2

Diptera

Chironomidae

10.7

Tipula sp.

+

Coleoptera

Stenelmis sp. (larvae)

43.1

Stenelmis sp. (adult)

+

Hemiptera

Metrobates hesperius

10.8

Total #

---

614

Number of taxa

12

\* indicates presence in non-quantifiable sample

Station 2: Catfish Cr. Dubuque Co. Rd. T88N, R2E, Sec. 20  
A small stream over rocks and gravel in a pasture

	7-12-78	8-7-78
Annelida		
Oligochaeta		
Tubificidae	3.6	3.6
Hirudinea		
Erpobdellidae		
<u>Erpobdella punctata</u>		+
Mollusca		
Gastropoda		
Pulmonata		
<u>Physa sp.</u>	3.6	3.6
Ancyliidae		
<u>Ferrissia sp.</u>		3.6
Arthropoda		
Crustacea		
Decapoda		
<u>Orconectes virilis</u>	+	+
Insecta		
Ephemeroptera		
<u>Baetis sp.</u>	10.7	7.2
<u>Caenis sp.</u>	21.6	158.0
<u>Isonychia sp.</u>	+	
<u>Stenacron sp.</u>	104.1	197.6
<u>Stenonema sp.</u>	3.6	10.7
Odonata		
<u>Argia sp.</u>		3.6
Trichoptera		
<u>Cheumatopsyche sp.</u>	111.3	43.1
<u>Hydropsyche bifida</u> (gp)	3.6	3.6
<u>H. betteni</u>	+	
<u>Ochrotrichia sp.</u>	+	
<u>Neotrichia sp.</u>		3.6
Diptera		
<u>Atherix variegata</u>	17.9	+
Chironomidae	35.9	25.1
Coleoptera		
<u>Stenelmis sp.</u> (larvae)	3.6	3.6
<u>Stenelmis sp.</u> (adult)	7.1	+
<u>Helichus sp.</u>	+	+
Total #	<u>327</u>	<u>467</u>
Number of taxa	16	17

Station 3: Catfish Cr. Dubuque Co. Rd. T88N, R2E, Sec. 9  
A small stream over sand and gravel in a pasture.

	7-12-78	8-7-78
Platyhelminthes		
Turbellaria		
Tricladida		
<u>Dugesia</u> sp.		10.7
Annelida		
Oligochaeta		
Tubificidae	26.9	154.4
Hirudinea		
Erpobdellidae		7.1
Mollusca		
Gastropoda		
Pulmonata		
<u>Physa</u> sp.	+	+
Arthropoda		
Crustacea		
Isopoda		
<u>Asellus communis</u>	16.2	
Decapoda		
<u>Orconectes virilis</u>	+	+
Insecta		
Ephemeroptera		
<u>Baetis</u> sp.	26.9	35.9
<u>Caenis</u> sp.	21.6	79.0
<u>Stenacron</u> sp.	97.0	89.8
Odonata		
<u>Argia</u> sp.		3.6
Trichoptera		
<u>Cheumatopsyche</u> sp.	10.8	100.6
<u>Hydropsyche bifida</u> (gp)	5.4	25.1
<u>Ochrotrichia</u> sp.	5.4	3.6
<u>Neotrichia</u> sp.		+
Diptera		
<u>Anopheles punctipennis</u>		+
Chironomidae	59.3	46.7
<u>Chrysops</u> sp.		+
<u>Tipula</u> sp.		3.6
Coleoptera		
<u>Stenelmis</u> sp. (larvae)	10.8	28.7
Hemiptera		
<u>Rhagovelia</u> sp.	10.8	
<u>Sigara</u> sp.	+	
<u>Belostoma</u> sp.		+
Total #	291	589
Number of taxa	14	19

Station 4: South Fork Catfish Cr. Dubuque Co. Rd. T88N, R1E, Sec. 1  
No biological samples collected.

---

Station 5: South Fork Catfish Cr. Dubuque Co. Rd. D-29 T89N, R2E, Sec. 34  
 A small stream over sand and gravel in a pasture. (Due to a laboratory accident, only data from the kick-net sample is presented.)

7-12-78

Annelida

Hirudinea

Erpobdellidae

Erpobdella punctata +

Glossiphoniidae

Placobdella ornata +

Mollusca

Gastropoda

Pulmonata

Physa sp. +

Pelecypoda

Sphaeriidae

Musculium sp. +

Arthropoda

Crustacea

Decapoda

Orconectes virilis +

Insecta

Ephemeroptera

Baetis sp. +

Stenacron sp. +

Odonata

Hetaerina americana +

Trichoptera

Cheumatopsyche sp. +

Hydropsyche bifida (gp) +

Diptera

Atherix variegata +

Chironomidae +

Chrysozona sp. +

Simulium sp. +

Coleoptera

Stenelmis sp. (larvae) +

Helichus sp. +

Number of taxa

16

Station 6: Catfish Cr. Dubuque Co. Rd. T88N, R2E, Sec. 1W  
 A small stream over rocks and gravel in a semi-urban area.

8-7-78

Annelida	
Oligochaeta	
Tubificidae	10.7
Mollusca	
Gastropoda	
Pulmonata	
<u>Physa</u> sp.	+
Ancyliidae	
<u>Ferrissia</u> sp.	3.6
Pelecypoda	
Sphaeriidae	
<u>Musculium</u> sp.	3.6
Arthropoda	
Crustacea	
Amphipoda	
<u>Gammarus</u> sp.	+
Decapoda	
<u>Orconectes virilis</u>	+
Isopoda	
<u>Asellus communis</u>	+
Insecta	
Ephemeroptera	
<u>Baetis</u> sp.	50.2
<u>Stenacron</u> sp.	132.9
Odonata	
<u>Argia</u> sp.	10.7
<u>Calopteryx</u> sp.	+
<u>Ischnura</u> sp.	+
Trichoptera	
<u>Cheumatopsyche</u> sp.	219.1
<u>Hydropsyche bifida</u> (gp)	89.8
<u>Ochrotrichia</u> sp.	14.3
<u>Neotrichia</u> sp.	+
Diptera	
<u>Atherix variegata</u>	21.6
Chironomidae	140.1
Coleoptera	
<u>Stenelmis</u> sp. (larvae)	10.8
<u>Stenelmis</u> sp. (adult)	14.3
Hemiptera	
<u>Belostoma</u> sp.	+
<u>Microvelia</u> sp.	+
<u>Rheumatobates</u> sp.	+
<u>Trichocorixa</u> sp.	+
Total #	<u>722</u>
Number of taxa	23

Station 7: Middle Fork Catfish Cr. Dubuque Co. Rd. T89N, R2E, Sec. 25-30  
No biological samples collected.

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Station 8: Middle Fork Catfish Cr. Dubuque Co. Hwy. 20 (old) T89N, R2E, Sec. 27W  
 A small stream over rocks and gravel in an urban area.

7-12-78

Ectoprocta	
Phylactolaemata	
<u>Plumatella</u> sp.	+
Annelida	
Hirudinea	
Erpobdellidae	14.3
Mollusca	
Gastropoda	
Ancylidae	
<u>Ferrissia</u> sp.	14.3
Pelecypoda	
Sphaeriidae	
<u>Pisidium</u> sp.	3.6
Arthropoda	
Insecta	
Ephemeroptera	
<u>Baetis</u> sp.	104.1
<u>Caenis</u> sp.	86.2
<u>Stenacron</u> sp.	459.8
Odonata	
<u>Argia</u> sp.	+
Trichoptera	
<u>Cheumatopsyche</u> sp.	28.7
<u>Hydropsyche bifida</u> (gp)	3.6
<u>H. betteni</u>	+
<u>Ochrotrichia</u> sp.	21.6
Diptera	
<u>Atherix variegata</u>	10.8
Chironomidae	226.3
<u>Simulium</u> sp.	+
Coleoptera	
<u>Stenelmis</u> sp. (larvae)	10.8
<u>Tropisternus ellipticus</u>	+
 Total #	 984
Number of taxa	17

Station 9: North Fork Catfish Cr. Dubuque Co. University St. T89N, R2E, Sec. 27E  
 A small trickle over sand and gravel in an urban area.

7-12-78

Annelida  
 Oligochaeta  
 Tubificidae 14.3  
 Hirudinea  
 Erpobdellidae 3.6  
Erpobdella punctata +

Mollusca  
 Gastropoda  
 Pulmonata  
Physa sp. 7.1

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Arthropoda  
 Crustacea  
 Amphipoda  
Gammarus sp. +  
 Isopoda  
Asellus communis +  
 Insecta  
 Ephemeroptera  
Baetis sp. 190.4  
Caenis sp. 3.6  
 Odonata  
Aeschna umbrosa +  
Argia sp. +  
 Diptera  
Atherix variegata 28.7  
Chironomidae 513.6  
Chrysops sp. 3.6  
 Coleoptera  
Halipus sp. +

Total # 765  
 Number of taxa 14

Station 10: Middle Fork Catfish Cr. Dubuque Co. Fremont St. T89N, R2E Sec. 35  
 A small stream over rocks and gravel in an urban area.

8-9-78

Annelida	
Oligochaeta	
Tubificidae	32.3
Hirudinea	
Erpobdellidae	10.8
Mollusca	
Gastropoda	
Pulmonata	
<u>Physa</u> sp.	3.6
Ancyliidae	
<u>Ferrissia</u> sp.	+
Pelecypoda	
Sphaeriidae	
<u>Musculium</u> sp.	7.1
<u>Pisidium</u> sp.	3.6
Arthropoda	
Crustacea	
Decapoda	
<u>Orconectes virilis</u>	+
Isopoda	
<u>Asellus communis</u>	+
Insecta	
Ephemeroptera	
<u>Baetis</u> sp.	68.2
<u>Caenis</u> sp.	32.3
<u>Stenacron</u> sp.	104.1
Odonata	
<u>Argia</u> sp.	14.3
Trichoptera	
<u>Cheumatopsyche</u> sp.	+
<u>Hydropsyche frisoni</u>	+
<u>Ochrotrichia</u> sp.	7.1
Diptera	
<u>Atherix variegata</u>	14.3
Chironomidae	97.0
Culicidae	+
<u>Simulium</u> sp.	+
<u>Tipula</u> sp.	+
Coleoptera	
<u>Stenelmis</u> sp. (larvae)	21.6
<u>Stenelmis</u> sp. (adult)	7.1

Total #	424
Number of taxa	21

Station 11: Catfish Cr. Dubuque Co. Rockdale Rd. T88N, R2E, Sec. 1E  
 An intermediate stream with long pools over sand and gravel  
 in a semi-urban area.

	7-12-78	8-7-78
Annelida		
Oligochaeta		
Tubificidae	70.0	35.9
Arthropoda		
Crustacea		
Decapoda		
<u>Orconectes virilis</u>		+
Insecta		
Ephemeroptera		
<u>Baetis</u> sp.		86.2
<u>Caenis</u> sp.	+	75.4
<u>Stenacron</u> sp.	5.4	93.3
Odonata		
<u>Hetaerina americana</u>	+	
Trichoptera		
<u>Ochrotrichia</u> sp.		+
Diptera		
<u>Atherix variegata</u>	5.4	
Chironomidae	+	71.8
Ceratopogonidae	5.4	
<u>Tipula</u> sp.	+	
Hemiptera		
<u>Sigara</u> sp.	5.4	+
Total #	<u>92</u>	<u>363</u>
Number of Taxa	9	8

Station 12: Granger Cr. Dubuque Co. Hwy. 52 T 88N, R3E, Sec. 6W  
 A small stream over rocks and gravel in a pasture

7-12-78

Annelida

Oligochaeta	
Tubificidae	86.2
Hirudinea	
Erpobdellidae	+
Glossiphoniidae	
<u>Helobdella stagnalis</u>	26.9

Mollusca

Gastropoda	
Ancylidae	
<u>Ferrissia</u> sp.	26.9
Pelecypoda	
Sphaeriidae	
<u>Musculium</u> sp.	16.2

Arthropoda

Crustacea	
Amphipoda	
<u>Gammarus</u> sp.	5.4
Decapoda	
<u>Orconectes virilis</u>	+

Insecta

Ephemeroptera	
<u>Baetis</u> sp.	188.6
<u>Caenis</u> sp.	26.9
<u>Stenacron</u> sp.	441.8
Trichoptera	
<u>Cheumatopsyche</u> sp.	555.0
<u>Hydropsyche bifida</u> (gp)	7.7
<u>H. betteni</u>	10.8
<u>H. slossonae</u>	5.4
<u>Ochrotrichia</u> sp.	5.4
Diptera	
<u>Atherix variegata</u>	+
Chironomidae	231.7
Coleoptera	
<u>Stenelmis</u> sp. (larvae)	53.9
<u>Stenelmis</u> sp. (adult)	16.2
Hemiptera	
<u>Gerris</u> sp.	5.4
Megaloptera	
<u>Sialis</u> sp.	21.6

Total #  
 Number of taxa

1,756  
 22

Station 13: Catfish Cr. Dubuque Co. Rd. T88N, R3E, Sec. 6E  
No biological samples collected.

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