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Fall Creek Monitoring Report, 2004-2005

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Introduction

Fall Creek is an approximately 6-mile tributary of the Eau Claire River located in the Lower Eau Claire River Priority Watershed. The watershed project ran from 1983 to 1994, utilizing a number of BMP's (Best Management Practices) including fencing for livestock exclusion and stream crossings. A report summarizing changes in the stream due to this project was completed in 1995 (Schreiber).

Fall Creek Pond is a 17 acre impoundment of Fall Creek located in the Village of Fall Creek. The upstream 4-mile portion of Fall Creek is managed as a Class II brown trout fishery, and the portion below the pond is managed as a warm water forage fishery. The trout fishery is maintained by annual stocking of about 70 yearling brown trout (Schreiber, 1995). The priority watershed project objective was to increase trout reproduction and survival by reducing organic and sediment loading to the stream (WDNR, 1985). According to Schreiber (1995), this objective had not yet been achieved in 1995 because accumulated sediments needed to be scoured and the underlying gravel riffle areas needed to be exposed.

The purpose of this report is to summarize and track changes in the stream since the last evaluation ten years ago.

Methods

Three sites were chosen on Fall Creek for evaluation (see Table 1 and Figure 1) under direction of the Wisconsin DNR. Methods of evaluation were chosen according to the Water Resource Evaluation Monitoring Report on Bears Grass Creek (Schreiber 1995) for reasons of comparison to the 1995 study. However, no information was taken from sites 1 or 5 for this study. Sites 1 and 2 are below Fall Creek Pond in the lower portion of the creek, and sites 3, 4, and 5 are in the upper portion above the impoundment.

Table 1. Fall Creek monitoring sites and parameters measured, X = 2004 and 2005.

Site	Location	Macroinvertebrates June	Macroinvertebrates Sept	Temperature	Habitat Assess.
1	1 mi. below Fall Creek				
2	CTH K below Fall Creek	X	X	X	2004
3	CTH J	X	X	2004	2004
4	CTH JJ				2004
5	Geske Rd.				

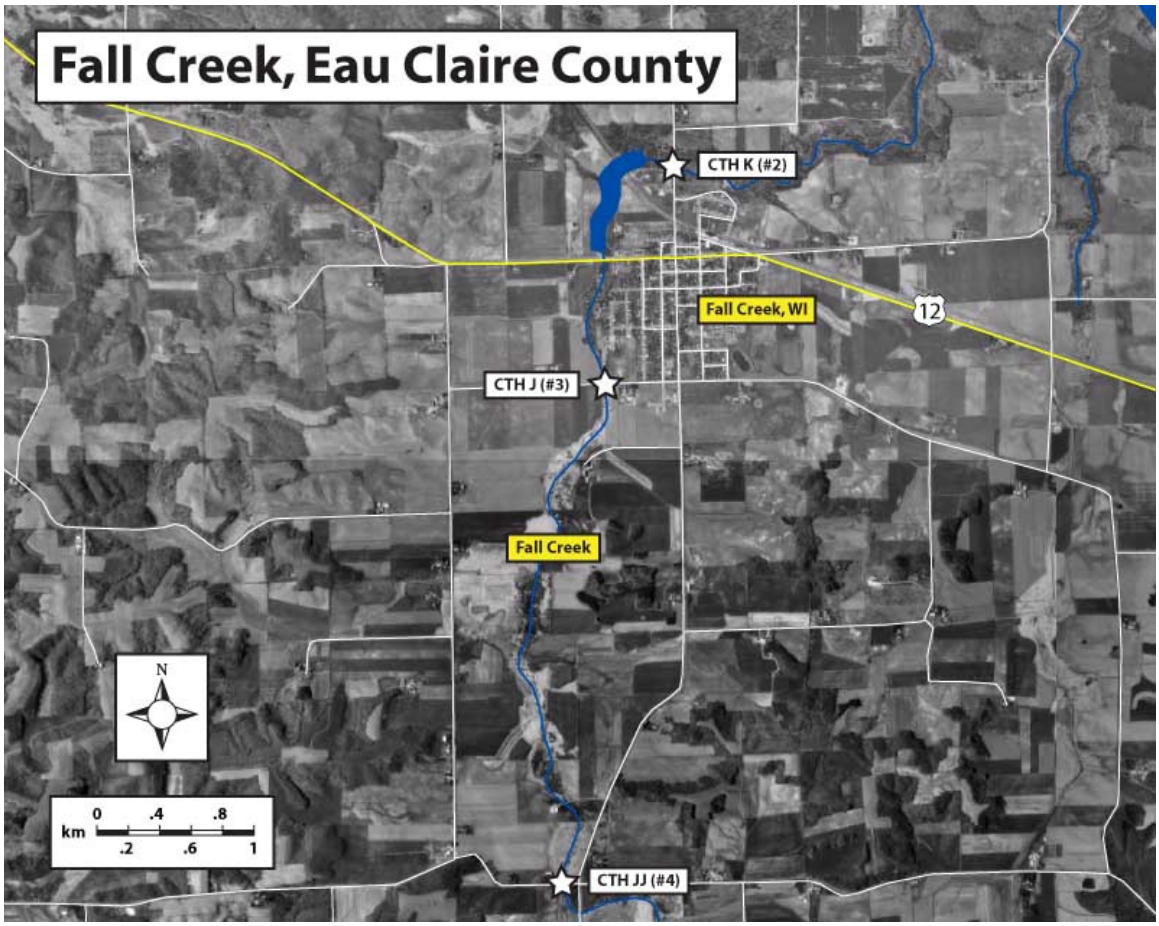

Figure 1. Map of monitoring sites on Fall Creek

Macroinvertebrates

Aquatic macroinvertebrates were collected in the spring and fall 2004 and 2005 in sites 2 and 3. They were collected in a D-frame net, preserved in alcohol, and taken back to the lab for sorting and identification to family. Data was analyzed using the Hilsenhoff Biotic Index (1988), which provides a qualitative measure of organic loading into the stream, family richness, percent EPT (Ephemeroptera-Plecoptera-Trichoptera), and Margalef's Diversity Index (using family diversity instead of species diversity). It should be noted that Hilsenhoff scores calculated in 2005 used a modified version of the index that includes a number of families that the original left out. This modified index typically raises the average score by half a point to a point. This index is more up to date and thought to be more accurate. More info can be found at: http://lakes.chebucto.org/ZOOBENTH/BENTHOS/tolerance.html

Temperature

Continuous temperature monitoring devices (Onset Corporation 75 day HOBOs) were placed in two sites for the duration of the summer months, recording instantaneous temperatures every hour from June until September.

Habitat Assessment

Stream habitat assessments were completed on three Fall Creek sites in 2004 according to methods developed by Simonson and Lyons (1992).

Results and Discussion

Temperature

Water temperatures from sites 2 and 3 (nearest the impoundment) during summer 2004 is displayed in Figure 2. Site 2, which is below the Fall Creek Pond, shows significantly higher temperatures than site 3 (above the pond). This could be due to activity on the pond or in the Village of Fall Creek. It could also be attributed to surface release of waters over the impoundment.

According to this data and the Thermal Criteria outlined by Lyons and Wang (1996), Fall Creek is a cold-water stream. However, the maximum instant temperature at site 2 would put the stream in the cool water category. In site 3, the temperatures are optimal for brook trout (11-16ºC daily optimal mean, 23.8ºC upper limit) and brown trout (12-19ºC daily optimal mean, 27.2ºC upper limit) survival. However, site 2 temperatures are well out of range for brook trout and just out of range for brown trout with a high daily mean temperature (22ºC). Unfortunately, data was lost at CTH J in 2005.

Table 2: Maximum and mean termperature data from 2004 and 2005.

Temperatures in ºC	2004		2005	
	Max	Mean	Max	Mean
Site 2 – CTH K	26.3	20.3	28.7°	22.3°
Site 3 – CTH J	22.4	15.1	-	-

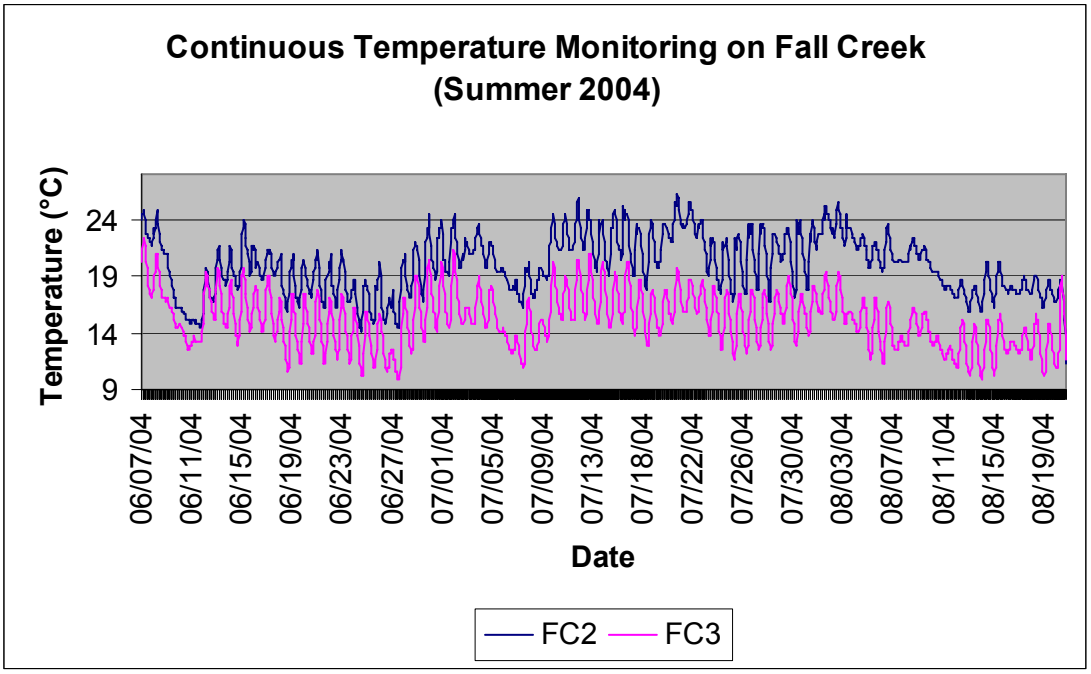

Figure 2. Temperature data collected by Onset Corporation HOBOs in Fall Creek sites 2 (CTH K) and 3 (CTH J) in 2004.

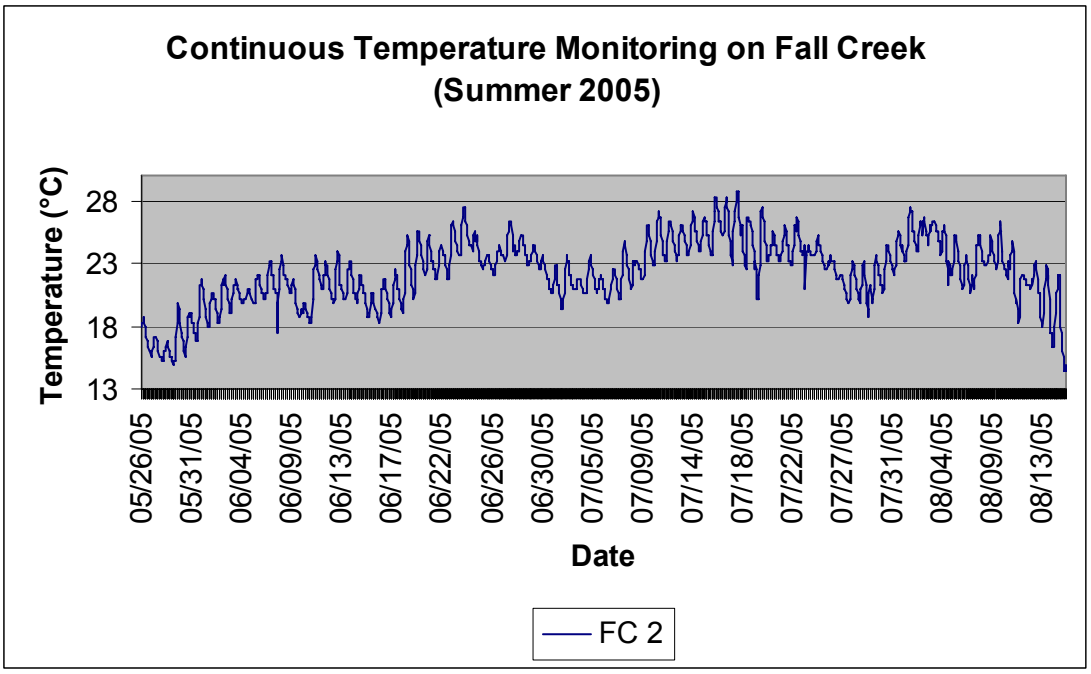

Figure 3. Temperature data collected by Onset Corporation HOBOs in Fall Creek site 2 (CTH K) in 2005.

Macroinvertebrates

Scores in the Hilsenhoff Family Biotic Index at the two sites measured both years have increased from 1993, indicating that water quality has decreased both above and below the pond. In particular, in the fall of 2004, the site just above the pond (site 3) was given a "fair" index score, indicating fairly significant organic pollution. Scores dropped further in 2005, this time three of the four samplings were found to be "fair". Appendices 1 – 4 have detailed information on scores.

Percent EPT in site 2 was very low in the spring, but improved significantly in the fall collection in both 2004 and 2005. This could possibly be attributed to the fact that many of these aquatic species that are terrestrial in the summer could have already emerged as adults and been out of the stream by the time the sample was taken. The high percentage present in the fall collection demonstrates good survival of these low-tolerance macroinvertebrates, indicating good water quality. However, the percent EPT in site 3 above the dam is less promising. In the spring, percentages were higher than in 1993, but fall collection percentages are much lower. They continued to be extremely low in 2005. This could indicate experimental error, but it could also indicate that something happened in the stream over the summer of 2004 that was detrimental to the success of low-tolerance individuals.

Overall, it seems as if macroinvertebrate scores have shown decreased quality of the stream as a whole. Hilsenhoff scores are higher and percent EPT scores are inconclusive.

To get a better idea of macroinvertebrate scores, samples need to be taken in all five sites in future years.

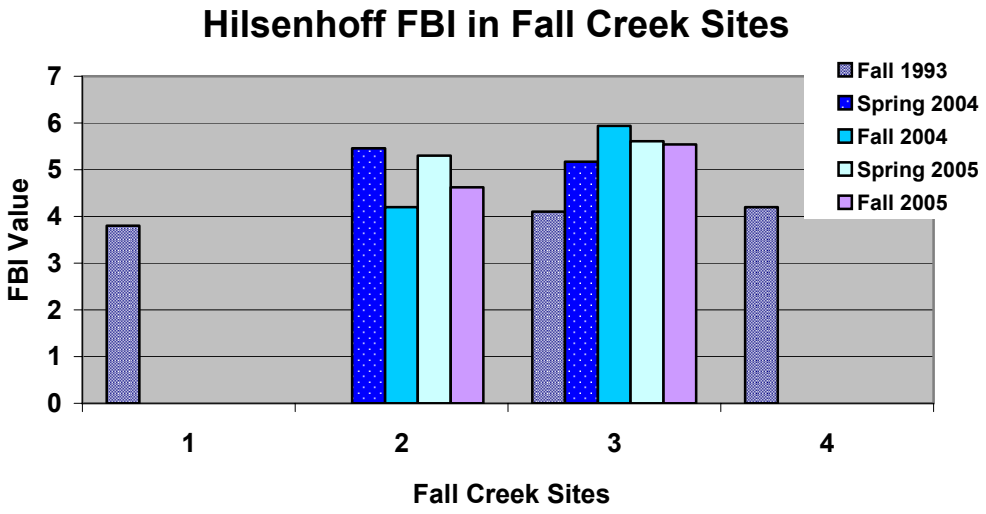

Figure 4. Hilsenhoff Family Biotic Index scores for Fall Creek Sites during monitoring in 1993, 2004 and 2005. Lower FBI values are indicative of higher quality streams.

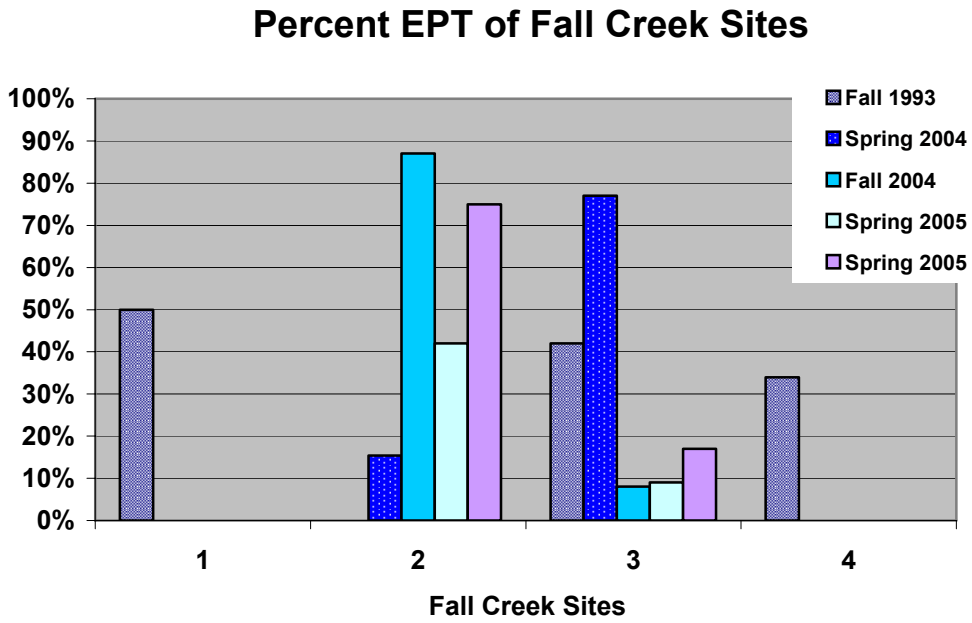

Figure 5. Percent Ephemeroptera, Plecoptera, Trichoptera (EPT) for Fall Creek Sites during monitoring in 1993, 2004, and 2005. Higher percentage values are indicative of higher quality streams.

Habitat

Table 2 shows a summary of habitat scores and comparisons to 1995 data. Habitat has improved at sites 2 and 4, but slightly declined in site 3 since 1995. In 2004, all three sites were given ratings of "good" in the habitat evaluation.
At Site 2 on CTH K, Fall Creek is still relatively wide and shallow (see pictures in figures 4 and 5) with stream substrate of predominantly rubble/cobble and gravel, which are good attachment sites for macroinvertebrates. It has a good number of riffles, but very few pools. Cover for fish is at 70%, and the streambank is still generally stable and well-protected on this portion of the creek.

Site 3 at CTH J is still very narrow and deep (see pictures in figures 6 and 7) with an overwhelming stream bottom of silt and clay. Although it is deeper than at site 2, it is slower moving (see Appendix 3). It has not changed much since the 1995 evaluation other than the score has decreased slightly. The abundant reed canary grass along the banks provides the lone small amount of bank stability and fish cover.

Site 4 at CTH JJ has shown the most improvement in habitat rating scores, but is still in need of improvements. It is moderately wide and deep, with predominate substrate of silt and clay. This portion of the creek is very slow moving, seemingly standing still in many areas. There are drainage pipes and ditches emptying into the creek from nearby farm fields, which are detrimental to habitat due to sediment deposition.

Overall, in comparison to 1995 data (Schreiber), the creek has slightly improved, but continues to be limited by sediment deposits in riffle and pool areas, scarcity of cover for adult fish, and lack of suitable spawning substrate. The sites above Fall Creek pond are especially in need of improvements if they are to continue to be stocked with trout.

Table 3. Habitat Assessment Results Comparisons

Site	Year	Mean Steam Width (m)	Mean Water Depth (m)	Mean Depth of Soft Sediment (m)	Substrate Composition	Percent Riffles	Percent Pools	Score
2	1995	5.83	.17		58% bedrock; 7% boulder; 29% rubble/gravel; 6% sand	44	0	60 good
2	2004	6.85	.21	.02	5% bedrock; 8% boulder; 21% rubble/cobble; 30% gravel; 29% sand; 2% silt; 5% detritus	43	0	70 good
3	1995	2.05	.54		7% rubble/gravel; 7% sand; 88% silt/clay	7	69	67 good
3	2004	4.0	.57	.15	1% rubble/cobble/gravel; 9% sand; 70% silt; 14% clay; 6% detritus	0	0	55 good
4	1995	5.26	.41		2% gravel; 17% sand; 81% silt/clay	0	16	38 fair
4	2004	4.6	.28	.20	4% gravel; 19% sand; 50% silt; 6% clay; 19% detritus	0	0	60 good

Figure 6. Fall Creek site 2 @ CTH K

Figure 7. Fall Creek Site 2 @ CTHK

Figure 8. Fall Creek Site 3 @ CTH J.

Figure 9. Fall Creek Sit e3 @ CTH J.

Conclusion

Little improvements have occurred on Fall Creek since the last evaluation in 1995. The brown trout fishery (above the pond) is limited due to the lack of a well-developed pool-riffle-run structure and high amounts of silt/sand sediment deposition. As was concluded in the 1995 study, shifting sediment deposition is the limiting factor in stream degradation because streambanks are generally stable and the stream has good water quality.

Streambank protection mechanisms need to be implemented for streambed stabilization and scouring of these sediments to occur. As concluded in the 1995 survey, in-stream devices such as channel deflectors and sediment traps could be used for this purpose. Once the stream bottom is stabilized, lunker structures and other in-stream cover devices could be implemented to increase fish habitat.

References

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Appendix 1. Macroinvertebrates found in Fall Creek, 2004.

Spring		Fall	
Site 2 (CTH K)		**Site 2 (CTH K)**	
7 Jun 04		**28 Sep 04**	
Athericidae	14	Baetidae	5
Baetidae	12	Elmidae	1
Cambaridae	3	Hydropsychidae	82
Chironomidae	31	Planorbidae	6
Elmidae (4A, 1L)	5	Simuliidae	1
Gammaridae	1	Tipulidae	5
Heptageniidae	2		
Lestidae	1		
Planorbidae (Heliosoma)	2		
Simuliidae	20		
Total	100	Total	100

Site 3 (CTH J)		**Site 3 (CTH J)**	
7 Jun 04		**28 Sep 04**	
Cambaridae	1	Aeshnidae	1
Gammaridae	21	Baetidae	1
Elmidae	1	Bdellidae	1
Hydropsychidae	4	Brachycentridae	4
Baetidae	73	Gammaridae	80
		Hydropsychidae	3
		Physidae	10
Total	100	Total	100

Appendix 2: Summary of macroinvertebrate analyses on sites 2 and 3

Spring 2004	**Site 2**	**Site 3**
Hilsenhoff FBI	5.46	5.17
Water Quality	Good	Good
Degree of Organic Pollution	some	some
% EPT	15.4%	77.0%
Family Richness	10	5
Margalef's Diversity Index	2.00	.87

Fall 2004	**Site 2**	**Site 3**
Hilsenhoff FBI	4.20	5.94
Water Quality	Very Good	Fair
Degree of Organic Pollution	possible slight	fairly significant
% EPT	87.0%	8.0%
Family Richness	6	7
Margalef's Diversity Index	1.09	1.30

Appendix 3: Macroinvertebrates found in Fall Creek, 2005.

Spring		Fall	
Site 2 (CTH K) 26 May 05		**Site 2 (CTH K) 1 Oct 05**	
Athericidae	2	Baetidae	1
Baetidae	20	Chironomidae	12
Chironomidae	38	Coenagrionidae	10
Elmidae	4	Elmidae	10
Hydropsychidae	22	Hydropsychidae	64
Planorbidae	3	Tipulidae	3
Simuliidae	10		
Tipulidae	3		
Total	100	Total	100

Site 3 (CTH J) 26 May 05		**Site 3 (CTH J) 1 Oct 05**	
Chironomidae	35	Brachycentridae	4
Tipulidae	4	Gammaridae	83
Gammaridae	46	Hydropsychidae	13
Simuliidae	5		
Baetidae	7		
Heptageniidae	1		
Elmidae	1		
Limnephilidae	1		
Total	100	Total	100

Appendix 4: Summary of macroinvertebrate analyses on sites 2 and 3.

Spring 2005	Site 2	Site 3
Hilsenhoff FBI	5.3	5.61
Water Quality	Fair	Fair
Degree of Organic Pollution	Fairly Substantial	Fairly Substantial
% EPT	42.0 %	9.0 %
Family Richness	8	8
Margalef's Diversity Index	1.52	1.52

Fall 2005	Site 2	Site 3
Hilsenhoff FBI	4.62	5.54
Water Quality	Good	Fair
Degree of Organic Pollution	Some Probable	Fairly Substantial
% EPT	75.0%	17.0%
Family Richness	6	3
Margalef's Diversity Index	1.09	.43

Appendix 5: Flow data taken on Fall Creek (8/03/2004)

	FC 2 (CTH K)	FC 3 (CTH J)	FC 4 (CTH JJ)
Stream width (m)	5.600	3.300	4.300
Flow (ft^3/sec)	2.815	1.831	0.038
Flow (m^3/sec)	0.080	0.052	0.001

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