Appendix D

City of Fort Worth

2010 Bioassessment Report

Rapid Bioassessment, Habitat Assessment, and Physico-chemical Characterization of Mary's Creek, Big Fossil Creek, Sycamore Creek, and Marine Creek, 2010.

Introduction

As a part of the monitoring requirements for the City of Fort Worth's TPDES storm water permit, rapid bioassessments are conducted on four area watersheds. Within each watershed, the primary Trinity River tributary is assessed at three locations, twice per year. The three selected sampling sites on each stream are identified as an upper reach (1), middle reach (2), and lower reach (3). During 2010, sampling events were conducted during late spring (May) and late fall (October). Bioassessments consist of evaluating chemical and physical water quality parameters, habitat assessment, and sample collection and analysis of benthic aquatic macroinvertebrate communities.

Macroinvertebrate community conditions found at a reference site provide a benchmark against which other sites can be assessed. In order for a site to be used as a reference site, it should have minimal impact from urbanization, but be geographically close enough to the other sites to be influenced by the same environmental conditions and weather patterns. The upper reach on Mary's Creek, MRY1, is used as the reference site for metrics requiring a benchmark.

Methods

Site Descriptions

City of Fort Worth Transportation and Public Works, Environmental Services Division (TPW/ESD) GIS personnel utilized 2005 North Central Texas Council of Governments (NCTCOG) land use data to generate watershed information as part of this assessment.

Mary's Creek is located in west Tarrant County with headwaters originating in east Parker County. Land use within the approximately 35,000-acre watershed is comprised of 87% open, 9% residential, 1% infrastructure, 1% commercial, 1% industrial and 1% government/education. Although there is currently a considerable amount of open area in the upper portion of the watershed, this area is seeing a rapid growth of residential and light commercial developments. Mary's Creek converges with the Clear Fork Trinity River approximately 0.25 mile west of SH-183 (Southwest Blvd.) and 0.80 mile north of IH-20.

The upper reach on Mary's Creek (MRY1) is the selected reference site and is located at the bridge crossing of FM 2871, Longvue Ave., approximately one mile west of west loop IH-820. Undeveloped and recently developed residential land uses dominate the watershed upstream between this location and IH-30. Immediately downstream of this location is a primarily undeveloped area with on-going slow-paced residential development to the south. The middle reach (MRY2) is located at a bridge crossing of west loop IH-820, approximately 0.40 mile south of Chapin Rd. A combination of commercial, residential and park land is evident below MRY2 as the creek passes through the City of Benbrook. The lower reach (MRY3) is located at the Winscott Rd. crossing. Below this point, the creek continues through a portion of Benbrook as well as a

private golf course and residential area prior to its convergence with the Clear Fork Trinity River.

Big Fossil Creek begins in northwest Tarrant County and flows southeast through north Fort Worth between the cities of Haslet and Saginaw. The 40,000-acre watershed includes land uses of approximately 59% open, 27% residential, 4% industrial, 3% government/education, 3% commercial, 3% water, and 1% infrastructure. Much of the currently undeveloped land in the upper portions of this watershed is slated for development or is currently under construction. The majority of development in this area is single family residential with supporting retail centers. The confluence of Big Fossil Creek with the West Fork Trinity River is approximately one mile west of east loop IH-820 and 1.3 miles north of IH-30.

The upper reach on Big Fossil Creek (BFC1) is located west of Pepperidge Ln., east of the city of Saginaw and approximately one mile downstream of Walnut Lake. Much of the watershed upstream of BFC1 is rural or undeveloped while downstream is an area of single-family residential development. The middle reach (BFC2) is located north of Western Center Blvd. at the IH-35W crossing. Below BFC2, the watershed is fully developed with land uses including residential, commercial, and industrial. The lower reach (BFC3) is located at Beach St., north of Fossil Creek Blvd. Below this point, the creek flows through the cities of Haltom City, North Richland Hills and Richland Hills before converging with Little Fossil Creek and the West Fork Trinity River.

Sycamore Creek begins in south Fort Worth and flows to the northeast through the south central part of the city. The watershed covers approximately 22,000 acres including land uses of 40% open, 37% residential, 7% government/education, 7% industrial, 4% commercial, 4% water, and 1% infrastructure. The confluence of Sycamore Creek with the West Fork Trinity River is located approximately 1.5 miles east of IH-35W, 0.25 mile north of IH-30 and 0.25 mile west of Beach St.

The upper reach on Sycamore Creek (SYC1) is located at the intersection of southeast loop IH-820 and IH-35W approximately 0.75 mile north of Altamesa Blvd. The developed portion of the watershed upstream of this location is a mix of residential, commercial, and industrial uses. Downstream of SYC1, Sycamore Creek drains an area of residential, commercial, industrial and park land uses. The middle reach (SYC2) is located in Cobb Park south of SH-287. Below SYC2, the watershed is developed with a mix of residential, commercial, and industrial land uses. The lower reach (SYC3) is located approximately 0.40 mile west of Beach St. at the dead end of Scott Ave. Sycamore Creek flows from this point approximately 0.30 mile north to its confluence with the West Fork Trinity River.

Marine Creek originates in northwest Fort Worth and flows south for approximately 3 miles before it joins with an unnamed tributary to form Marine Creek Lake. Marine Creek Lake, which is owned and operated by the Tarrant Regional Water District (TRWD), is located northwest of IH-820 between the cities of Lake Worth and Saginaw. From the containment dam on the south side of Marine Creek Lake, Marine Creek flows southeast through northwest Fort Worth until it enters the West Fork Trinity River near Samuels Ave. The Marine Creek watershed includes approximately 14,000 acres with

land uses including 55% open, 22% residential, 7.5% water, 5% airports, 4% government/education, 3% industrial, 2% infrastructure, and 1.5% commercial.

Within the Marine Creek watershed, the upper reach (MAR1) is located at the Angle Ave. crossing in Buck Sansom Park. Marine Creek meanders through undeveloped land and a city park below MAR1. The middle reach (MAR2) is located north of the NW 28th St. bridge in Lincoln Park. Surrounding watershed influences above MAR2 include single-family residential and runoff from Meacham International Airport. Potential commercial impacts, including the Fort Worth Stockyards National Historic District, increase in the lower reach (MAR3). MAR3 is accessed through Saunders Park on the south end of the Fort Worth Stockyards and north of the NE 23rd St. bridge crossing. Marine Creek flows approximately 0.45 mile southeast from this point to its confluence with the West Fork Trinity River.

Habitat Assessments and Water Quality Characterization

Chemical and physical parameters collected and analyzed with portable meters include pH, dissolved oxygen, turbidity, specific conductance, water temperature and air temperature. Colorimetric test kits were used to analyze nutrient concentrations of ammonia-nitrogen, phosphate, and nitrate-nitrogen. Escherichia coli bacteria sampling was included at all sites during the 2010 sampling. E. coli samples were processed in the City of Fort Worth's TPW/ESD storm water lab according to the current Standard Operating Procedures (SOP).

Habitat assessment is an integral part of bioassessment as it aids in the interpretation of differences in community composition and provides characterization of the ability of a stream to support aquatic life. Physical stream habitat characteristics such as surrounding land use, amount of stream side riparian cover, channel alteration, and substrate characteristics can strongly affect the benthic macroinvertebrate community assemblage. When physical habitat is similar between the reference site and sample site, water quality parameters are considered when determining stress causation to biological communities.

Habitat assessments were performed at each site following guidelines for high gradient streams in Chapter 5 of USEPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers, Second Edition*[1]. This assessment includes scoring 10 different habitat factors with available scores ranging from 0 to 20, with 0 representing poor conditions and 20 representing optimal habitat. Parameters evaluated in habitat assessments include bottom substrate and available cover suitability for colonization, embeddedness, flow regimes present, bottom scouring and sediment deposition, channel alteration and flow status, frequency of riffles or bends, stream bank stability, vegetative protection and riparian vegetative zone width. Individual scores for these 10 factors are totaled to produce the overall habitat score.

[1] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Bioassessments

Rapid bioassessments were performed on all stream sites during two separate sampling events occurring during late spring (May) and fall (October).

Macroinvertebrates were collected from riffle areas at each site using Surber samplers, with a 500µm mesh. Bottom substrate within the 12"x12" Surber frame area ($0.09m^2$) was disturbed to dislodge organisms. Three replicate samples were collected within each reach, and individual sample locations were recorded. Collected samples were transferred from the Surber sampler to sample containers and preserved in the field with 95% ethanol. Following transport to an in-house laboratory, macroinvertebrates in the samples were separated from the debris and identified. Most organisms were identified to family level with several noted exceptions. In accordance with the current City of Fort Worth SOP, Chironomidae was identified to sub-family, Turbellaria and Hirudinea were identified to class, and Nematoda was identified to phylum.

Macroinvertebrate Data Analysis

Two separate methods were used for macroinvertebrate data analysis: the USEPA protocol and the Texas Index of Biotic Integrity (TX-IBI). The USEPA protocol has been used in all previous reports and the TX-IBI has been added to the analysis suite this year. Both methods use a series of community metrics to determine a score for each site. The primary difference in the two methods is in how the score is used to assess stream health. The USEPA protocol uses a comparison of test site scores to the score at a reference site to assess the degree of impairment at the test sites, while the TX-IBI uses a comparison to guidelines established by TCEQ to determine an aquatic life use rating for each site.

The USEPA protocol for aquatic macroinvertebrate community data analysis includes eight structural and functional feeding group biometric calculations. Each test site biometric value is then compared to the reference site value, expressed as a percentage: the ratio of test site to reference site for values expected to increase with improving conditions or the ratio of the reference site to the test site for values expected to decrease with improving conditions. The percent comparison is used to assign each test site metric a score based on a predetermined scoring index (the reference site is assigned the highest possible score for each metric). Scores for individual metrics are totaled to calculate an overall site score. Degree of impairment at a site is determined based on percentage comparison of the test site score to the reference score.

The TX-IBI methodology is found in the TCEQ's *Surface Water Quality Monitoring Procedures, Volume 2*[2], and utilizes eleven macroinvertebrate community structural and functional metrics for the assessment of biotic integrity. The TX-IBI is a quantitative method designed for use with macroinvertebrates collected with a Surber sampling device, calculating biological metrics with the resulting data, and generating a score for each individual site. Scores generated at each site are compared to values in TCEQ guidelines to determine an aquatic life use rating. This method is included as part of the assessment as it generates an individual value for each site without a direct comparison to the reference site. Accordingly, individual sites may be compared to themselves year to

[2] TCEQ, June 2007. Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data. TCEQ Surface Water Quality Monitoring Program. TCEQ RG-416. June 2007.

year on a seasonal basis (spring to spring and fall to fall) to demonstrate biological community changes within each reach.

Results and Discussion

Habitat Assessments and Water Quality Characterization

Overall scores for habitat assessments conducted in 2010 are included in Table 1 as well as Figures 1 and 2, with measured physico-chemical parameters presented in Tables 4 and 5. Habitat assessment scores were ranked in the sub-optimal or marginal categories for all sites during both sampling seasons and were within normal habitat score fluctuations for the sites. The middle reach on Sycamore Creek (SYC2) indicated an improved habitat score between the spring (102, marginal) and fall (112, sub-optimal) sampling events, while the lower reaches on Mary's Creek (MRY3) and Big Fossil Creek (BFC3) showed decreases in the scores between the spring (MRY3:112, sub-optimal; BFC3:123, sub-optimal) and fall (MRY3:102, marginal; BFC3:108, marginal) sampling events.

Overall habitat score at SYC2 increased during fall sampling because of higher ratings in the individual parameters of epifaunal substrate/available cover, embeddedness, and sediment deposition. The area may have been scoured of deposited sediments during rain events that occurred between the bioassessment sampling events, allowing for more amenable substrate available for colonization.

The decreased habitat score at MRY3 between spring and fall sampling events is attributed to decreased ratings in the individual parameters of epifaunal substrate/available cover, velocity/depth regime, and channel flow status. The overall habitat at MRY3 is primarily bedrock, with small areas of boulder/cobble/gravel. Because bedrock is an unstable habitat, the habitat available for colonization is patchy and changes over time. During fall sampling, areas that were sampled during the spring were either dry, missing, or had very little flow. Measured velocity during fall sampling (0.20 m/s) was less than half the velocity measured during spring sampling (0.41 m/s).

The habitat score at BFC3 was lower during the fall sampling event than during the spring sampling events because of the decreased scores in the individual parameters of embeddedness, frequency of riffles or bends, and vegetative protection. The available habitat at BFC3 is characterized by bedrock with patches of boulder/cobble/gravel. During fall sampling, it was observed that the stream had seen a high flow event which removed streamside vegetation and washed part of the available cobble/gravel habitat downstream of the sampling reach. As such, a riffle area sampled in spring no longer exists.

Habitat assessment scores at SYC1, MRY2 and BFC2 indicated marginal ratings during both spring and fall. These three sites are located underneath and directly adjacent to interstate highways and the natural channels of the streams at these locations have been altered. The overall marginal ratings result from low scores in the categories of sediment deposition (BFC2), channel alteration, bank stability (MRY2 and SYC1), vegetative protection, and riparian (stream side) vegetative zone width.

Table 1. Habitat Scores collected for Mary's Creek, Big Fossil Creek, Sycamore Creek, and Marine Creek during 2010.				
Site	**Spring Score**	**Fall Score**	**Habitat Score**	**Value**
MRY1	147	120	Optimal	160-200
MRY2	108	95	Sub-optimal	110-159
MRY3	112	102	Marginal	60-109
BFC1	147	146	Poor	<60
BFC2	90	81		
BFC3	123	108		
SYC1	87	91		
SYC2	102	112		
SYC3	117	111		
MAR1	95	104		
MAR2	118	110		
MAR3	127	130		

Figure 1. Habitat Assessment Scores for Mary's Creek, Big Fossil Creek, Sycamore Creek, and Marine Creek, May 2010.

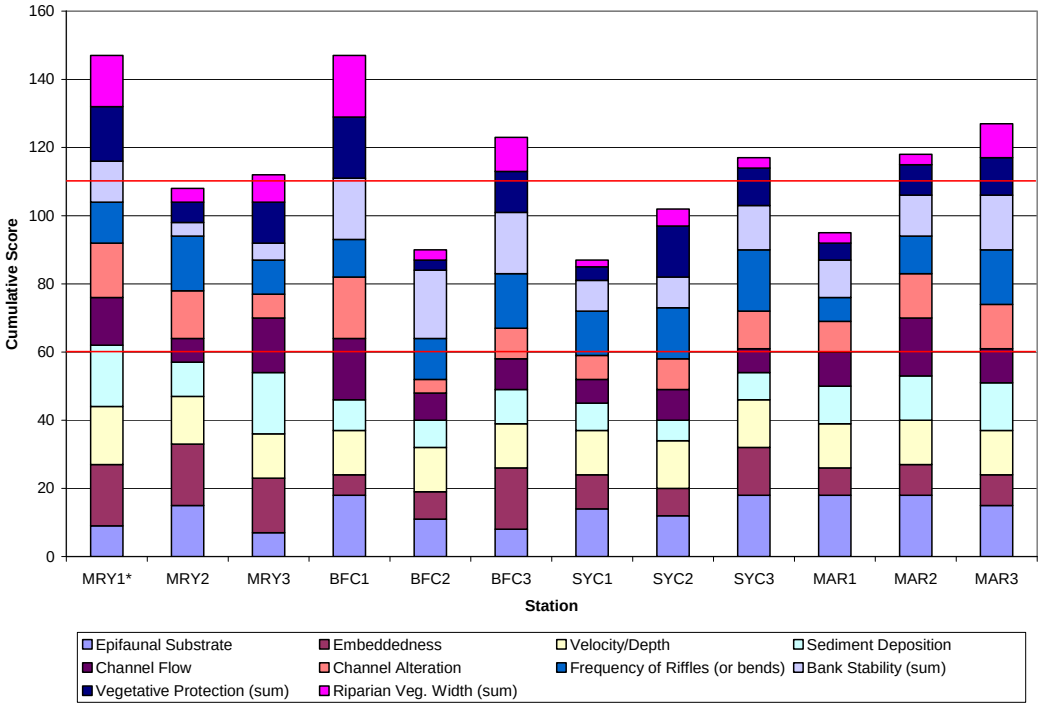
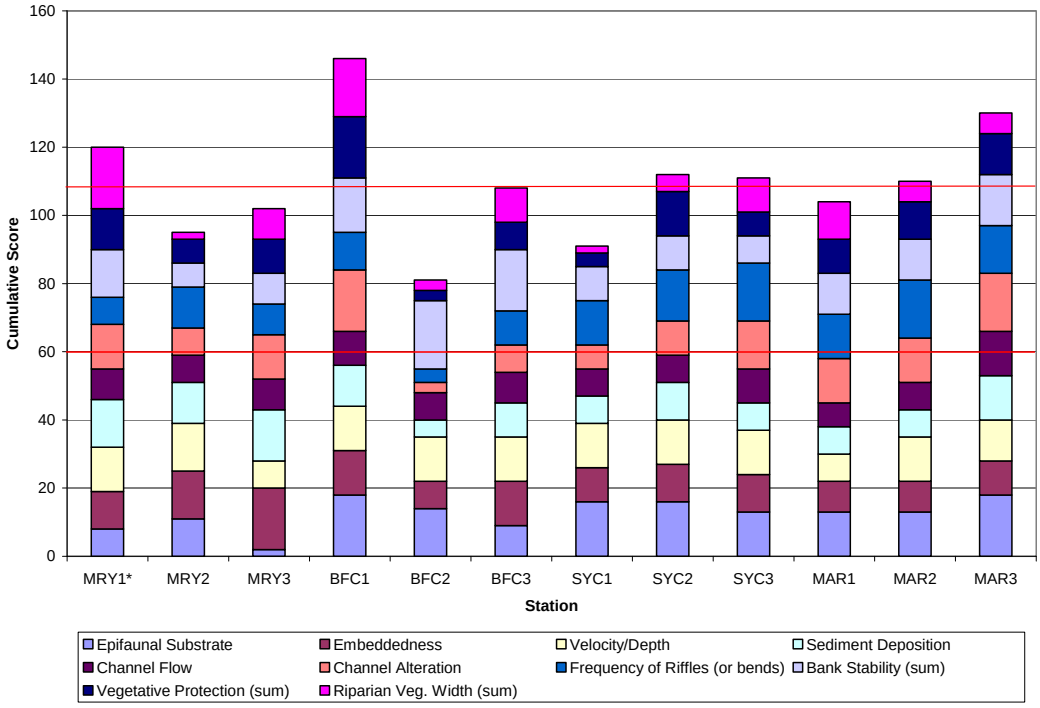


Figure 2. Habitat Assessment Scores for Mary's Creek, Big Fossil Creek, Sycamore Creek, and Marine Creek, October 2010.



Macroinvertebrate Data Analysis

In the spring, the lower reach of Sycamore Creek (SYC3) was flooded and unwadeable and there were no riffle areas; sampling was moved approximately 450 yards upstream to the first appropriately similar area. This location was within Sycamore Creek Municipal Golf Course. During the fall, samples were collected at the original SYC3 location where conditions had returned to normal, with wadeable depths and riffle areas available for sampling.

Aquatic macroinvertebrate community data analysis using the USEPA protocol metrics indicated all sites were classified as non-impaired during spring sampling, and all but two were non-impaired during fall sampling (Table 2 and Figures 3 and 4). The lower reach site on Sycamore Creek, SYC3, and the lower reach site on Marine Creek, MAR3, were categorized as non-impaired during spring sampling and as slightly impaired during fall. The rating decreased to slightly impaired at SYC3 between seasons due to a decrease in the number of Ephemeroptera, Plecoptera and Tricoptera (EPT) taxa, an increase in percent contribution of dominant non-EPT taxa and increase in the prevalence of the dominant functional group. The MAR3 rating dropped to slightly impaired between sampling seasons because of decreases in taxa richness and the Quantitative Similarity Index, and increases in percent contribution of dominant non-EPT taxa and the prevalence of the dominant functional group. Results for individual metrics used in these calculations are shown in Tables 6 through 8.

Macroinvertebrate data analysis using the TX-IBI calculations indicated all sites except SYC3 were rated with a high aquatic life use (Table 3 and Figures 5 and 6) in the spring. SYC3 was classified with an intermediate aquatic life use during both the spring and fall sampling. Four other sites (MRY3, BFC1, MAR1, MAR3) were rated with a high aquatic life use during spring sampling but rated with an intermediate aquatic life use during the fall. All other sites were rated with high aquatic life use during the fall. Since there are naturally occurring seasonal differences in the structure and function of the biological community, sampling results from spring and fall should not be compared to each other, but may be compared year to year on a seasonal basis. The results from all sampled years will be compared seasonally when sampling concludes for this permit term. Results from individual metrics used in the TX-IBI calculations are included in Tables 9 through 11. Macroinvertebrate data are presented in Tables 14 through 19.

Table 2. Macroinvertebrate index scores for samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek, and Marine Creek during 2010

Site	Spring Score	Fall score	Assessment	Score
MRY1			Non-impaired	>75%
MRY2	100%	107%	Slightly impaired	50-75%
MRY3	100%	78%	Moderately impaired	25-49%
BFC1	104%	87%	Severely impaired	<25%
BFC2	89%	87%		
BFC3	87%	93%		
SYC1	87%	87%		
SYC2	91%	93%		
SYC3	80%	62%		
MAR 1	84%	80%		
MAR 2	84%	84%		
MAR 3	89%	64%		

Scores are a percentage compared to the reference site MRY1

Table 3. Texas Index of Biotic Integrity Scores (TX-IBI) for Mary's Creek, Big Fossil Creek, Sycamore Creek, and Marine Creek during 2010

Site	Spring score	Fall score	Aquatic Life Use Rating		Score
MRY1	33	31	Exceptional		>40
MRY2	33	37	High		31-40
MRY3	33	25	Intermediate		21-30
BFC1	35	29	Limited		<21
BFC2	33	31			
BFC3	33	33			
SYC1	31	33			
SYC2	37	35			
SYC3	29	27			
MAR1	31	29			
MAR2	31	31			
MAR3	31	29			

Conclusion

During spring and fall 2010, rapid bioassessments were conducted at 12 sites along four Trinity River tributaries in Fort Worth. Habitat assessment scores were rated in the sub-optimal and marginal categories during both seasons. Macroinvertebrate scores using USEPA protocol metrics indicate macroinvertebrate communities at all sites rated non-impaired during spring sampling. TX-IBI metrics produced ratings at all but one site (SYC3) with high aquatic life use during spring sampling.

During fall sampling, SYC3 was rated as slightly impaired with the USEPA protocol. Utilizing the TX-IBI metric, it scored in the intermediate aquatic life use range. All other sites were rated in the USEPA non-impaired category and indicated high aquatic life use on the TX-IBI. MRY3, BFC1, MAR1, and MAR3 were rated intermediate for aquatic life use in the fall. Lower scores at SYC3 and MAR3 on both the USEPA and TX-IBI rating scales may be attributed to physical changes in the habitat and flow regimes as well as seasonal differences in the structural and functional groups of the macroinvertebrate community.

Table 4: Physico-chemical results for assessments conducted in May 2010.

PARAMETER	STATION											
	MRY1	**MRY2**	**MRY3**	**BFC1**	**BFC2**	**BFC3**	**SYC1**	**SYC2**	**SYC3**	**MAR1**	**MAR2**	**MAR3**
Avg. Width (m)	**14.0**	**10.0**	**23.8**	**7.0**	**18.9**	**17.6**	**18.6**	**14.2**	**7.3**	**7.9**	**8.2**	**3.0**
Depth, Riffle (m)	**0.14**	**0.36**	**0.16**	**0.19**	**0.18**	**0.13**	**0.12**	**0.11**	**0.15**	**0.12**	**0.15**	**0.26**
Depth, Run (m)	**0.16**	**0.37**	**0.20**	**0.32**	**0.16**	**0.29**	**0.16**	**0.22**	**0.28**	**0.35**	**0.21**	**0.20**
Depth, Pool (m)	**---n/a---**	**0.41**	**---n/a---**	**0.44**	**0.41**	**0.27**	**0.83**	**0.40**	**0.32**	**0.56**	**0.30**	**0.22**
Length, Riffle (m)	**32.9**	**28.3**	**65.8**	**13.7**	**6.4**	**7.3**	**21.9**	**1.8**	**55.8**	**7.3**	**6.4**	**21.0**
Length, Run (m)	**28.3**	**44.8**	**45.7**	**33.8**	**11.0**	**17.4**	**18.3**	**21.0**	**31.1**	**12.8**	**17.4**	**13.7**
Length Pool (m)	**---n/a---**	**9.1**	**---n/a---**	**6.4**	**12.8**	**1.8**	**17.4**	**9.1**	**8.2**	**23.8**	**22.9**	**7.3**
Avg. Velocity (m/s)	**0.36**	**0.46**	**0.41**	**0.20**	**0.25**	**0.25**	**0.25**	**0.36**	**0.20**	**0.15**	**0.25**	**0.20**
Water Temperature(ºC)	**21.2**	**20.5**	**21.6**	**25.0**	**25.5**	**24.2**	**19.0**	**18.1**	**19.2**	**22.2**	**22.5**	**22.3**
DO (mg/L)	**8.71**	**8.26**	**7.44**	**9.50**	**8.84**	**9.17**	**6.83**	**7.11**	**6.12**	**9.97**	**10.13**	**8.80**
pH (s.u.)	**7.93**	**7.90**	**7.72**	**8.25**	**8.38**	**8.17**	**7.83**	**7.81**	**7.89**	**8.25**	**8.14**	**7.71**
Conductivity (µS)	**476**	**505**	**620**	**461**	**476**	**476**	**534**	**663**	**691**	**476**	**534**	**620**
Turbidity (NTUs)	**0.96**	**1.28**	**1.57**	**1.32**	**3.67**	**3.23**	**1.11**	**2.71**	**0.83**	**2.17**	**1.62**	**2.33**
NH_3-N (mg/L)	**0.19**	**0.22**	**0.35**	**0.21**	**0.24**	**0.20**	**0.35**	**0.24**	**0.18**	**0.16**	**0.20**	**0.26**
NO_3 -N (mg/L)	**0.17**	**0.21**	**0.09**	**0.07**	**0.01**	**0.10**	**0.00**	**0.00**	**0.02**	**0.13**	**0.20**	**0.69**
PO_4 (mg/L)	**0.04**	**0.10**	**0.25**	**0.01**	**0.08**	**0.17**	**0.04**	**0.09**	**0.04**	**0.16**	**0.08**	**0.05**
E. coli, MPN/100 mL	**27**	**48**	**93**	**6**	**93**	**58**	**78**	**82**	**345**	**184**	**114**	**328**

* n/a = not assessed

Table 5: Physico-chemical results for assessments conducted in October 2010.

PARAMETER	STATION											
	MRY1	**MRY2**	**MRY3**	**BFC1**	**BFC2**	**BFC3**	**SYC1**	**SYC2**	**SYC3**	**MAR1**	**MAR2**	**MAR3**
Avg. Width (m)	**13.1**	**9.4**	**21.9**	**1.8**	**21.9**	**15.5**	**17.4**	**8.2**	**11.9**	**3.0**	**6.7**	**5.5**
Depth, Riffle (m)	**0.12**	**0.14**	**0.05**	**0.08**	**0.18**	**0.11**	**0.11**	**0.09**	**0.17**	**0.05**	**0.14**	**0.14**
Depth, Run (m)	**0.14**	**0.28**	**0.10**	**0.21**	**0.14**	**0.10**	**0.18**	**0.12**	**0.29**	**0.13**	**0.19**	**0.31**
Depth, Pool (m)	**0.22**	**0.29**	**0.12**	**0.41**	**0.34**	**0.25**	**0.61**	**0.43**	**0.49**	**0.26**	**0.39**	**0.32**
Length, Riffle (m)	**6.4**	**28.3**	**12.8**	**10.1**	**8.2**	**6.4**	**28.3**	**2.7**	**32.9**	**9.1**	**50.3**	**21.9**
Length, Run (m)	**64.9**	**82.3**	**17.4**	**35.7**	**22.9**	**92.3**	**17.4**	**46.6**	**14.6**	**14.6**	**21.9**	**12.8**
Length Pool (m)	**14.6**	**13.7**	**8.2**	**2.7**	**22.9**	**9.1**	**21.9**	**9.1**	**27.4**	**6.4**	**39.3**	**6.4**
Avg. Velocity (m/s)	**0.20**	**0.25**	**0.20**	**0.10**	**0.25**	**0.25**	**0.15**	**0.20**	**0.20**	**0.15**	**0.05**	**0.25**
Water Temperature(ºC)	**17.5**	**15.6**	**15.6**	**24.5**	**21.0**	**25.6**	**17.0**	**17.5**	**16.5**	**15.0**	**14.5**	**15.0**
DO (mg/L)	**9.03**	**8.80**	**8.28**	**7.95**	**9.19**	**8.78**	**8.03**	**7.73**	**7.74**	**9.03**	**8.45**	**8.03**
pH (s.u.)	**8.16**	**7.95**	**7.69**	**8.43**	**8.20**	**8.12**	**8.59**	**8.02**	**7.39**	**7.39**	**7.25**	**6.98**
Conductivity (µS)	**519**	**476**	**648**	**310**	**476**	**505**	**519**	**591**	**691**	**648**	**719**	**762**
Turbidity (NTUs)	**0.48**	**1.04**	**--n/a--**	**0.80**	**0.49**	**4.02**	**1.27**	**3.91**	**3.03**	**1.68**	**2.16**	**2.57**
NH_3-N (mg/L)	**0.48**	**0.16**	**0.11**	**0.21**	**0.16**	**0.24**	**0.56**	**0.23**	**0.21**	**0.32**	**0.40**	**0.13**
NO_3-N(mg/L)	**0.02**	**0.00**	**0.07**	**0.03**	**0.01**	**0.43**	**0.00**	**0.40**	**0.34**	**0.16**	**0.48**	**0.71**
PO_4 (mg/L)	**0.00**	**0.03**	**0.00**	**0.02**	**0.01**	**0.05**	**0.00**	**0.10**	**0.02**	**0.14**	**0.30**	**0.00**
E. coli, MPN/100 mL	**13**	**99**	**123**	**228**	**16**	**157**	**37**	**112**	**219**	**105**	**141**	**435**

* n/a = not assessed

Table 6: USEPA bioassessment metric calculations for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in May 2010.

Bioassessment Metrics	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness (Family)	31	30	30	27	22	28	19	25	16	23	27	24
EPT Index (Family)	11	10	10	7	6	10	4	4	6	3	7	5
Community Balance Metrics												
Hilsenhoff Biotic Index (Family)	5.1	4.7	4.8	4.3	4.4	3.4	4.4	4.5	4.6	4.2	4.8	4.5
%Contribution of Dominant non EPT Taxa	43%	36%	32%	12%	22%	73%	14%	16%	19%	30%	24%	24%
EPT/(Chironomidae + EPT) Abundances	0.40	0.52	0.59	0.75	0.67	0.79	0.83	0.75	0.58	0.72	0.70	0.53
Functional Feeding Group Metrics												
Quantitative Similarity Index - Functional Groups	N/A	94%	92%	92%	95%	45%	74%	79%	85%	76%	72%	85%
Prevalence of Dominant Functional Group	58%	58%	59%	65%	55%	79%	48%	51%	65%	48%	86%	60%
%FPOM Collectors (Col + Fil + Min)	82%	88%	90%	88%	82%	97%	91%	88%	97%	94%	94%	97%
Metric Value Comparison with Reference Data	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness (Family)*	-	97%	97%	87%	71%	90%	61%	81%	52%	74%	87%	77%
EPT Index*	-	91%	91%	64%	55%	91%	36%	36%	55%	27%	64%	45%
Community Balance Metrics												
Hilsenhoff Biotic Index (Family)*	-	109%	108%	119%	116%	152%	118%	114%	111%	122%	107%	114%
%Contribution of Dominant non EPT Taxa**	-	119%	134%	355%	200%	59%	316%	276%	228%	145%	182%	180%
EPT/(Chironomid + EPT) Abundances*	-	130%	146%	189%	169%	199%	207%	188%	146%	179%	174%	134%
Functional Feeding Group Metrics												
Prevalence of Dominant Functional Group**	-	99%	98%	89%	106%	73%	119%	114%	89%	120%	67%	96%
%FPOM Collectors (Col + Fil + Min)**	-	93%	91%	93%	100%	84%	89%	92%	84%	87%	87%	84%
*Ratio of the study site to the reference site expressed as a percentage.												
**Ratio of the reference site to the study site expressed as a percentage.												

Table 7: USEPA bioassessment final index scores for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in May 2010.

Bioassessment Scores	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness (Family)	8	8	8	8	6	8	4	6	2	6	8	6
EPT Index (Family)	8	8	8	4	2	8	0	0	2	0	4	2
Community Balance Metrics												
Hilsenhoff Biotic Index (Family)	8	8	8	8	8	8	8	8	8	8	8	8
%Contribution of Dominant non EPT Taxa	3	3	3	6	6	0	6	6	6	3	6	6
EPT/(Chironomidae + EPT) Abundances	3	3	3	6	3	6	6	6	3	3	3	3
Functional Feeding Group Metrics												
Quantitative Similarity Index - Functional Groups	6	6	6	6	6	0	3	6	6	6	3	6
Prevalence of Dominant Functional Group	3	3	3	3	3	3	6	3	3	6	0	3
%FPOM Collectors (Col + Fil + Min)	6	6	6	6	6	6	6	6	6	6	6	6
Total Score	45	45	45	47	40	39	39	41	36	38	38	40
% Comparison to Reference		100%	100%	104%	89%	87%	87%	91%	80%	84%	84%	89%

Table 8: USEPA bioassessment metric calculations for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in October 2010.

Bioassessment Metrics	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness (Family)	29	36	16	24	21	29	23	23	13	18	27	20
EPT Index (Family)	10	11	5	6	6	10	6	6	4	3	6	5
Community Balance Metrics												
Hilsenhoff Biotic Index (Family)	5.0	5.2	5.5	5.5	4.6	5.2	4.8	4.7	5.1	5.3	5.3	4.9
%Contribution of Dominant non EPT Taxa	36%	28%	33%	35%	27%	51%	42%	23%	47%	16%	34%	31%
EPT/(Chironomidae + EPT) Abundances	0.40	0.48	0.31	0.50	0.66	0.38	0.45	0.62	0.47	0.73	0.53	0.48
Functional Feeding Group Metrics												
Quantitative Similarity Index - Functional Groups	N/A	91%	82%	86%	76%	95%	85%	91%	77%	79%	80%	74%
Prevalence of Dominant Functional Group	62%	68%	80%	71%	86%	65%	77%	60%	85%	76%	82%	87%
%FPOM Collectors (Col + Fil + Min)	83%	83%	89%	83%	92%	89%	95%	90%	94%	76%	90%	93%
Metric Value Comparison with Reference Data	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness (Family)*	-	124%	55%	83%	72%	100%	79%	79%	45%	62%	93%	69%
EPT Index*	-	110%	50%	60%	60%	100%	60%	60%	40%	30%	60%	50%
Community Balance Metrics												
Hilsenhoff Biotic Index (Family)*	-	96%	92%	92%	108%	96%	105%	108%	99%	94%	96%	102%
%Contribution of Dominant non EPT Taxa**	-	127%	108%	103%	133%	69%	85%	156%	76%	224%	103%	114%
EPT/(Chironomid + EPT) Abundances*	-	121%	78%	125%	165%	94%	112%	156%	118%	182%	132%	120%
Functional Feeding Group Metrics												
Prevalence of Dominant Functional Group**	-	91%	78%	87%	72%	95%	81%	104%	73%	82%	76%	71%
%FPOM Collectors (Col + Fil + Min)**	-	100%	93%	101%	91%	94%	88%	93%	89%	110%	93%	90%
*Ratio of the study site to the reference site expressed as a percentage.												
**Ratio of the reference site to the study site expressed as a percentage.												

Table 9: USEPA bioassessment final index scores for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in October 2010.

Bioassessment Scores	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness (Family)	8	8	4	6	6	8	6	6	2	4	8	4
EPT Index (Family)	8	8	2	4	4	8	4	4	0	0	4	2
Community Balance Metrics												
Hilsenhoff Biotic Index (Family)	8	8	8	8	8	8	8	8	8	8	8	8
%Contribution of Dominant non EPT Taxa	3	6	3	3	6	0	3	6	3	6	3	3
EPT/(Chironomidae + EPT) Abundances	3	3	3	3	3	3	3	3	3	3	3	3
Functional Feeding Group Metrics												
Quantitative Similarity Index - Functional Groups	6	6	6	6	6	6	6	6	6	6	6	3
Prevalence of Dominant Functional Group	3	3	3	3	0	3	3	3	0	3	0	0
%FPOM Collectors (Col + Fil + Min)	6	6	6	6	6	6	6	6	6	6	6	6
Total Score	45	48	35	39	39	42	39	42	28	36	38	29
% Comparison to Reference		107%	78%	87%	87%	93%	87%	93%	62%	80%	84%	64%

Table 10: TX-IBI metric calculations for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in May 2010.

TX-IBI metrics	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness	31	30	30	27	22	28	19	25	16	23	27	24
Diptera Taxa	6	6	6	6	5	5	4	4	4	6	6	7
Ephemeroptera taxa	4	3	3	2	1	4	1	1	1	1	3	1
Intolerant taxa	14	13	14	12	11	13	7	9	8	8	11	10
% EPT Taxa	33.7%	43.6%	55.2%	60.5%	51.1%	19.5%	75.3%	59.9%	44.7%	47.6%	60.5%	37.0%
%Chironomidae	50.7%	40.5%	39.2%	19.7%	24.7%	5.1%	15.7%	19.9%	32.0%	18.9%	26.3%	32.2%
% Tolerant Taxa	1.0%	0.9%	0.6%	0.6%	1.6%	0.5%	1.7%	4.1%	3.5%	1.2%	3.8%	1.2%
% Grazers (scrapers)	2.4%	2.2%	1.7%	3.4%	0.6%	0.6%	3.8%	9.1%	0.6%	2.6%	1.5%	0.4%
% Gatherers (collectors)	57.7%	58.2%	59.0%	64.8%	54.6%	18.2%	43.1%	50.6%	64.9%	45.7%	85.8%	60.3%
% Filterers	23.9%	29.8%	30.6%	23.0%	27.2%	79.1%	48.3%	37.8%	32.1%	47.9%	8.1%	36.6%
% Dominance (3 taxa)	71.4%	73.2%	81.6%	70.0%	64.8%	90.2%	84.7%	66.9%	66.0%	75.5%	86.0%	71.1%

Table 11: TX-IBI scores for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in May 2010.

TX-IBI Scores	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness	3	3	3	3	3	3	3	3	1	3	3	3
Diptera Taxa	3	3	3	3	3	3	3	3	3	3	3	3
Ephemeroptera taxa	3	3	3	3	1	3	1	1	1	1	3	1
Intolerant taxa	5	5	5	5	5	5	3	5	3	3	5	5
% EPT Taxa	5	5	5	5	5	3	5	5	5	5	5	5
%Chironomidae	1	1	1	3	1	3	3	3	1	3	1	1
% Tolerant Taxa	3	3	3	3	3	3	3	3	3	3	3	3
% Grazers (scrapers)	1	1	1	1	1	1	1	3	1	1	1	1
% Gatherers (collectors)	5	5	5	5	5	5	5	5	5	5	5	5
% Filterers	3	3	3	3	3	3	3	3	3	3	1	3
% Dominance (3 taxa)	1	1	1	1	3	1	1	3	3	1	1	1
Total Score	33	33	33	35	33	33	31	37	29	31	31	31
Aquatic Life Use Rating	High	High	High	High	High	High	High	High	Intermediate	High	High	High

Table 12: TX-IBI metric calculations for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in October 2010.

TX-IBI Metrics	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness	29	36	16	24	21	29	23	23	13	18	27	20
Diptera Taxa	4	7	4	5	5	5	5	6	5	4	7	5
Ephemeroptera taxa	3	5	2	3	3	4	2	2	2	1	3	2
Intolerant taxa	12	15	8	10	10	13	10	9	5	6	9	7
% EPT Taxa	27.4%	31.9%	28.5%	39.7%	56.3%	35.1%	36.7%	43.1%	44.8%	55.6%	45.2%	35.5%
%Chironomidae	41.2%	34.4%	63.1%	40.1%	29.2%	58.1%	45.0%	26.1%	50.6%	20.8%	40.3%	38.5%
% Tolerant Taxa	10.5%	16.8%	5.1%	12.8%	4.3%	2.5%	4.0%	9.1%	2.3%	15.3%	9.1%	6.8%
% Grazers (scrapers)	3.9%	1.2%	3.9%	0.4%	2.3%	2.4%	0.6%	0.8%	0.2%	10.7%	2.8%	2.0%
% Gatherers (collectors)	62.1%	68.4%	80.0%	71.4%	86.5%	65.2%	76.7%	59.5%	84.8%	75.5%	82.3%	87.2%
% Filterers	21.3%	15.0%	9.3%	11.1%	5.4%	23.7%	18.6%	30.6%	9.5%	0.5%	7.9%	5.6%
% Dominance (3 taxa)	58.6%	57.8%	77.2%	73.6%	84.7%	77.1%	72.5%	57.7%	86.8%	81.3%	76.3%	74.9%

Table 13: TX-IBI scores for macroinvertebrate community samples collected from Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in October 2010.

TX-IBI Score	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Taxa Richness	3	5	1	3	3	3	3	3	1	3	3	3
Diptera Taxa	3	3	3	3	3	3	3	3	3	3	3	3
Ephemeroptera taxa	3	5	3	3	3	3	3	3	3	1	3	3
Intolerant taxa	5	5	3	5	5	5	5	5	3	3	5	3
% EPT Taxa	3	5	3	5	5	5	5	5	5	5	5	5
%Chironomidae	1	1	1	1	1	1	1	1	1	3	1	1
% Tolerant Taxa	1	1	3	1	3	3	3	3	3	1	3	3
% Grazers (scrapers)	1	1	1	1	1	1	1	1	1	3	1	1
% Gatherers (collectors)	5	5	5	5	5	5	5	5	5	5	5	5
% Filterers	3	3	1	1	1	3	3	3	1	1	1	1
% Dominance (3 taxa)	3	3	1	1	1	1	1	3	1	1	1	1
Total Score	31	37	25	29	31	33	33	35	27	29	31	29
Aquatic Life Use Rating	High	High	Intermediate	Intermediate	High	High	High	High	Intermediate	Intermediate	High	Intermediate

Table 14: Sum of individual macroinvertebrate abundances for three replicate samples collected at each sample site along Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in May 2010.

Order	Tol	Family	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Turbellaria	4		635	382	100	359	195	160	113	24	10	1	0	13
Nematoda	5		1	2	3	0	2	1	0	1	0	7	1	4
Oligochaeta	8	Lumbriculidae	0	1	1	0	0	1	0	0	0	3	0	0
	10	Tubificidae	25	36	9	3	17	61	16	53	18	0	27	12
	9	Naididae	14	11	4	3	1	13	45	47	74	25	38	34
Hirudinea	8		21	5	6	4	2	1	5	5	1	48	45	54
Gastropoda	9	Physidae	0	0	0	0	0	0	0	25	7	17	10	0
	7	Planorbidae	4	0	0	0	0	0	2	3	0	0	3	0
	7	Lymnaeidae	0	0	0	0	0	0	1	0	0	0	0	0
	7	Ancylidae	2	1	1	5	0	0	2	12	0	0	3	3
Bivalvia	6	Corbiculidae	31	22	2	8	5	9	1	13	0	1	0	16
	4	Sphaeridae	41	0	0	9	0	2	0	1	0	2	1	0
Decapoda	5	Cambaridae	0	1	1	0	0	0	0	1	0	0	1	0
Amphipoda	8	Talitridae	213	10	4	65	0	38	1	10	0	3	15	27
Ephemeroptera	4	Baetidae	696	1101	1171	3411	331	1760	930	846	880	999	1203	1020
	5	Caenidae	2	0	0	3	0	7	0	0	0	0	2	0
	4	Heptageniidae	2	2	3	0	0	1	0	0	0	0	8	0
	4	Tricorythidae	105	1	1	0	0	3	0	0	0	0	0	0
Trichoptera	2	Helicopsychidae	26	9	8	8	4	66	0	0	3	0	4	8
	4	Hydropsychidae	1692	1411	1239	672	187	564	1658	721	353	639	58	495
	4	Hydroptilidae	170	140	73	239	3	16	135	239	6	76	4	7
	3	Leptoceridae	2	4	4	1	2	17	0	0	0	0	0	0
	3	Philopotamidae	178	302	201	101	98	226	25	27	21	0	1	3
	0	Odontoceridae	10	3	1	0	0	0	0	0	0	0	0	0
	6	Polycentropodidae	2	1	3	0	0	2	0	0	12	0	0	0

Table 14: Sum of individual macroinvertebrate abundances for three replicate samples collected at each sample site along Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in May 2010, continued.

Order	Tol	Family	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Anisoptera	1	Gomphidae	0	0	0	1	0	0	0	0	0	0	0	0
Zygoptera	9	Coenagrionidae	47	14	14	38	0	1	0	1	0	0	5	4
	5	Calopterygidae	0	0	0	1	0	0	0	0	0	0	0	0
Hemiptera	9	Corixidae	0	0	0	0	1	0	0	0	0	0	0	0
	5	Gerridae	0	0	0	0	0	0	0	0	0	0	0	1
	5	Hebridae	0	0	0	0	0	1	0	2	0	0	3	0
	5	Notonectidae	0	0	0	0	1	0	1	0	0	0	0	0
	5	Veliidae	0	0	0	0	0	0	0	0	0	1	0	0
Coleoptera	4	Carabidae	0	0	0	0	1	0	0	1	0	1	0	0
	5	Chrysomelidae	0	0	0	0	1	0	0	1	0	1	0	0
	2	Elmidae	108	249	50	47	26	20	61	24	11	6	9	93
	5	Hydrophilidae	32	3	2	3	0	0	0	0	0	3	0	0
Lepidoptera	4	Pyralidae	4	6	13	4	0	1	0	0	0	0	3	11
Diptera	5	Ceratopogonidae	33	7	0	4	0	2	0	0	0	0	0	3
	6	Empididae	17	36	7	3	0	0	0	0	0	4	0	1
	3	Simuliidae	106	300	57	898	42	10014	78	394	543	1082	111	1002
	7	Stratiomyidae	0	0	0	0	0	0	0	0	0	1	1	0
	4	Tipulidae	0	0	1	0	1	0	0	0	0	0	1	1
	6	Chironominae	3716	2482	1587	824	266	455	502	482	460	596	504	926
	6	Tanypodinae	568	203	271	221	12	127	53	41	44	73	40	21
	6	Orthocladiinae	50	73	59	399	24	109	19	87	410	13	13	386
Number of Individuals			8553	6818	4896	7334	1222	13678	3648	3061	2853	3602	2114	4145

Table 15: Sum of individual macroinvertebrate abundances for three replicate samples collected at each sample site along Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in October 2010.

Order	Tol	Family	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Turbellaria	4		9	3	0	9	7	26	9	30	0	0	0	0
Nematoda	5		0	0	0	0	0	1	0	3	0	0	3	0
Oligochaeta	8	Lumbriculidae	0	7	0	2	0	0	0	1	0	3	8	4
	10	Tubificidae	5	38	0	8	4	4	6	64	0	2	33	59
	9	Naididae	4	30	4	5	5	3	27	9	0	0	41	12
Hirudinea	8		0	1	0	3	1	4	1	12	0	24	2	12
Gastropoda	9	Physidae	8	5	0	0	8	7	2	0	1	58	24	0
	7	Planorbidae	7	1	0	0	0	8	1	0	0	2	1	0
	7	Lymnaeidae	0	1	1	0	0	2	0	0	0	0	0	0
	7	Ancylidae	0	0	1	0	0	0	1	0	0	0	1	2
Bivalvia	6	Corbiculidae	4	7	0	12	1	0	6	3	1	0	0	2
	4	Sphaeridae	43	4	0	3	3	11	2	31	0	0	1	0
Decapoda	5	Cambaridae	0	0	0	2	0	0	0	0	0	0	0	0
Amphipoda	8	Talitridae	2	2	0	1	0	1	0	0	0	0	4	11
Ephemeroptera	4	Baetidae	58	227	57	216	463	209	210	146	155	314	482	439
	5	Caenidae	12	7	0	6	5	64	3	1	2	0	4	3
	4	Heptageniidae	0	3	0	0	2	3	0	0	0	0	2	0
	2	Leptophlebiidae	0	2	0	0	0	0	0	0	0	0	0	0
	4	Tricorythidae	8	2	1	12	0	4	0	0	0	0	0	0
Trichoptera	1	Brachycentridae	0	3	0	0	0	0	0	0	0	0	0	0
	2	Helicopsychidae	10	1	0	0	0	27	2	3	0	0	0	4
	4	Hydropsychidae	59	33	15	47	17	445	81	70	19	0	73	85
	4	Hydroptilidae	12	5	12	3	11	13	1	5	0	1	9	26
	3	Leptoceridae	2	1	0	0	0	1	0	0	0	0	0	0
	3	Philopotamidae	96	134	16	23	14	123	121	188	18	1	28	0
	0	Odontoceridae	1	0	0	0	0	0	0	0	0	0	0	0
	6	Polycentropodidae	2	0	0	0	0	2	0	0	0	0	0	0

Table 15: Sum of individual macroinvertebrate abundances for three replicate samples collected at each sample site along Mary's Creek, Big Fossil Creek, Sycamore Creek and Marine Creek in October 2010, continued.

Order	Tol	Family	MRY1	MRY2	MRY3	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3	MAR1	MAR2	MAR3
Anisoptera	1	Gomphidae	1	3	0	0	0	0	0	0	0	3	0	0
	9	Libellulidae	0	0	0	0	0	0	0	1	0	0	0	0
Zygoptera	9	Coenagrionidae	82	144	14	86	22	49	10	13	9	26	23	36
	9	Lestidae	1	0	0	0	0	0	0	0	0	1	0	0
Hemiptera	10	Belostomatidae	0	3	0	0	0	0	0	0	0	0	0	0
	5	Veliidae	4	1	1	0	0	0	0	0	0	0	0	0
Coleoptera	5	Dytiscidae	1	0	0	0	0	0	0	0	0	1	0	0
	2	Elmidae	123	163	5	18	64	18	138	122	5	10	37	245
	5	Hydrophilidae	2	5	0	2	0	15	0	0	0	2	5	0
Megaloptera	5	Corydalidae	0	3	0	0	0	0	0	0	0	0	0	0
Lepidoptera	4	Pyralidae	0	0	2	1	2	1	1	0	0	0	2	21
Diptera	5	Ceratopogonidae	1	2	0	4	1	1	2	5	1	0	2	0
	6	Sciomyzidae	0	0	0	0	0	0	0	1	0	0	1	1
	3	Simuliidae	0	16	2	1	14	23	2	1	3	2	3	1
	7	Stratiomyidae	0	1	0	0	0	0	0	0	0	0	2	0
	7	Tabanidae	0	2	0	0	0	0	0	0	0	0	0	0
	6	Chironominae	337	367	117	268	243	1304	478	219	202	90	455	489
	6	Tanypodinae	16	34	7	27	20	123	23	22	14	18	55	10
	6	Orthocladiinae	38	49	100	15	2	47	12	9	3	10	23	105
Number of Individuals			948	1310	355	774	909	2539	1139	959	433	568	1324	1567

Table 16: Macroinvertebrate abundances for May samples collected at each site along Mary's Creek and Big Fossil Creek in 2010 (three replicate samples per site).

Order	Family	MRY1	MRY1	MRY1	MRY2	MRY2	MRY2	MRY3	MRY3	MRY3	BFC1	BFC1	BFC1	BFC2	BFC2	BFC2	BFC3	BFC3	BFC3
Turbellaria		121	423	91	150	107	81	44	18	38	88	22	249	37	47	111	72	53	35
Nematoda		0	0	1	0	0	0	2	0	1	0	0	0	0	0	2	0	0	1
Oligochaeta	Lumbriculidae	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Tubificidae	12	11	2	29	0	0	7	0	2	1	1	1	0	7	10	1	1	59
	Naididae	7	4	3	9	0	0	2	0	2	2	0	1	1	0	0	1	2	10
Hirudinea		2	18	1	1	0	0	4	1	1	0	3	1	0	1	1	0	0	1
Gastropoda	Physidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Planorbidae	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ancylidae	0	2	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0
Bivalvia	Corbiculidae	7	18	6	19	2	0	1	0	1	0	0	8	0	3	2	1	0	8
	Sphaeridae	24	13	4	0	0	0	0	0	0	0	1	8	0	0	0	0	0	2
Decapoda	Cambaridae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Amphipoda	Talitridae	210	3	0	7	0	0	3	0	1	19	20	26	0	0	0	7	19	12
Ephemeroptera	Baetidae	334	205	157	537	185	22	357	149	665	717	528	2166	91	62	178	802	465	493
	Caenidae	1	0	1	0	0	0	0	0	0	1	0	2	0	0	0	1	4	2
	Heptageniidae	1	0	1	0	0	0	2	0	1	0	0	0	0	0	0	0	1	0
	Leptophebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tricorythidae	98	6	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2
Trichoptera	Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae	12	7	7	0	1	0	8	0	0	0	0	8	0	0	4	41	20	5
	Hydropsychidae	35	1308	349	465	296	122	528	185	526	177	31	464	4	51	132	377	84	103
	Hydroptilidae	8	107	55	82	29	3	26	0	47	9	0	230	0	0	3	1	4	11
	Leptoceridae	0	1	1	0	0	0	4	0	0	0	0	1	0	1	1	10	2	5
	Philopotamidae	5	158	15	22	186	55	39	57	105	8	3	90	7	17	74	162	7	57
	Odontoceridae	5	4	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae	0	2	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	2
Anisoptera	Gomphidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zygoptera	Coenagrionidae	27	17	3	4	1	2	7	2	5	4	1	33	0	0	0	1	0	0
	Lestidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hemiptera	Belostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	Gerridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hebridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Notonectidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Veliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	Carabidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chrysomelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Dytiscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elmidae	14	38	56	138	55	31	25	9	16	0	31	16	16	8	2	15	3	2
	Hydrophilidae	22	5	5	1	0	0	2	0	0	1	0	2	0	0	0	0	0	0
Megaloptera	Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidoptera	Pyralidae	1	1	2	0	0	0	6	4	3	0	2	2	0	0	0	0	1	0
Diptera	Ceratopogonidae	20	11	2	3	2	2	0	0	0	1	0	3	0	0	0	0	1	1
	Empididae	1	9	7	7	22	3	4	0	3	1	0	2	0	0	0	0	0	0
	Sciomyzidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Simuliidae	6	65	35	26	214	52	8	12	37	277	250	371	7	5	30	8844	1153	17
	Stratiomyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tipulidae	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
	Chironominae	210	2478	1028	582	373	811	716	295	576	78	14	732	20	24	222	130	102	223
	Tanypodinae	367	146	55	17	16	27	143	61	67	51	42	128	7	2	3	30	49	48
	Orthocladiinae	23	15	12	11	18	11	33	8	18	19	72	308	0	1	23	53	6	50
Number of Individuals		1577	5075	1901	2113	1508	1222	1975	802	2119	1454	1022	4858	190	231	800	10549	1979	1150

Table 17: Macroinvertebrate abundances for May samples collected at each site along Sycamore Creek and Marine Creek in 2010 (three replicate samples per site).

Order	Family	SYC1	SYC1	SYC1	SYC2	SYC2	SYC2	SYC3	SYC3	SYC3	MAR1	MAR1	MAR1	MAR2	MAR2	MAR2	MAR3	MAR3	MAR3
Turbellaria		37	34	42	17	6	1	5	4	1	0	1	0	0	0	0	6	3	4
Nematoda		0	0	0	1	0	0	0	0	0	2	5	0	0	0	1	0	4	0
Oligochaeta	Lumbriculidae	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0
	Tubificidae	3	1	12	3	50	0	14	4	0	0	0	0	17	3	7	6	6	0
	Naididae	2	4	39	0	1	46	10	54	10	9	15	1	35	1	2	1	7	26
Hirudinea		5	0	0	1	4	0	1	0	0	27	3	18	20	4	21	28	20	6
Gastropoda	Physidae	0	0	0	2	21	2	6	0	1	7	5	5	4	1	5	0	0	0
	Planorbidae	1	1	0	1	2	0	0	0	0	0	0	0	3	0	0	0	0	0
	Lymnaeidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ancylidae	2	0	0	1	11	0	0	0	0	0	0	0	1	0	2	0	1	2
Bivalvia	Corbiculidae	0	1	0	2	11	0	0	0	0	1	0	0	0	0	0	7	7	2
	Sphaeridae	0	0	0	0	1	0	0	0	0	0	2	0	1	0	0	0	0	0
Decapoda	Cambaridae	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
Amphipoda	Talitridae	0	0	1	1	9	0	0	0	0	1	0	2	1	6	8	0	8	19
Ephemeroptera	Baetidae	221	238	471	116	50	680	471	242	167	287	632	80	280	333	590	223	478	319
	Caenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
	Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0
	Leptophlebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tricorythidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae	0	0	0	0	0	0	0	0	3	0	0	0	3	0	1	2	1	5
	Hydropsychidae	275	474	909	277	22	422	214	124	15	25	590	24	34	22	2	159	263	73
	Hydroptilidae	0	6	129	3	2	234	5	1	0	6	67	3	3	1	0	0	0	7
	Leptoceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Philopotamidae	2	12	11	14	1	12	6	15	0	0	0	0	1	0	0	0	3	0
	Odontoceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae	0	0	0	0	0	0	11	0	1	0	0	0	0	0	0	0	0	0
Anisoptera	Gomphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zygoptera	Coenagrionidae	0	0	0	1	0	0	0	0	0	0	0	0	3	2	0	0	4	0
	Lestidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemiptera	Belostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gerridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Hebridae	0	0	0	0	2	0	0	0	0	0	0	0	1	0	2	0	0	0
	Notonectidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Veliidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Coleoptera	Carabidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chrysomelidae	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Dytiscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elmidae	25	34	2	21	3	0	6	5	0	6	0	0	4	2	3	31	58	4
	Hydrophilidae	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Megaloptera	Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidoptera	Pyralidae	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	6	2	3
Diptera	Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0
	Empididae	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	1	0
	Sciomyzidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Simuliidae	10	10	58	59	2	333	440	99	4	60	878	144	91	14	6	251	629	122
	Stratiomyidae	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
	Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Chironominae	60	68	374	122	32	328	295	116	49	29	558	9	382	78	44	180	444	302
	Tanypodinae	11	3	39	9	4	28	20	11	13	18	23	32	10	23	7	7	8	6
	Orthocladiinae	0	3	16	0	1	86	129	73	208	1	12	0	4	4	5	39	205	142
Number of Individuals		654	891	2103	652	235	2173	1633	748	472	484	2795	322	911	495	708	948	2153	1044

Table 18: Macroinvertebrate abundances for October samples collected at each site along Mary's Creek and Big Fossil Creek in 2010 (three replicate samples per site).

Order	Family	MRY1	MRY1	MRY1	MRY2	MRY2	MRY2	MRY3	MRY3	MRY3	BFC1	BFC1	BFC1	BFC2	BFC2	BFC2	BFC3	BFC3	BFC3
Turbellaria		3	1	5	0	1	2	0	0	0	8	1	0	1	3	3	25	1	0
Nematoda		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Oligochaeta	Lumbriculidae	0	0	0	6	0	1	0	0	0	1	1	0	0	0	0	0	0	0
	Tubificidae	5	0	0	26	6	6	0	0	0	8	0	0	1	0	3	1	0	3
	Naididae	4	0	0	7	23	0	0	1	3	5	0	0	0	0	5	1	0	2
Hirudinea		0	0	0	1	0	0	0	0	0	3	0	0	0	0	1	0	3	1
Gastropoda	Physidae	1	4	3	3	2	0	0	0	0	0	0	0	6	0	2	1	0	6
	Planorbidae	2	3	2	0	1	0	0	0	0	0	0	0	0	0	0	1	0	7
	Lymnaeidae	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0
	Ancylidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Bivalvia	Corbiculidae	4	0	0	7	0	0	0	0	0	4	8	0	0	0	1	0	0	0
	Sphaeridae	33	10	0	0	3	1	0	0	0	3	0	0	2	0	1	4	0	7
Decapoda	Cambaridae	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Amphipoda	Talitridae	1	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1
Ephemeroptera	Baetidae	43	14	1	82	58	83	4	1	52	171	19	26	53	55	355	121	51	37
	Caenidae	2	4	6	1	6	0	0	0	0	2	3	1	4	1	0	4	15	45
	Heptageniidae	0	0	0	2	1	0	0	0	0	0	0	0	0	2	0	0	0	3
	Leptophlebiidae	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tricorythidae	8	0	0	0	0	1	1	0	0	11	0	1	0	0	0	0	2	2
Trichoptera	Brachycentridae	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae	5	4	1	0	1	0	0	0	0	0	0	0	0	0	0	18	0	9
	Hydropsychidae	31	16	12	5	17	11	0	0	15	30	7	10	6	6	5	427	16	2
	Hydroptilidae	10	1	1	0	5	0	0	1	11	2	1	0	2	0	9	5	3	5
	Leptoceridae	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	Philopotamidae	30	48	18	66	44	22	2	1	13	22	0	1	3	5	6	116	5	2
	Odontoceridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Anisoptera	Gomphidae	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zygoptera	Coenagrionidae	41	30	11	39	70	30	5	1	8	57	12	17	6	6	10	0	12	37
	Lestidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemiptera	Belostomatidae	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gerridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hebridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Notonectidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Veliidae	4	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0
Coleoptera	Carabidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chrysomelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dytiscidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elmidae	56	17	50	3	87	72	1	2	2	9	5	4	21	22	21	1	15	2
	Hydrophilidae	1	1	0	5	0	0	0	0	0	2	0	0	0	0	0	0	5	10
Megaloptera	Corydalidae	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
Lepidoptera	Pyralidae	0	0	0	0	0	0	0	1	1	1	0	0	2	0	0	0	0	1
Diptera	Ceratopogonidae	1	0	0	0	1	1	0	0	0	4	0	0	0	0	1	0	0	1
	Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Simuliidae	0	0	0	4	11	1	0	0	2	0	0	1	0	9	5	22	1	0
	Stratiomyidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chironominae	224	63	50	109	164	72	22	14	81	144	47	77	48	82	113	632	92	580
	Tanypodinae	6	5	5	14	13	4	3	0	4	21	3	3	5	6	9	68	27	28
	Orthocladiinae	38	0	0	4	20	4	21	44	35	10	5	0	1	0	1	9	7	31
Number of Individuals		559	222	167	388	543	320	59	66	230	521	112	141	161	197	551	1460	257	823

Table 19: Macroinvertebrate abundances for October samples collected at each site along Sycamore Creek and Marine Creek in 2010 (three replicate samples per site).

Order	Family	MRY1	MRY1	MRY1	MRY2	MRY2	MRY2	MRY3	MRY3	MRY3	BFC1	BFC1	BFC1	BFC2	BFC2	BFC2	BFC3	BFC3	BFC3
Turbellaria		3	1	5	0	1	2	0	0	0	8	1	0	1	3	3	25	1	0
Nematoda		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Oligochaeta	Lumbriculidae	0	0	0	6	0	1	0	0	0	1	1	0	0	0	0	0	0	0
	Tubificidae	5	0	0	26	6	6	0	0	0	8	0	0	1	0	3	1	0	3
	Naididae	4	0	0	7	23	0	0	1	3	5	0	0	0	0	5	1	0	2
Hirudinea		0	0	0	1	0	0	0	0	0	3	0	0	0	0	1	0	3	1
Gastropoda	Physidae	1	4	3	3	2	0	0	0	0	0	0	0	6	0	2	1	0	6
	Planorbidae	2	3	2	0	1	0	0	0	0	0	0	0	0	0	0	1	0	7
	Lymnaeidae	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0
	Ancylidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Bivalvia	Corbiculidae	4	0	0	7	0	0	0	0	0	4	8	0	0	0	1	0	0	0
	Sphaeridae	33	10	0	0	3	1	0	0	0	3	0	0	2	0	1	4	0	7
Decapoda	Cambaridae	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Amphipoda	Talitridae	1	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1
Ephemeroptera	Baetidae	43	14	1	82	58	83	4	1	52	171	19	26	53	55	355	121	51	37
	Caenidae	2	4	6	1	6	0	0	0	0	2	3	1	4	1	0	4	15	45
	Heptageniidae	0	0	0	2	1	0	0	0	0	0	0	0	0	2	0	0	0	3
	Leptophlebiidae	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tricorythidae	8	0	0	0	0	1	1	0	0	11	0	1	0	0	0	0	2	2
Trichoptera	Brachycentridae	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae	5	4	1	0	1	0	0	0	0	0	0	0	0	0	0	18	0	9
	Hydropsychidae	31	16	12	5	17	11	0	0	15	30	7	10	6	6	5	427	16	2
	Hydroptilidae	10	1	1	0	5	0	0	1	11	2	1	0	2	0	9	5	3	5
	Leptoceridae	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	Philopotamidae	30	48	18	66	44	22	2	1	13	22	0	1	3	5	6	116	5	2
	Odontoceridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Anisoptera	Gomphidae	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zygoptera	Coenagrionidae	41	30	11	39	70	30	5	1	8	57	12	17	6	6	10	0	12	37
	Lestidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemiptera	Belostomatidae	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gerridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hebridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Notonectidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Veliidae	4	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0
Coleoptera	Carabidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chrysomelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dytiscidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elmidae	56	17	50	3	87	72	1	2	2	9	5	4	21	22	21	1	15	2
	Hydrophilidae	1	1	0	5	0	0	0	0	0	2	0	0	0	0	0	0	5	10
Megaloptera	Corydalidae	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
Lepidoptera	Pyralidae	0	0	0	0	0	0	0	1	1	1	0	0	2	0	0	0	0	1
Diptera	Ceratopogonidae	1	0	0	0	1	1	0	0	0	4	0	0	0	0	1	0	0	1
	Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Simuliidae	0	0	0	4	11	1	0	0	2	0	0	1	0	9	5	22	1	0
	Stratiomyidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chironominae	224	63	50	109	164	72	22	14	81	144	47	77	48	82	113	632	92	580
	Tanypodinae	6	5	5	14	13	4	3	0	4	21	3	3	5	6	9	68	27	28
	Orthocladiinae	38	0	0	4	20	4	21	44	35	10	5	0	1	0	1	9	7	31
Number of Individuals		559	222	167	388	543	320	59	66	230	521	112	141	161	197	551	1460	257	823

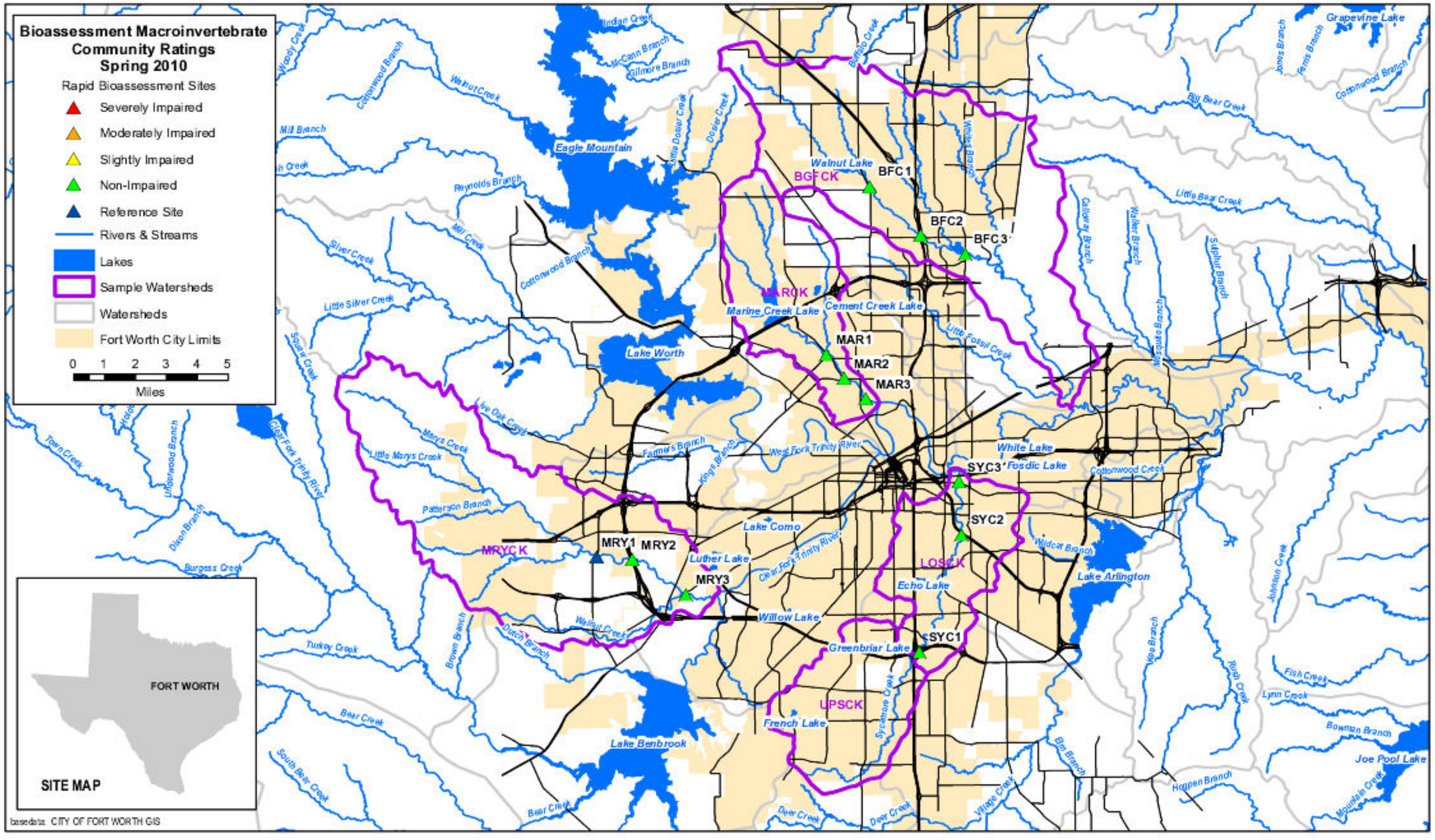


Figure 3. USEPA macroinvertebrate community ratings, Spring 2010.

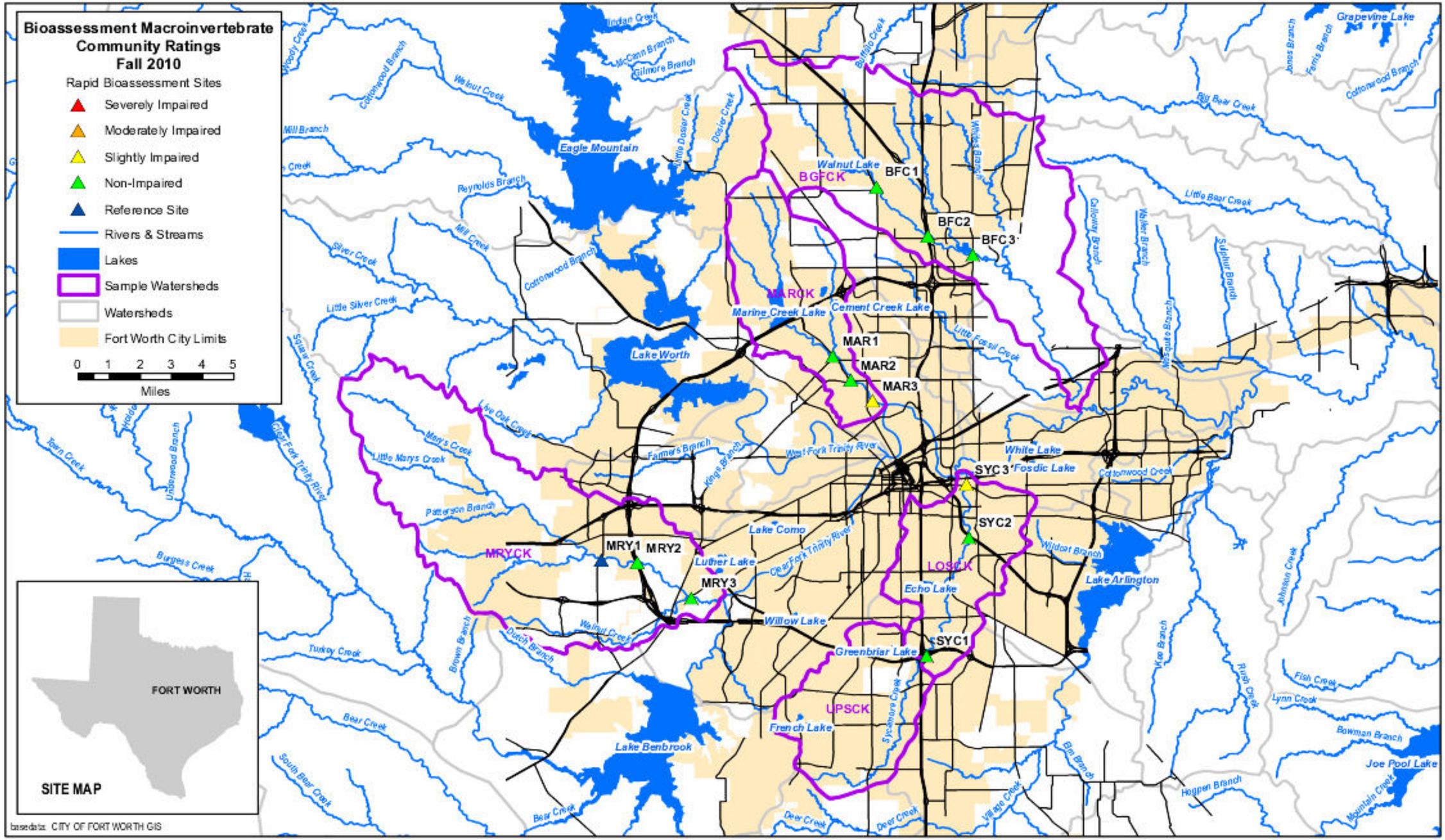


Figure 4. USEPA macroinvertebrate community ratings, Fall 2010.

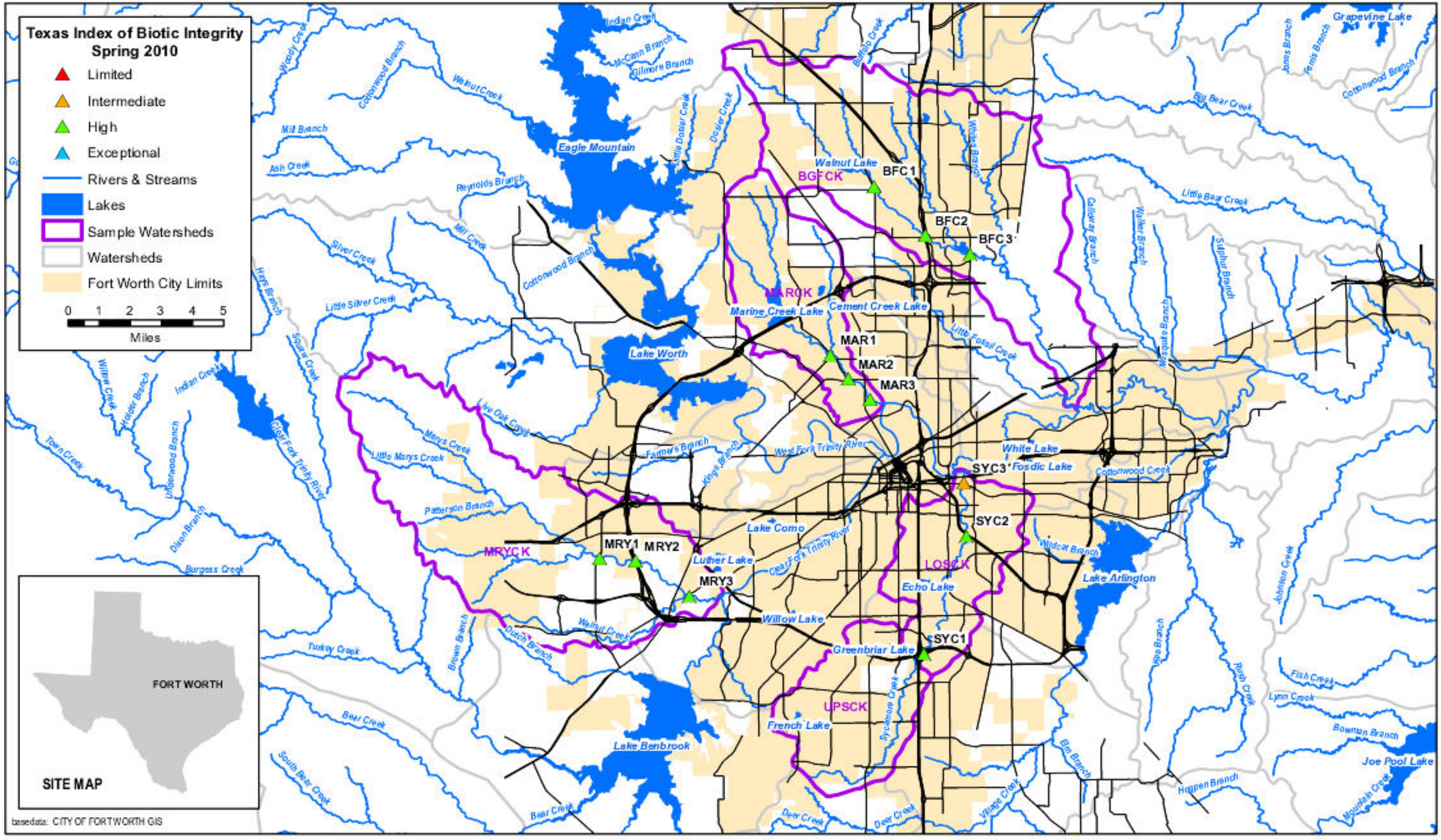


Figure 5. TX-IBI aquatic life use ratings, Spring 2010.

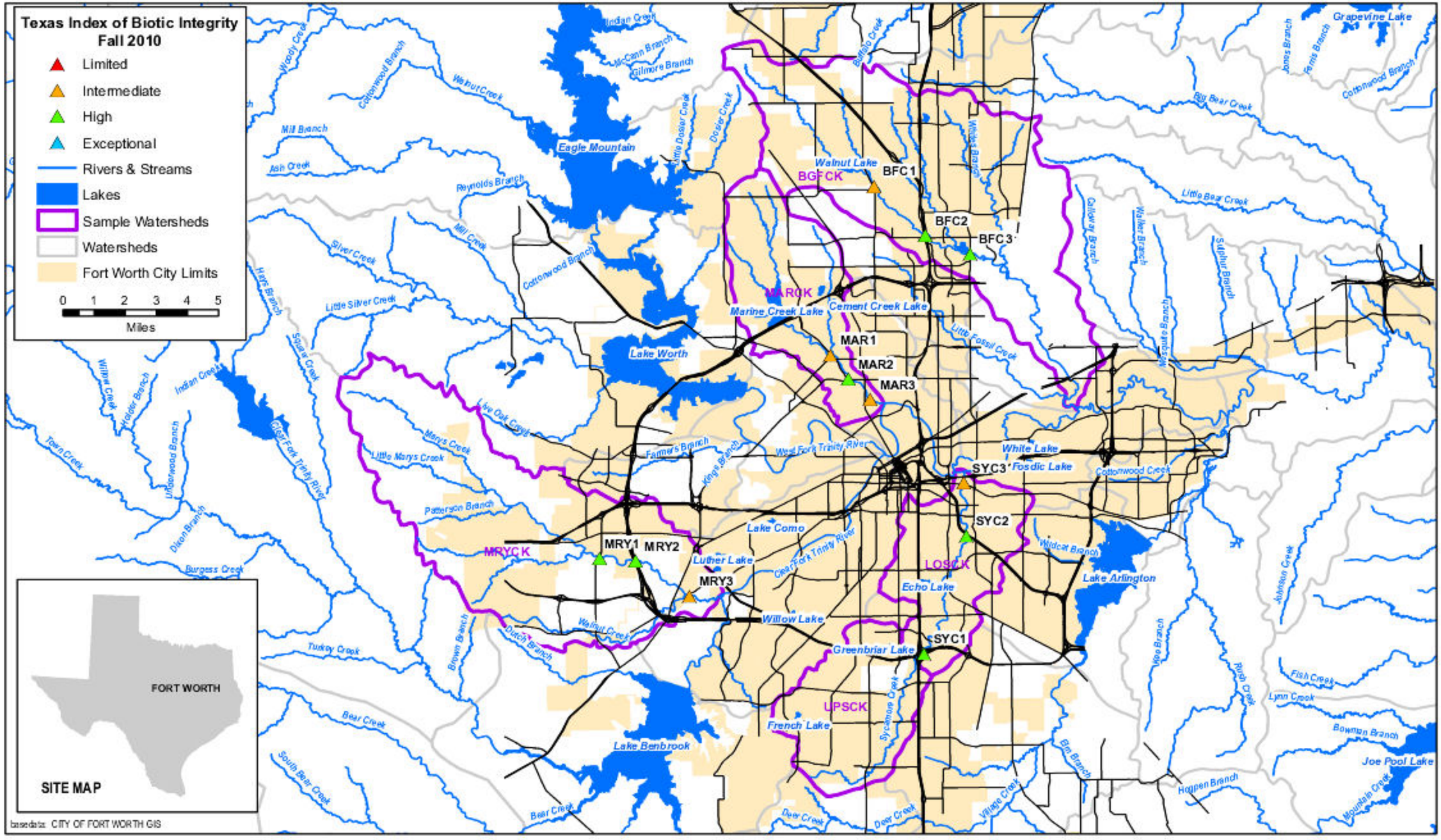


Figure 6. TX-IBI aquatic life use ratings, Fall 2010.