

**Stony Creek Watershed**  
**Nonpoint Source Pollution Assessment**  
**Report**

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January 1996



## I. INTRODUCTION

As recommended in the *Twin-Door-Kewaunee River Basin Water Quality Management Plan (1995)*, Lake Michigan District Department of Natural Resources monitored streams in the Stony Creek watershed (Figure 1) in 1994 to evaluate the extent of nonpoint source pollution impacts on water quality. This information, along with existing watershed data, was used to rank the priority of the watershed streams for potential selection in the Priority Watershed program.

## II. METHODS AND PROCEDURES

Described below is monitoring that was conducted in the Stony Creek watershed to evaluate the extent of nonpoint source pollution impacts on the water resources and the process used to rank the priority of the watershed streams for selection as a possible priority watershed project.

Stream habitat conditions were evaluated throughout the watershed in the spring, summer and/or fall and recorded on the Stream Habitat Evaluation Form (Ball, 1982). This rates the quality and quantity of habitat available in the stream for aquatic life.

Aquatic macroinvertebrates were collected in spring and fall at several locations in the watershed and sent to UW-Stevens Point for sorting and identification. Sample results were evaluated using the Hilsenhoff Biotic Index (HBI) which provides a relative measure of organic loading to the streams (Hilsenhoff, 1987).

Water chemistry monitoring results were retrieved utilizing the EPA's federal STORET retrieval system. Monthly samples of Stony Creek at CTH U in 1994 were reviewed.

Continuous dissolved oxygen and temperature meters (Hydrolab DataSonde 3 Multiprobe Loggers) were placed in Stony Creek at Rosewood Road for 15 days in June 1994 in addition to grab samples at several other locations in the watershed. Wisconsin Administrative code NR102 establishes dissolved oxygen water quality standard in order to maintain favorable aquatic life. For warm water streams the standard is 5 mg/l. For cold water the standard is 6 mg/l.

Using criteria defined in the Department of Natural Resources Planner's Guidance (1991), existing and new water quality information was applied to such things as endangered resources, water chemistry, macroinvertebrates, vegetation, and physical habitat so the watershed can be prioritized for selection as a priority watershed project. Based on impacts on the water resources from nonpoint sources of pollution, each major tributary stream and the overall watershed is given a high, medium, or low priority ranking.

### III. RESULTS AND DISCUSSION

The Stony Creek watershed with monitoring locations are shown in Figure 1. A summary of habitat evaluation results, biotic index results, and stream classifications for the major tributaries in the watershed are presented in Table 1. Following is a discussion of monitoring results for each of the major watershed streams.

#### Woodard Creek

Woodard Creek is a four mile long warm water forage fish classified stream. Even though the upper reaches flow intermittently and the lower reaches are perennial, flows are minimal even near the mouth in summer.

Aquatic life habitat rated good in the spring, but only fair in fall. At Mount Lookout Road, the rocky substrate is covered by silt and soft sediment and riffles are rare. The stream banks are well protected from erosion by dense tree and shrub growth. Water drops over the culvert at this location. Fish cannot move upstream unless water levels are high. Macroinvertebrate samples receives biotic index values of 3.99 in spring and 3.90 in fall which rates this section of Woodard Creek as very good water quality with possible slight organic pollution present. Dissolved oxygen, temperature, and pH readings were all normal.

Nonpoint sources of pollution are evident in the drainage area of Woodard Creek, but in the lower reaches, impacts to the creek itself are not as obvious. The increased gradient near the creek mouth improves water quality and habitat conditions. On the whole, Woodard Creek received a medium priority rating.

#### Schuyler Creek

Schuyler Creek is a four mile long warm water forage fish classified stream. Only the lower most reaches flow continuously. Aquatic life habitat received a fair rating in spring at CTH U. The substrate is mostly rock and rubble with some deposition of soft sediment in slower current areas. The banks do not appear to be excessively eroding. Macroinvertebrate samples received a biotic index value of 6.47 in spring which rate this section of Schuyler Creek as fair water quality with significant organic pollution present. Macroinvertebrate samples collected in 1979 at CTH U and Midway Road also received fair water quality ratings. Dissolved oxygen and temperature values were normal.

Nonpoint sources of pollution seems to impact habitat and macroinvertebrate communities of Schuyler Creek and therefore, received a medium priority rating.

Figure 1. **Stony Creek Watershed (TK05)**

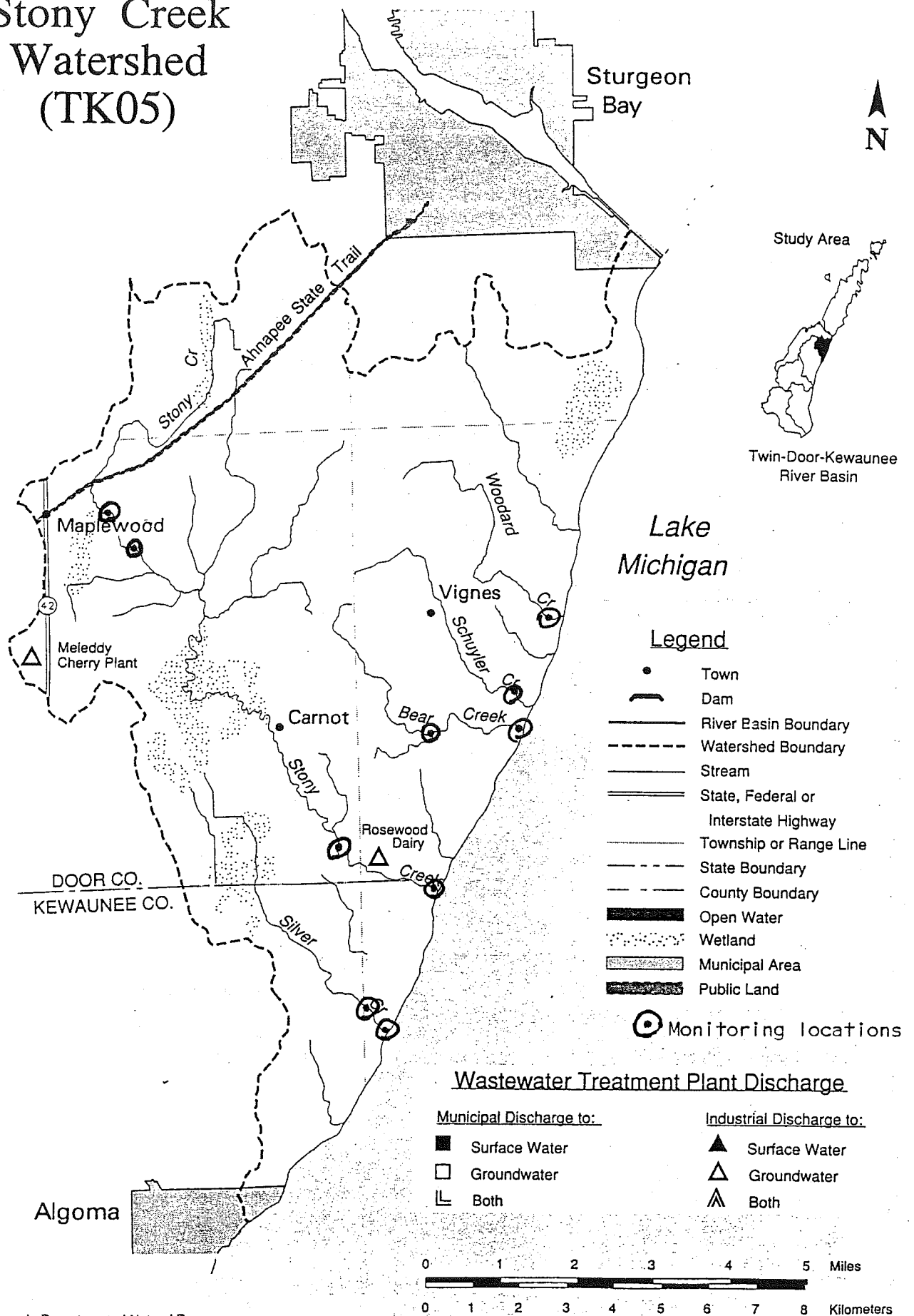


Table 1. Water Resource Conditions for Streams in the Stony Creek Watershed						
River	Location	Stream Classification <sup>1</sup>	Date	Habitat Evaluation <sup>2</sup>	HBI <sup>3</sup> Spring / Fall	
Woodard Creek	Mount Lookout Road	WWFF	4/14/94	116 - good	3.99 very good	3.90 very good
			9/19/94	183 - fair		
Schuyler Creek	CTH U	WWFF	5/2/94	138 - fair	6.47 fair	----
Bear Creek	CTH U	WWFF	3/22/94	112 - good	3.92 very good	3.81 very good
			9/19/94	157 - fair		
	Shiloh Road	WWFF	5/2/94	141 - fair	4.24 very good	----
			9/19/94	190 - fair		
Stony Creek	CTH H	WWFF	4/14/94	128 - good	6.52 fairly poor	----
			9/19/94	213 - poor		
	Maplewood Road	WWFF	4/14/94	117 - fair	7.27 fairly poor	7.13 fairly poor
			9/19/94	180 - fair		
	Rosewood Road	Cold (ClassII)	4/14/94	90 - good	5.33 good	5.03 good
			6/14/94	147 - fair		
			9/19/94	140 - fair		
	CTH U	Cold (ClassII)	3/22/94	82 - good	3.83 very good	3.67 very good
6/14/94			121 - good			
9/19/94			120 - good			
Silver Creek	CTH S	WWFF	6/14/94	149 - fair	----	----
	Washington Road	WWFF	3/22/94	88 - good	4.20 very good	4.24 very good
			9/19/94	152 - fair		

1. Stream Classification:

Cold: cold water trout stream communities includes surface waters capable of supporting a community of coldwater fish and other aquatic life or serving as a spawning area for coldwater fish species.

Class I: streams are high-quality streams where populations are sustained by natural reproduction.

Class II: streams have some natural reproduction but need stocking to maintain a desirable fishery.

Class III: streams sustain no natural reproduction and require annual stocking of legal size fish for sport fishing.

WWFF: warm water forage fish communities includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

2. Habitat Evaluation Rating:

- < 70 = excellent habitat
- 71 - 129 = good habitat
- 130 - 200 = fair habitat
- > 200 = poor habitat

3. Hilsenhoff Biotic Index (HBI):

Biotic Index	Water Quality	Degree of Organic Pollution
0-3.50	Excellent	No apparent organic pollution
3.51-4.50	Very good	Possible slight organic pollution
4.51-5.50	Good	Some organic pollution
5.51-6.50	Fair	Fairly significant organic pollution
6.51-7.50	Fairly poor	Significant organic pollution
7.51-8.50	Poor	Very significant organic pollution
8.51-10.0	Very poor	Severe organic pollution

### Bear Creek

Bear Creek is a four mile long warm water forage fish classified stream. The lower one half of Bear Creek flows continuously. Aquatic life habitat seems to be degraded by nonpoint sources of pollution. At Shiloh Road, habitat received a fair rating. Silt has settled in the slow areas and near the banks. Because of the abundance of filamentous algae and periphyton growth covering the rocky substrate, macroinvertebrates could not be collected here in the fall; however, a sample in spring received a biotic index value of 4.24 which rates this section of Bear Creek as very good water quality with possible slight organic pollution present.

As the gradient increases near the creek mouth, aquatic life habitat appears to be somewhat better. It rated good and fair in spring and fall at CTH U even though some silt has accumulated near the banks and the water clarity was not good. Macroinvertebrate samples at CTH U received biotic index values of 3.92 in spring and 3.81 in fall which also rates Bear Creek as very good water quality. All dissolved oxygen, temperature, and pH readings were in acceptable ranges.

Nonpoint sources of pollution seems to impact Bear Creek more in the upper reaches then downstream because of the increased gradient near the mouth. The abundance of aquatic plants and accumulation of sediment in the creek is impacting Bear Creek; therefore, Bear Creek received a medium priority rating.

### Stony Creek

The upper eleven miles of Stony Creek is classified as warm water forage fish while the lower five miles are class II cold water. Stony Creek changes considerably from the upper to lower reaches. In the upper reaches at CTH H, the creek is slow moving. Some portions of the creek have been ditched. In early spring, aquatic life habitat rated good because of the abundance of water; however, in fall, it received a poor water quality rating. The dark stained water had a low dissolved oxygen reading of 3.7 mg/l. the state standard for this warm water section is 5 mg/l. Water levels were low and duck weed was abundant. The silt covered substrate made it impossible to collect macroinvertebrates in the fall; however, a spring sample received a biotic index value of 6.52 which rates this section of Stony Creek as fairly poor water quality with significant organic pollution present.

At Maplewood Road, aquatic life habitat received fair ratings. The rocky substrate has some riffles and deep pools which provide some habitat. Macroinvertebrate samples received biotic index values of 7.27 in spring and 7.13 in fall both indicating fairly poor water quality with significant organic pollution present. As the creek flows downstream, it travels through significant wetland areas.

At Rosewood Road, the creek is classified as class II cold water. Aquatic life habitat rated as good and fair. The substrate is mostly rocks with some riffles and deep pools. Filamentous algae and periphyton growth is present on the rocks. In slow areas, silt covers the substrate. Cattle access has caused some erosion of the banks and destroyed bank vegetation. Aquatic macroinvertebrate samples at Rosewood Road received biotic index values of 5.33 in spring and 5.03 in fall both indicating good water quality with some organic pollution present.

Dissolved oxygen and temperature monitoring conducted at Rosewood Road from June 7 to 22, 1994 shows daily dissolved oxygen violations of the 6 mg/l state standard for cold water streams from June 12 to 22 (Appendix A and B). Diurnal fluctuations are caused when aquatic plants consume oxygen by respiration at night and produce oxygen by photosynthesis during the day. Low dissolved oxygen levels and high water temperatures (maximum 28°C) are stressful to aquatic life in the stream.

At CTH U near the creek mouth, the stream gradient increases significantly and thus, aquatic life habitat improves. The large rocks and good gradient provide many riffles and good habitat. Some periphyton and algae growth is present on the rocks. The stream banks are well protected from erosion with diverse tree and shrub growth. Macroinvertebrate samples at CTH U received biotic index values of 3.83 in spring and 3.67 in fall both indicating very good water quality with possible slight organic pollution present.

Monthly water chemistry samples collected in 1994 (DNR Lake Michigan District Water Resources Management files) at CTH U found occasional elevated concentrations of total phosphorus, dissolved phosphorus, ammonia, and bacteria. Dissolved phosphorus was the only parameter with a monthly average concentration above desirable levels. Bacteria counts were generally in the acceptable range except after an intense rain event in September.

Nonpoint sources of pollution seems to impact Stony Creek especially in the upper reaches. The higher gradient improves the water quality and habitat significantly in the lower reaches. Monthly water chemistry samples near the creek mouth shows elevated loading of dissolved phosphorus to Lake Michigan. Dissolved oxygen monitoring shows violations of state standards. Therefore, Stony Creek received a high priority rating.



## Silver Creek

Silver Creek is a five mile long warm water forage fish classified stream. This small stream originates in wetlands and has been ditched in the upper reaches. At CTH S, there is some sediment accumulation and algae growth on the rocky substrate. The banks are well protected from erosion with diverse tree and shrub growth. Aquatic life habitat rated fair.

At Washington Road, the steep gradient provides good habitat when flows are significant and only fair habitat during lower flows. The riffles provide good reaeration and sedimentation does not occur. Macroinvertebrate samples at Washington Road received biotic index values of 4.20 in spring and 4.24 in fall which indicates very good water quality with possible slight organic pollution present.

Nonpoint sources of pollution in Silver Creek can be seen in the upper reaches of the creek, but the lower reaches are not significantly being impacted because of the higher stream gradient. The abundance of filamentous algae and sedimentation in the creek warrants rating Silver Creek medium priority.

## IV. CONCLUSIONS

The streams in the Stony Creek watershed have different characteristics upstream then downstream near the mouths. In the upper reaches of these creeks, flows and gradient are minimal. Here nonpoint sources of pollution is obvious and has an impact on the water resources. Sediment fills in the creek beds and aquatic plants flourish. In the lower reaches, as the gradient increases, so does aquatic life habitat and macroinvertebrate communities. Sediment is flushed from the system and the riffles provide good reaeration. Nonetheless, nonpoint sources of pollution is limiting the abundance and diversity of aquatic communities in the watershed streams. Woodard Creek, Schuyler Creek, Bear Creek, and Silver Creek all received medium priority rankings. Stony Creek received a high priority ranking. Applying the priority watershed ranking procedures outlined in the Planner's Guidance, overall the Stony Creek watershed ranked *high* priority for streams for potential selection in the Nonpoint Source Priority Watershed Program.

## V. REFERENCES

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

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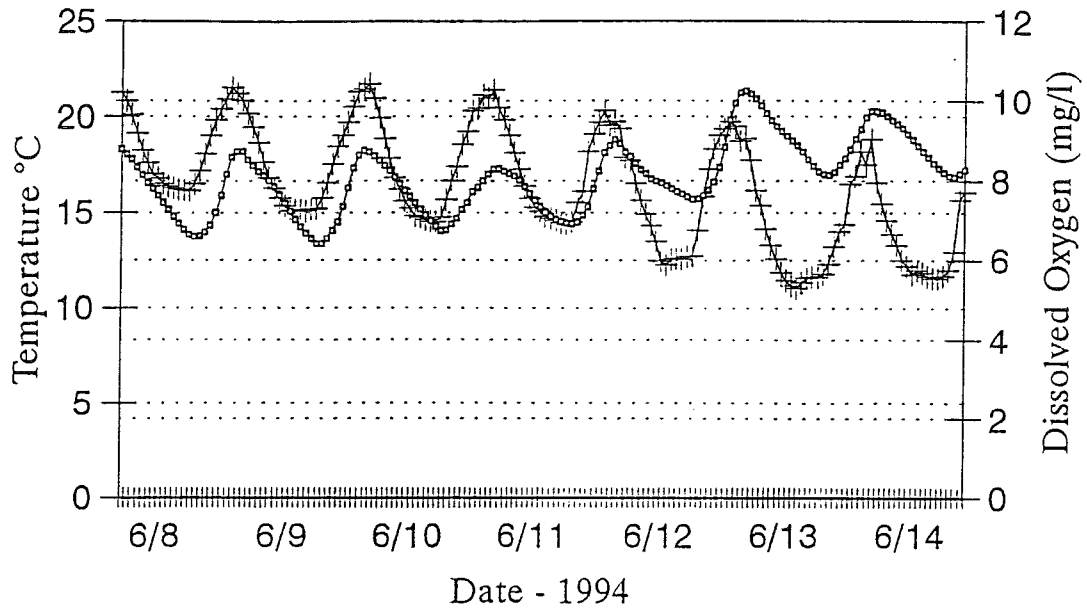
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Appendix A

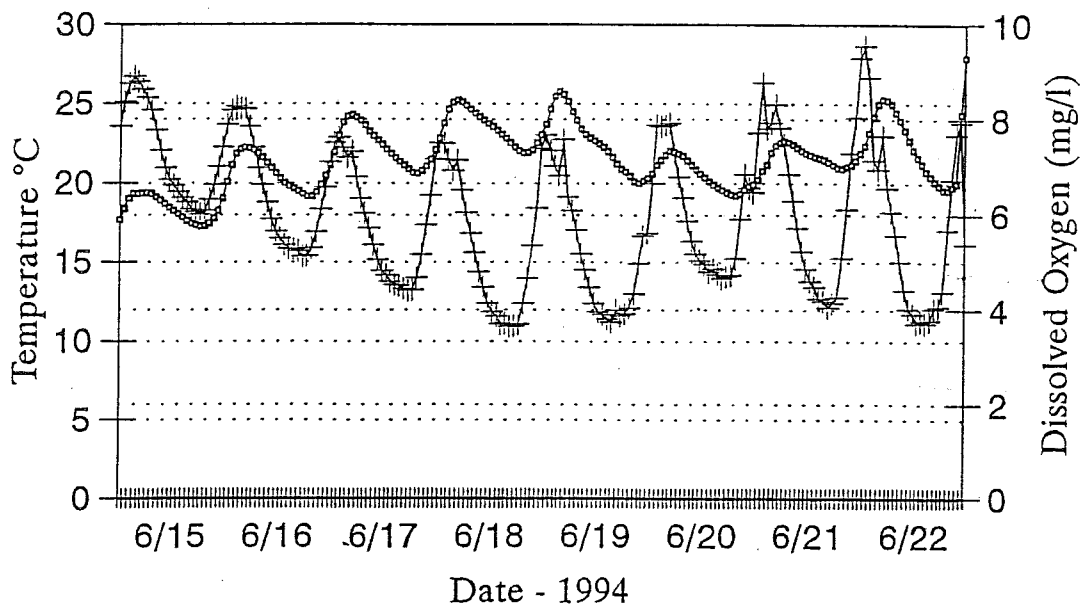
# Stony Creek Rosewood Road



— Temperature + Dissolved Oxygen

Appendix B

# Stony Creek Rosewood Road



— Temperature + Dissolved Oxygen

