Missouri Department of Natural Resources

Biological Assessment Study

Third Fork of the Platte River
Andrew, Buchanan, and DeKalb Counties

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Prepared for:

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1.0 Introduction

At the request of the Missouri Department of Natural Resources (**MDNR**), Water Pollution Branch (**WPB**), the Environmental Services Program (**ESP**), Water Quality Monitoring Section (**WQMS**) conducted a macroinvertebrate biological assessment and stream habitat study on the Third Fork of the Platte River in Andrew, Buchanan, and DeKalb Counties, Missouri. The stream is currently on the 2002 303(d) list for impacts from sediment. Six study stations located within a 31.5-mile segment of the Third Fork of the Platte River were used to make the assessment. Macroinvertebrate data collected at the stations were compared to biological criteria reference stream data collected from the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages Ecological Drainage Unit (**EDU**). Macroinvertebrate data collected from the Third Fork of the Platte River study stations were also compared to a regional control station located on Castile Creek just south of the town of Gower. The Castile Creek watershed is adjacent to the Third Fork of the Platte River watershed and was identified by the Missouri Department of Conservation as one of the higher quality streams in the Platte River watershed (Currier and Smith 1988).

1.1 Study Area/Justification

Third Fork of the Platte River originates in eastern Gentry County near the town of King City. It flows in a south to southwest direction and discharges into the Platte River near the town of Easton in Buchanan County. The section of the Third Fork of the Platte River being assessed in this study is listed in the Missouri Water Quality Standards (MDNR 2005a) as a class "C" stream. Designated uses for Third Fork of the Platte River for all 31.5 river miles are "warm water aquatic life protection and livestock and wildlife watering." An additional designated use for the last 7.5 miles is "category B whole body contact recreation." Based on our personal observations and topographic map comparisons, Third Fork of the Platte River appears to have been channelized for a large portion of the study reach. Topographic maps indicate that many sections of the stream have been straightened and we observed levees along the stream in several locations during field sampling. The only point source that discharges into the Third Fork of the Platte River watershed is the Union Star Wastewater Treatment Facility with a design flow of 0.07 million gallons per day (**MGD**).

1.2 Purpose

The purpose of the study is to determine if the Third Fork of the Platte River macroinvertebrate community is impaired. If Third Fork of the Platte River is impaired, a second objective is to determine the cause of impairment.

1.3 Objectives

1) Determine if the macroinvertebrate community and water quality in Third Fork of the Platte River is impaired compared to data collected from biological criteria reference streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU and the Castile Creek regional control station.

2) Assess the habitat quality of Third Fork of the Platte River.

1.4 Tasks

1) Conduct a bioassessment of the macroinvertebrate community on Third Fork of the Platte River at six sampling stations and Castile Creek at one sampling station during the fall 2005 and spring 2006 sampling seasons.

2) Conduct a water quality characterization at the sampling stations to determine potential water quality impacts.

3) Conduct a stream habitat assessment at the sampling stations to ensure comparability of aquatic habitats.

4) Collect stream width and depth measurements to determine possible habitat alterations caused by past stream channelizaton.

1.5 Null Hypotheses

1) The macroinvertebrate community will not differ between longitudinally separate reaches of the Third Fork of the Platte River.

2) The macroinvertebrate community in Third Fork of the Platte River will not differ from data collected from biological criteria reference streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU and the Castile Creek regional control station.

3) Stream habitat assessment scores and channel measurements collected will not differ substantially between longitudinally separate reaches of Third Fork of the Platte River.

4) Stream habitat assessment scores and channel measurements collected in Third Fork of the Platte River will not differ substantially from data collected from biological criteria reference streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU and the Castile Creek regional control station.

2.0 Methods

Carl Wakefield, Mike Irwin, and others from the Missouri Department of Natural Resources, Field Services Division, Environmental Services Program, Water Quality Monitoring Section conducted this study.

2.1 Study Timing

At each sampling station macroinvertebrate and water quality samples were collected once per fall season and once per spring season. The stream habitat assessment and the channel measurements were conducted during the fall sampling season. Fall sampling occurred from September 19-22, 2005 and spring sampling occurred from March 27-29, 2006.

2.2 Station Descriptions

Six test stations and one regional control station were sampled for this study. See Figure 1 for a map of the locations of the test stations.

Third Fork of the Platte River Station #1: Legal description of NW ¼, sec. 25, T. 57 N., R. 34 W. and geographic coordinates at latitude 39.726050 N. and longitude –94.671867 W. Station #1 was located upstream of SE Kemmer Road in Buchanan County. The station had a very sinuous channel that had a bottom substrate made up mainly of sand and silt. Water depth was deep around outside bends and woody debris was abundant.

Third Fork of the Platte River Station #2: Legal description of SE ¼, sec. 7, T. 57 N., R. 33 W. and geographic coordinates at latitude 39.762983 N. and longitude –94.640667 W. Station #2 was located upstream of County Road 123 in Buchanan County. The lower half of the station was made up of a riffle-run complex made up of slate or shale and the upper half of the station was glide-pool like with deeper water depths. Woody debris and rootmat were abundant and of good quality.

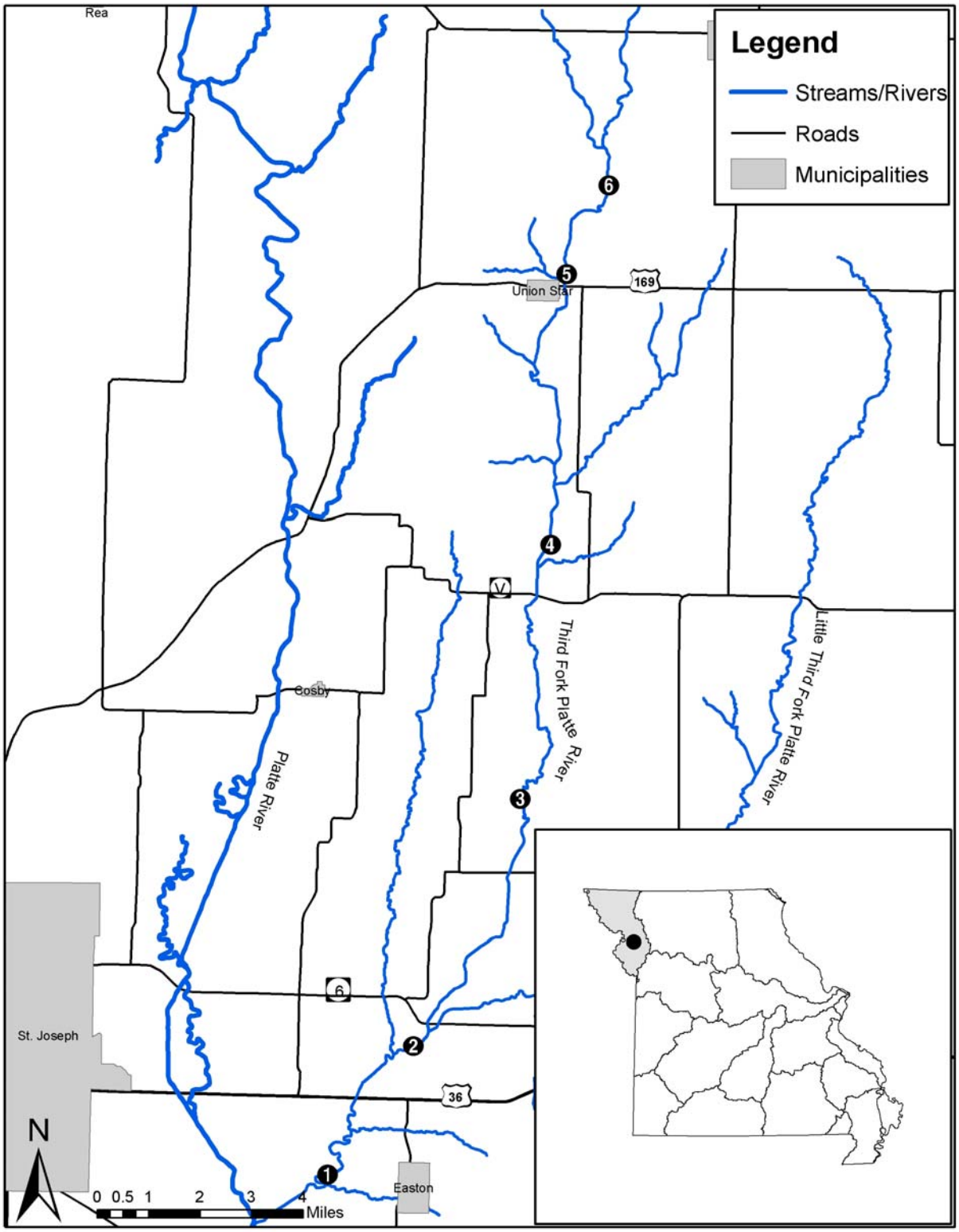
Third Fork of the Platte River Station #3: Legal description of SE ¼, sec. 16, T. 58 N., R. 33 W. and geographic coordinates at latitude 39.834317 N. and longitude –94.603700 W. Station #3 was located upstream of County Road 272 in Andrew County. The station had a narrow channel, shallow water depths, and a bottom substrate made up primarily of fine gravel and sand. The stream banks were very steep and this stream reach looked like it may have been channelized in the past. Woody debris and rootmat were very limited in abundance at this station.

Third Fork of the Platte River Station #4: Legal description of NW ¼, sec. 27, T. 59 N., R. 33 W. and geographic coordinates at latitude 39.907300 N. and longitude –94.594000 W. Station #4 was located downstream of NW Fairmount Road in DeKalb County. The upper half of the station was a riffle-pool complex containing large pieces of slate or shale that most likely came from a bluff located just upstream of the riffle complex. The lower half of the sampling reach had glide-pool conditions with deeper water depths. The riparian zone and stream banks were in poor condition at this station. Woody debris and rootmat were limited in quantity and quality at this station.

Third Fork of the Platte River Station #5: Legal description of SE ¼, sec. 27, T. 60 N., R. 33 W. and geographic coordinates at latitude 39.980683 N. and longitude –94.590850 W. Station #5 was located upstream of Highway 169 in DeKalb County. The channel at this station had a narrow, straight channel with shallow water depths that had a bottom substrate made up primarily of silt and organic matter. Woody debris and rootmat were limited in quantity and quality at this station.

Third Fork of the Platte River Station #6: Legal description of NE ¼, sec. 23, T. 60 N., R. 33 W. and geographic coordinates at latitude 40.009850 N. and longitude –94.575467 W. Station #6 was located downstream of NW Pleasant Road in DeKalb County. The channel at this station was narrow and had shallow water depths. The bottom substrate was made up of primarily organic matter and fine sediment. Woody debris, rootmat, and the overall stream habitat condition were poor at this station.

Figure 1: Map of the Third Fork of the Platte River Sampling Stations



Castile Creek #1: Legal Description of SW ¼, sec. 11, T. 55 N., R. 33 W. and geographic coordinates at latitude 39.594600 and longitude –94.574700. Castile Creek #1 was located downstream of Highway 169 in Clinton County. The upper third of the sampling reach was a riffle-run complex of very good quality. The lower two thirds of the sampling reach was made up of large pools with deeper water depths. Sand was the most common type of bottom substrate in the pools, but coarse substrate was present in some locations. Non-flow and rootmat habitats were very abundant and good in quality, but woody debris was somewhat limited at this station.

2.3 Ecological Drainage Unit

An EDU is a region in which aquatic biological communities and habitat conditions can be expected to be similar. A map of the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU is inset in Figure 1. All of the sampling stations are within this EDU.

2.4 Land Cover

Table 1 compares the land cover percentages from the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU and the 14-digit Hydrologic Units (**HU)** containing the Third Fork of the Platte River test stations, the Castile Creek regional control station, and the biological criteria reference stations in that EDU. Land cover data were derived from Thematic Mapper satellite data from 2000 to 2004 and interpreted by the Missouri Resource Assessment Partnership (**MoRAP**). Cropland and grassland were the dominant land uses in the Third Fork of the Platte River watershed. Cropland land cover was highest at the Third Fork of the Platte River test stations #5 and #6. However, cropland land cover at these stations was similar to the entire EDU and lower than the biological criteria reference stations Long Branch Platte River and White Cloud Creek (Table 1).

2.5 Habitat Assessment

A standardized assessment procedure was followed as described for Glide/Pool Habitat in the Stream Habitat Assessment Project Procedure (**SHAPP**) (MDNR 2003a). The habitat assessment was conducted on all stations during the fall 2005 sampling season.

2.6 Sinuosity

Sinuosity was used as an indicator of historic channelization. Using the National Hydrography Dataset (**NHD**) and Arcmap® software, the sampling stations were placed in the approximate middle of a two-mile stream segment and sinuosity was measured by calculating the ratio of the stream length distance divided by the straight-line distance. Values close to 1.0 are very straight stream reaches, which indicate potential channelization.

2.7 Channel Measurements

The lack of instream habitat can be observed in many northern Missouri streams that are wide and shallow. Wider, shallower streams tend to have less ability to retain pools and woody debris (Haithcoat et al. 2003). At each sampling station, a series of 10 bank-to-bank transects was established. Each transect was equally spaced within the sampling reach, which is 20x the average width. Measurements taken at each transect included lower bank width, wetted width, and water depth at ¼, ½, and ¾ of the distance across the wetted width. To document critical habitat conditions, measurements were collected during the fall low flow period.

Table 1
Percent Land Cover

Land Cover	14-digit Hydrological Unit (HU)	Urban	Crops	Grassland	Forest	Wetland
EDU	Multiple Hydrological Units	4	**53**	26	11	0
Third Fork Platte River #1 and #2	10240012090005	4	38	41	11	3
Third Fork Platte River #3 and #4	10240012090003	1	37	45	12	2
Third Fork Platte River #5 and #6	10240012090001	2	**53**	32	8	1
Castile Creek #1	1024001210003	4	44	35	11	3
Honey Creek	10240012050002	1	36	47	12	1
Long Branch Platte River	10240012080001	1	**56**	36	7	1
White Cloud Creek	10240013050004	5	**65**	21	5	1

2.8 Biological Assessment

Biological assessments consisted of macroinvertebrate and physicochemical sampling for the fall and spring index periods.

2.8.1 Invertebrate Collection and Analysis

A standardized macroinvertebrate sample collection and analysis procedure was followed as described in the Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure (**SMSBPP**) (MDNR 2003b). Three standard habitats, depositional substrate in non-flowing water (**NF**), large wood debris (**SG**), and root-mat (**RM**), were sampled at all locations. Macroinvertebrates were identified to taxonomic levels indicated in standard operating procedure MDNR-WQMS-209: Taxonomic Levels for Macroinvertebrate Identifications (MDNR 2005b).

Macroinvertebrate data were analyzed using two methods. The first analysis used four general biological metrics found in the SMSBPP. Those metrics are: 1) Taxa Richness (**TR**); 2) Ephemeroptera/Plecoptera/Trichoptera Taxa (**EPTT**); 3) Biotic Index (**BI**); and 4) Shannon Diversity Index (**SDI**). The metric evaluations were determined by comparing Third Fork of the Platte River test stations on a seasonal basis to biological criteria calculated from reference stream data collected in the the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU. Potential biological impairment of the Third Fork of the Platte River test stations was determined by calculating the Macroinvertebrate Stream Condition Index (**MSCI**), which is the sum of the four biological metric scores. The second analysis of the biological data was an evaluation of macroinvertebrate community percent composition of different macroinvertebrate groups.

2.8.2 Physicochemical Collection and Analysis

Physicochemical samples collected in fall 2005 and spring 2006 were: pH, temperature, conductivity, dissolved oxygen, discharge, turbidity, ammonia-N, nitrate/nitrite-N, total nitrogen, chloride, and total phosphorus. Temperature, pH, conductivity, dissolved oxygen, and discharge analyses were conducted in the field. The WQMS measured turbidity in the WQMS Biology Laboratory. All other samples were delivered to the ESP Chemical Analysis Section for analyses. All samples were collected per MDNR-FSS-001: Required/Recommended Containers, Volumes, Preservatives, Holding Times, and Special Sampling Considerations (MDNR 2003e), kept on ice until they were delivered to the ESP laboratory, and recorded on a chain-of-custody per MDNR-ESP-002 (MDNR 2005c).

Results of water quality analyses were compared to Water Quality Standards (MDNR 2005a). The study reach of Third Fork of the Platte River is classified as a Class “C” stream and a general warm-water fishery (GWWF). Waters designated as GWWF “allow the maintenance of a wide variety of warm-water biota, including naturally reproducing populations of recreationally important fish species”.

Two other criteria were included to identify limits. The first criterion applied for the “Protection of Aquatic Life”. The second was the rate of exposure, such as chronic or acute exposure. This was important to determine limits for pollutants that could be tolerated by aquatic life over a period of time.

2.8.3 Discharge

Stream flow was measured using a Marsh-McBirney Flow Meter at each station and discharge was calculated as cubic feet per second (cfs). Methodology was in accordance with the standard operating procedure MDNR-WQMS 113: Flow Measurement in Open Channels (MDNR 2003d).

2.9 Quality Control

Quality control was used as stated in the various MDNR Project Procedures and Standard Operating Procedures and methodology was in accordance with standard operating procedure MDNR-WQMS-214: Quality Control Procedures for Data Processing (MDNR 2003c). Duplicate samples were collected and analyzed for macroinvertebrate and physicochemical

parameters at Castile Creek station #1 during the fall 2005 sampling season and Third Fork of the Platte River station #1 during the spring 2006 sampling season. A random number of processed macroinvertebrate collections were also rechecked for missed specimens.

3.0 Analyses and Results

Five areas of interest are important to impact assessment in Third Fork of the Platte River. These include a physical habitat assessment, stream sinuosity measurements, stream channel measurements, biological assessment, and physicochemical water analyses.

Statistical analyses were used to find possible differences between sampling stations in watershed size, stream sinuosity, and metrics calculated from the channel measurements. A t-test was performed on data that met the assumptions of parametric statistical analyses and the Mann-Whitney rank sum test was performed on non-parametric data. During statistical analyses it was necessary to adjust water depth because a few of the water depth values were zero at some transects and data could not be $\log_{10}$ transformed to meet the assumptions of a normal distribution. A value of 0.1 feet was added to all water depth values and was $\log_{10}$ transformed to meet the assumptions of a t-test. The wetted width to water depth ratio data was also $\log_{10}$ transformed to meet the assumptions of a t-test.

3.1 Habitat Assessment

Table 2 provides habitat assessment scores for Third Fork of the Platte River test stations, Honey Creek, a biological criteria reference station from the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU, and Castile Creek, a regional control station. Data was collected in the fall 2005 sampling season with Carl Wakefield and Mike Irwin performing the scoring. SHAPP guidance states that test stations scoring at least 75 percent of the total score of reference/control stations should support a similar biological community. Based on the habitat scores, Third Fork of the Platte River test stations #5 and #6 could potentially have problems supporting a reference quality biological community. Test station #3 also may have problems supporting a reference quality biological community since the stream habitat score was 75 percent of the reference/control station scores.

Table 2
Habitat Assessment Scores for Honey Creek, a Biological Criteria Reference Station, Castile Creek, a Regional Control Station, and the Test Stations on Third Fork of the Platte River
September 2005

Reference/Control Station	Habitat Score	Test Stations	Habitat Score	% of Reference
Honey Creek #1	111	Third Fork Platte River #1	109	94
Castile Creek #1	122	Third Fork Platte River #2	104	89
		Third Fork Platte River #3	87	75
		Third Fork Platte River #4	100	86
		Third Fork Platte River #5	77	**66**
		Third Fork Platte River #6	73	**63**

Two habitat parameters in the SHAPP, epifaunal substrate and channel sinuosity scored in the poor or marginal category at the Third Fork of the Platte River test stations (Table 3). Bank stability was in the poor or marginal category for most of the sampling stations. The riparian zone scored in the poor category for at least one bank except for Third Fork of the Platte River test station #3. Vegetative protection scored in the marginal or poor category for both banks at most of the sampling locations. Pool variability, channel alteration, and channel sinuosity generally scored lower at Third Fork of the Platte River test stations #3-#6 than the other test stations and the reference/control stations. These three habitat parameters, along with other habitat parameters like bank stability and vegetative protection, give some indication that channelization may have occurred at test stations #3-#6 in the past.

3.2 Sinuosity

Sinuosity was close to 1.0 at Third Fork of the Platte River test stations #4 and #5, but all other test stations had much higher values (Table 4). A t-test found that sinuosity at the Third Fork of the Platte River test stations was not significantly different from the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU, even though sinuosity was low at test stations #4 and #5 ($P = 0.80$). The mean sinuosity value for the Third Fork of the Platte River test stations was actually higher than the mean value for the reference/control stations. The high sinuosity value at test station #1 (2.43) most likely caused the higher mean sinuosity value for the Third Fork of the Platte River.

3.3 Channel Measurements

Table 4 shows values for metrics that were calculated from channel measurements. Figures 2-4 are box plots of the channel measurement data. From top to bottom of each box plot the horizontal lines represent the 90th percentile, 75th percentile, median, the 25th percentile, and the 10th percentile, with filled circles as outliers.

The watershed size of the Third Fork of the Platte River test stations was not significantly higher than the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU (t-test, $P = 0.343$). This indicates that the channel measurements taken for this study were valid and should be comparable to reference and control streams since these measurements can change as the size of the watershed changes. The Third Fork of the Platte River test stations generally had channels that increased in size moving from upstream to downstream and all of the test stations, except #1 and #2, had shallow water depths with little variation of water depths (Table 4). Channel widths at the Third Fork of the Platte River test stations were significantly lower than the channel widths at the reference/control stations (t-test, $P < 0.001$). Mean channel width at the Third Fork of the Platte River test stations ranged from 22.2 feet at test station #6 to 48.7 feet at test station #2 (Figure 2). Wetted widths at the Third Fork of the Platte River test stations were also significantly lower than the wetted widths at the reference/control stations (t-test, $P = 0.002$). Mean wetted width at the Third Fork of the Platte River ranged from 10.2 feet at test station #4 to 28.4 feet at test station #1. There was no significant difference for the ratio of channel width to wetted width between the Third Fork of the Platte River test stations and the reference/control stations (Mann Whitney rank sum test, $P = 0.35$). These results indicate that the Third Fork of the Platte River test stations generally had

narrower channels than the reference/control stations, but the proportion of the channel being filled by water was not different than the reference/control stations.

Mean water depth at the Third Fork of the Platte River test stations was significantly shallower than at the reference/control stations (t-test, $P < 0.001$) even though water depths at test stations #1 and #2 were as deep as most of the reference/control streams. Water depth variation at the sampling stations was analyzed by comparing the standard deviation of the depth. Standard deviation of the water depth, like water depth, was much higher at Third Fork of the Platte River test stations #1 and #2 than the other test stations. A t-test excluding Third Fork of the Platte River test stations #1 and #2 found that the other test stations had a significantly lower standard deviation of water depth than at the reference/control stations ($P = 0.002$). Maximum depth at Third Fork of the Platte River test station #1 was much higher than the other test stations and the reference/control stations. A t-test excluding water depths from test station #1 found that the Third Fork of the Platte River test stations had significantly lower maximum depths than the reference/control stations ($P = 0.04$). The ratio of wetted width to water depth was higher at Third Fork of the Platte River test stations #3-#6 than the reference/control stations. A t-test found that the ratio of wetted width to water depth was significantly higher for the Third Fork of the Platte River test stations than the reference/control stations even though test stations #1 and #2 had values similar to the reference/control stations ($P = 0.02$). These results of water depth indicate that the Third Fork of the Platte River test stations, except test stations #1 and #2, had narrower channel widths, shallower water depths, and a lower standard deviation of water depths than the reference/control stations.

Table 3
Predominant Category Habitat Values Estimated from Stream Habitat Assessments for Third Fork of the Platte River (TFPR) Test Stations, Castile Creek Regional Control Station, and Honey Creek Biological Criteria Reference Station

	TFPR #1	**TFPR #2**	**TFPR #3**	**TFPR #4**	**TFPR #5**	**TFPR #6**	**Castile Creek #1**	**Honey Creek #1**
Stream Habitat Parameters								
Epifaunal Substrate/Available Cover	IV (4.6)	IV (9.9)	IV (1.4)	IV (8.4)	IV (0.9)	IV (1.4)	III (13.3)	III (18.8)
Pool Substrate Characterization	I	I	III	I	III	III	I	I
Pool Variability	I	I	IV	III	IV	IV	I	III
Sediment Deposition	I (18.6)	I (6.8)	I (11.1)	I (18.7)	II (31.5)	II (32.5)	I (3.5)	I (3.0)
Channel Flow Status	II	III	III	III	III	III	III	III
Channel Alteration	I	I	II	II	II	II	I	I
Channel Sinuosity	III	III	IV	IV	IV	IV	III	IV
Bank Stability – Left Bank	IV	IV	IV	II	IV	III	III	IV
Bank Stability – Right Bank	I	IV	IV	IV	III	IV	IV	III
Vegetative Protection – Left Bank	IV (41.0)	III (53.0)	III (68.5)	II (78.0)	III (54.0)	II (70.5)	II (72.0)	IV (37.5)
Vegetative Protection – Right Bank	II (74.5)	IV (35.1)	III (57.0)	III (59.5)	III (67.6)	III (67.5)	III (54.0)	III (66.0)
Riparian Zone Width – Left Bank	IV	III	I	I	IV	IV	IV	IV
Riparian Zone Width – Right Bank	IV	IV	I	IV	I	IV	II	II

Mean values are listed in parentheses for habitat parameters in which a mean value was calculated. Habitat parameter categories ranged from I to IV with category I = optimal, category II = suboptimal, category III = marginal, and category IV = poor.

Table 4
Stream Channel Measurements Calculated for the Third Fork of the Platte River Test Stations, Biological Criteria Reference Stations Located in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU, and the Castile Creek Control Station

Measurement	**Drainage Area (Miles^2)**	**Sinuosity**	**Channel Width (Feet)**	**Wetted Width (Feet)**	**Ratio of Channel Width to Wetted Width**	**Water Depth (Feet)**	**Ratio of Wetted Width to Water Depth**	**Maximum Depth (Feet)**
Test Stations								
Third Fk. Platte River #1	236	2.43	37.9 ± 4.8	28.4 ± 4.6	1.4 ± 0.3	1.6 ± 0.9	24.5 ± 17.9	4.4
Third Fk. Platte River #2	203	1.21	48.7 ± 9.5	24.6 ± 8.6	2.3 ± 1.1	0.9 ± 0.6	34.5 ± 19.1	2.4
Third Fk. Platte River #3	98	1.46	41.1 ± 4.6	20.4 ± 7.8	2.3 ± 1.0	0.3 ± 0.2	78.7 ± 31.3	1.0
Third Fk. Platte River #4	75	1.05	33.4 ± 5.9	10.2 ± 5.3	4.4 ± 2.6	0.3 ± 0.2	49.1 ± 29.4	0.8
Third Fk. Platte River #5	52	1.10	31.1 ± 5.9	18.0 ± 6.7	2.2 ± 1.5	0.3 ± 0.2	62.7 ± 29.3	0.8
Third Fk. Platte River #6	31	1.31	22.2 ± 2.7	14.7 ± 3.6	1.7 ± 0.9	0.3 ± 0.2	77.2 ± 54.1	0.8
Mean Value	115.8 ± 76.9	1.43 ± 0.51	35.7 ± 10.0	19.4 ± 8.6	2.4 ± 1.7	0.6 ± 0.7	54.4 ± 37.2	1.7 + 1.5
Reference/Control Stations								
Honey Creek #1	86	1.46	35.4 ± 3.8	31.6 ± 6.6	1.2 ± 0.6	1.6 ± 0.7	21.1 ± 6.0	3.1
Long Br. Platte River #1	22	1.03	31.0 ± 5.4	13.8 ± 6.0	2.7 ± 1.5	0.6 ± 0.5	36.7 ± 18.5	2.1
White Cloud Creek #1	37	1.34	55.7 ± 12.9	27.3 ± 13.5	3.0 ± 2.7	0.9 ± 0.6	31.5 ± 15.5	2.2
Castile Creek #1	129	1.58	55.9 ± 12.4	30.2 ± 9.5	2.0 ± 0.8	0.7 ± 0.4	52.9 ± 29.5	1.7
Mean Value	68.5 ± 48.7	1.35 ± 0.24	44.5 ± 14.7	25.8 ± 11.4	2.2 ± 1.7	0.9 ± 0.7	36.8 ± 21.8	2.3 ± 0.6

Values are listed in the table as the mean ± SD for the measurements that were collected at multiple transects located within the sampling stations.

Figure 2
Box plots of a) channel widths and b) wetted widths at the biological criteria reference stations Honey Creek (HC), Long Branch Platte River (LBPR), White Cloud Creek (WCC), Castile Creek (CC) regional control station, and the test stations on the Third Fork of the Platte River (TFP)
Fall 2005

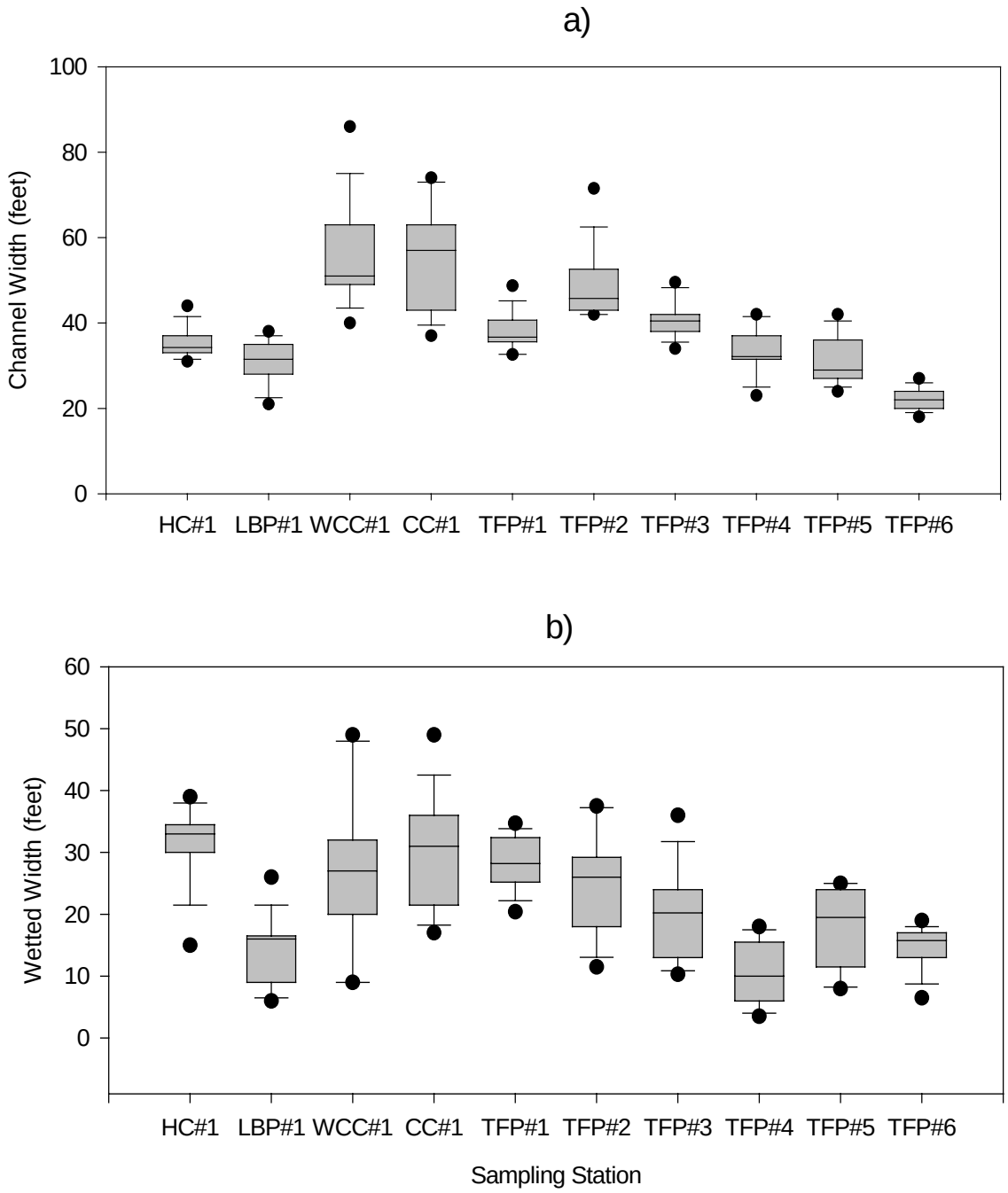


Figure 3
Box plots of a) channel width to wetted width ratio and b) water depths at the biological criteria reference stations Honey Creek (HC), Long Branch Platte River (LBPR), White Cloud Creek (WCC), Castile Creek (CC) regional control station, and the test stations on the Third Fork of the Platte River (TFP)
Fall 2005

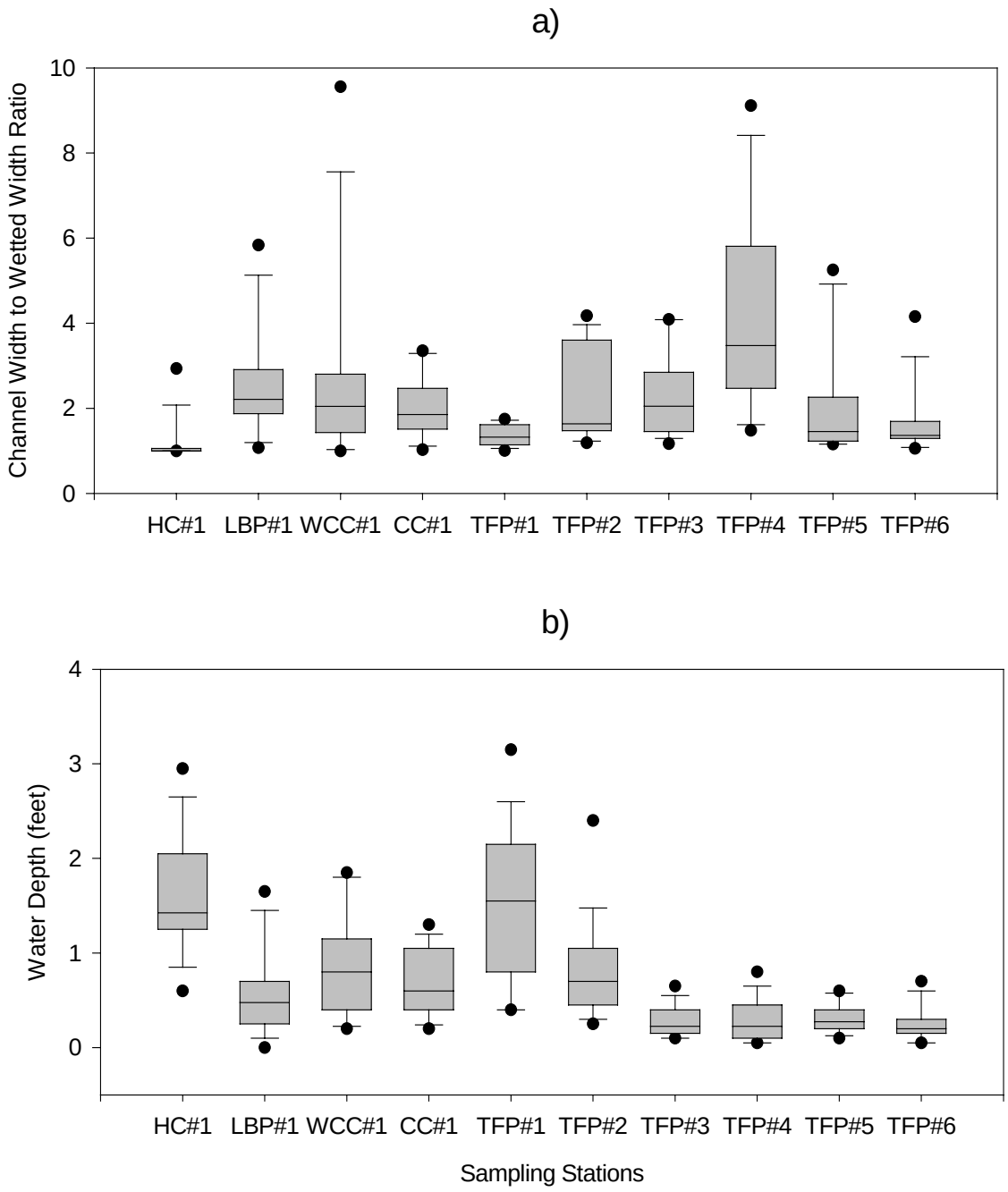
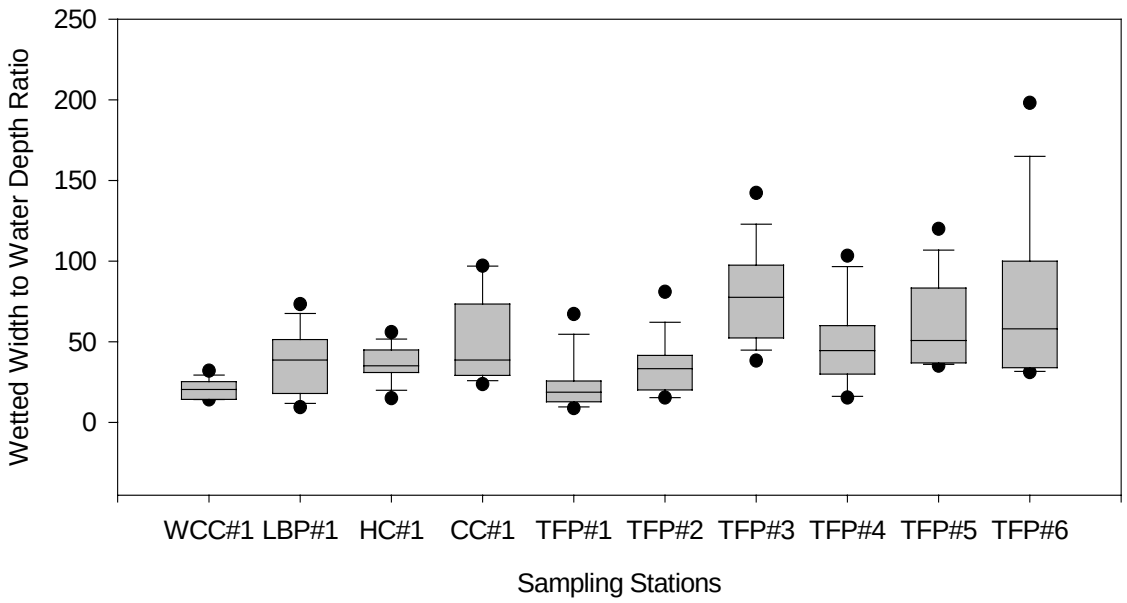


Figure 4
Box plots of wetted width to water depth ratio at the biological criteria reference stations Honey Creek (HC), Long Branch Platte River (LBPR), White Cloud Creek (WCC), Castile Creek (CC) regional control station, and the test stations on the Third Fork of the Platte River (TFP), Fall 2005



3.4 Biological Assessment

Macroinvertebrate data were evaluated by two methods. The first analysis used the general biological metrics in the SMSBPP. The second analysis of the biological data was an evaluation of macroinvertebrate community using percent composition of predominant macroinvertebrate taxa.

3.4.1 Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure

The SMSBPP metric evaluation used numeric biological criteria within the Plains/ Missouri Tributaries between Nishnabotna and Platte Drainages EDU that were calculated from the ESP Biological Criteria for Wadeable and Perennial Streams database. Criteria are listed for the fall and spring seasons in Table 5.

Table 5
Biological Criteria Scores Calculated from Biological Criteria Streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU

	Score = 5	Score = 3	Score = 1
Fall Season			
TR	>57	57-28	27-0
EPTT	>9	9-4	3-0
BI	<7.26	7.26-8.63	8.64-10
SDI	>3.02	3.02-1.51	1.50-0
Spring Season			
TR	>44	44-22	21-0
EPTT	>7	7-4	3-0
BI	<7.71	7.71-8.85	8.86-10
SDI	>2.17	2.17-1.08	1.07-0

The metric values and scores for the Third Fork of the Platte River test stations and for the Castile Creek regional control station are presented in Tables 6 and 7. During the fall 2005 sampling season, Third Fork of the Platte River test stations #1-#3 had MSCI scores in the full sustainability category and test stations #4-#6 had scores in the partial sustainability category. A duplicate sample was collected at the Castile Creek regional control station and both samples scored in the full sustainability category. The BI and SDI metrics generally did not perform as well at the Third Fork of the Platte River test stations #4-#6 as at test stations #1-#3. All of the Third Fork of the Platte River test stations, except test station #5 and the Castile Creek regional control station, had MSCI scores in the full sustainability category during the spring 2006 sampling season. Three metrics, EPTT, BI, and SDI did not perform as well at test station #5.

Table 6
Metric Values and Scores for the Third Fork of the Platte River
Test Stations and the Castile Creek Regional Control Station Using Biological Criteria
Calculated from Biological Criteria Reference Streams in the Plains/Missouri Tributaries
between Nishnabotna and Platte Drainages EDU
Fall 2005

Sample No./Station	TR	EPTT	BI	SDI	MSCI Score	Sustain.
05-03093						
Third Fk. Platte River #1 Value	72	14	6.82	3.30		
Third Fk. Platte River #1 Score	5	5	5	5	20	Full
05-03094						
Third Fk. Platte River #2 Value	75	17	6.69	2.97		
Third Fk. Platte River #2 Score	5	5	5	3	18	Full
05-03095						
Third Fk. Platte River #3 Value	66	14	7.38	2.44		
Third Fk. Platte River #3 Score	5	5	3	3	16	Full
05-03096						
Third Fk. Platte River #4 Value	64	9	7.44	1.73		
Third Fk. Platte River #4 Score	5	3	3	3	14	**Partial**
05-03097						
Third Fk. Platte River #5 Value	58	14	7.46	1.46		
Third Fk. Platte River #5 Score	5	5	3	1	14	**Partial**
05-03098						
Third Fk. Platte River #6 Value	59	8	7.44	2.84		
Third Fk. Platte River #6 Score	5	3	3	3	14	**Partial**
05-03099						
Castile Creek #1a Value	62	17	6.93	2.50		
Castile Creek #1a Score	5	5	5	3	18	Full
05-03100						
Castile Creek #1b Value	60	16	7.24	2.21		
Castile Creek #1b Score	5	5	5	3	18	Full

Table 7
Metric Values and Scores for the Third Fork of the Platte River Test Stations and the Castile Creek Regional Control Station Using Biological Criteria Calculated from Biological Criteria Reference Streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU
Spring 2006

Sample No./Station	TR	EPTT	BI	SDI	MSCI Score	Sustain.
06-02619						
Third Fk. Platte River #1a Value	67	12	6.88	3.14		
Third Fk. Platte River #1a Score	5	5	5	5	20	Full
06-02620						
Third Fk. Platte River #1b Value	74	13	6.97	3.27		
Third Fk. Platte River #1b Score	5	5	5	5	20	Full
06-02626						
Third Fk. Platte River #2 Value	76	12	7.14	2.86		
Third Fk. Platte River #2 Score	5	5	5	5	20	Full
06-02627						
Third Fk. Platte River #3 Value	63	12	7.46	2.24		
Third Fk. Platte River #3 Score	5	5	5	5	20	Full
06-02628						
Third Fk. Platte River #4 Value	69	7	7.46	2.46		
Third Fk. Platte River #4 Score	5	3	5	5	18	Full
06-02629						
Third Fk. Platte River #5 Value	53	4	7.71	1.90		
Third Fk. Platte River #5 Score	5	3	3	3	14	**Partial**
06-02630						
Third Fk. Platte River #6 Value	67	4	7.47	3.14		
Third Fk. Platte River #6 Score	5	3	5	5	18	Full
06-02631						
Castile Creek #1 Value	61	9	7.15	2.62		
Castile Creek #1 Score	5	5	5	5	20	Full

3.4.2 Macroinvertebrate Percent and Community Composition

The macroinvertebrate community composition for samples collected during the fall 2005 and spring 2006 sampling seasons at the Third Fork of the Platte River test stations and the Castile Creek regional control stations are presented in Tables 8 and 9.

The tolerant mayfly, *Caenis latipennis*, was the most abundant taxon at all sampling stations, except Third Fork of the Platte River test station #1, during the fall 2005 sampling season (Table 8). It was especially abundant at the Third Fork of the Platte River test stations #3-#5 and the Castile Creek regional control station, ranging from 47.0 percent of the sample composition at test station #3 to 71.7 percent at test station #5.

Other types of EPTT were not very abundant at test stations #3-#5, but taxa like *Nectopsyche*, *Cheumatopsyche*, *Tricorythodes*, *Acerpenna*, and *Stenacron* were moderately abundant at some of the other sampling stations. Test stations #3-#6 also had generally tolerant taxa such as *Dicrotendipes*, *Physella*, *Hyalella azteca*, *Thienemannimyia* group, and Scirtidae that were moderately abundant. Test station #1 was generally more diverse than the other sampling stations and was composed of other EPTT besides *Caenis latipennis.* The Castile Creek regional control station generally had a lower abundance of *Caenis latipennis* and a higher abundance of other EPTT in the Baetidae, Heptageniidae, and Hydropsychidae families than test stations #3-#5.

Chironomids were much more abundant during the spring 2006 sampling season, ranging from 12.9 percent of the sample composition at test station #5 to 74.6 percent at the Castile Creek regional control station (Table 9). Chironomid taxa *Tanytarsus*, *Cricotopus/Orthocladius*, *Cricotopus bicintus*, *Hydrobaenus*, *Dicrotendipes*, and *Polypedilum illinoense* group were common in some or all of the samples. *Caenis latipennis* was the most abundant taxon at test stations #2-#6 during the spring 2006 sampling season, ranging from 20.8 percent of the sample composition at test station #6 to 54.5 percent at test station #5. Other EPTT in the families Baetidae, Heptageniidae, and Hydropsychidae were somewhat abundant at test stations #1-#3 and the Castile Creek control station. Other taxa like *Tanytarsus*, *Cricotopus/Orthocladius*, *Cricotopus bicintus*, *Hydrobaenus*, *Dicrotendipes*, *Polypedilum illinoense* group, Ceratopogoninae, *Hyalella azteca*, and *Physella* were common in all or some of the samples collected at test stations #3-#6 and generally had high BI values. Test station #5, which had an MSCI score in the partially sustainable category and had a very high abundance of *Caenis latipennis*, also had a high abundance of two of the previously mentioned tolerant taxa, *Hyalella azteca* and *Physella*.

Table 8
Macroinvertebrate Community Composition for the Third Fork of the Platte River (TFPR) Test Stations and the Castile Creek Regional Control Station During the Fall 2005 Sampling Season

Variable-Station	**BI Value**	**TFPR #1**	**TFPR #2**	**TFPR #3**	**TFPR #4**	**TFPR #5**	**TFPR #6**	**Castile Ck. #1a**	**Castile Ck. #1b**
Sample Date		09/19/05	09/20/05	09/20/05	09/20/05	09/21/05	09/21/05	09/22/05	09/22/05
Sample Number		05-03093	05-03094	05-03095	05-03096	05-03097	05-03098	05-03099	05-03100
% EPT		36.3	60.4	52.5	70.5	75.6	38.0	68.5	66.8
% Ephemeroptera		25.5	52.7	50.3	70.1	74.7	37.7	62.1	64.7
% Plecoptera		0	0	0	0	0	0	0	0
% Trichoptera		10.8	7.7	2.3	0.4	0.9	0.3	6.4	2.1
Percent Macroinvertebrate Taxa									
Dicrotendipes	7.9	**14.4**	**4.5**	**6.7**	**2.9**	0.2	**7.3**	1.2	**3.8**
Caenis latipennis	7.6	**12.1**	**34.8**	**47.0**	**67.2**	**71.7**	**31.7**	**48.1**	**56.4**
Nectopsyche	4.1	**10.1**	2.9	1.9	0	0.3	0	0.4	1.3
Immature Corixidae	6.0	**6.1**	0.1	2.4	0	1.2	**5.3**	0	0
Polypedilum illinoense Grp.	9.2	**5.1**	0.5	1.8	0.5	0.8	2.3	1.0	0.9
Tanytarsus	6.7	4.6	**7.5**	**3.8**	**2.6**	0.4	**6.2**	**4.7**	**3.7**
Cheumatopsyche	6.6	0.7	**4.8**	0	0.3	0.1	0	**5.5**	0.6
Tricorythodes	5.4	3.3	**3.8**	0.7	0.3	0.1	0	0.2	0.4
Physella	9.1	0.3	0.3	**8.1**	0.9	**3.0**	**5.6**	0	0.3
Thienemannimyia Grp.	6.0	2.3	1.8	**3.3**	**2.8**	0.9	1.6	1.5	2.1
Hyalella azteca	7.9	1.5	2.2	1.3	**3.2**	**5.8**	4.8	1.2	1.6
Dubiraphia	6.4	1.1	1.0	1.1	1.4	**3.0**	3.7	2.2	2.1
Scirtidae	5.0	0.5	0.2	0.6	2.3	**3.0**	2.7	0	0
Acerpenna	3.7	0.4	1.8	0.1	0.1	0	0	**3.3**	**3.0**
Stenacron	7.1	2.8	2.1	0.9	1.4	1.1	1.1	**3.2**	**2.6**

Values in bold indicate the five most abundant macroinvertebrate taxa for each sample.

Table 9
Macroinvertebrate Community Composition for the Third Fork of the Platte River (TFPR) Test Stations and the Castile Creek Regional Control Station During the Spring 2006 Sampling Season

Variable-Station	**BI Value**	**TFPR #1a**	**TFPR #1b**	**TFPR #2**	**TFPR #3**	**TFPR #4**	**TFPR #5**	**TFPR #6**	**Castile Ck. #1**
Sample Date		03/27/06	03/27/06	03/27/06	03/28/06	03/28/06	03/28/06	03/28/06	03/29/06
Sample Number		06-02619	06-02620	06-02626	06-02627	06-02628	06-02629	06-02630	06-02631
% EPT		24.7	15.7	42.5	54.2	48.7	55.0	23.1	19.5
% Ephemeroptera		20.0	14.0	39.4	53.4	48.3	54.9	23.1	18.8
% Plecoptera		0	0	0	0	0	0	0	0
% Trichoptera		4.7	1.8	3.1	0.8	0.4	0.1	0	0.7
Percent Macroinvertebrate Taxa									
Tanytarsus	6.7	**17.1**	**19.6**	**10.9**	3.1	**3.8**	**1.9**	**7.8**	**7.4**
Caenis latipennis	7.6	**13.0**	**7.1**	**33.7**	**49.4**	**47.4**	**54.5**	**20.8**	**12.7**
Cricotopus/Orthocladius	6.5	**8.8**	**5.3**	**8.5**	**8.4**	3.5	0.9	1.8	**35.0**
Simulium	4.4	**6.5**	2.9	1.4	0.8	0.4	0	0	1.1
Hydrobaenus	9.6	**6.1**	**6.7**	**6.5**	**4.0**	**5.9**	1.6	3.6	**8.4**
Dicrotendipes	7.9	5.6	**8.4**	**3.6**	**3.5**	**4.1**	1.0	**7.8**	2.0
Crictopus bicinctus	8.7	2.1	0.9	1.7	**8.4**	2.1	0.2	1.2	0.9
Ceratopogoninae	6.0	1.1	2.3	0.7	0.6	**3.8**	0.4	**7.1**	0.3
Hyalella azteca	7.9	1.5	1.8	0.9	2.3	3.4	**16.2**	1.2	2.4
Physella	9.1	0.3	0.1	0	0.4	1.4	**6.4**	**7.9**	0
Fossaria	-	0	0	0	0.2	2.3	**2.0**	2.2	0
Polypedilum illinoense Grp.	9.2	2.4	2.7	0.7	2.4	0.8	1.1	2.4	**5.1**

Values in bold indicate the five most abundant macroinvertebrate taxa for each sample.

3.4.3 Physicochemical Water

Physicochemical results are arranged to demonstrate trends of certain variables that may identify a source for human induced stress to the Third Fork of the Platte River. Results can be found in Table 10 for fall 2005 samples and Table 11 for spring 2006 samples. Results specifically discussed in this section are quality control, discharge, turbidity, and nitrogen.

3.4.3.1 Quality Control

Castile Creek #1a and #1b samples collected during the fall 2005 sampling season and Third Fork of the Platte River #1a and #1b samples collected during the spring 2006 sampling season were duplicate water quality samples. Results from these duplicate samples were similar and indicated that sampling, transport, and processing were consistent, as well as demonstrating that the sample analyses were precise.

3.4.3.2 Discharge

Discharge during the fall 2005 sampling season ranged from <0.05 cfs at test stations #5 and #6 to 6.72 cfs at test station #1. Discharge during the spring 2006 sampling season ranged from 0.08 cfs at test station #6 to 21.0 cfs at test station #1.

3.4.3.3 Turbidity

Turbidity was elevated at test stations #5 and #6 during the fall 2005 sampling season, but was not elevated during the spring 2006 sampling season. Turbidity during the fall 2005 sampling season ranged from 12.0 NTU at test station #3 to 93.0 NTU at test station #5. During the spring 2006 sampling season, turbidity ranged from 6.2 NTU at the Castile Creek regional control station to 19.2 NTU at test station #4. The higher turbidity values at test stations #5 and #6 during the fall 2005 sampling season were in the range of all turbidity values collected at the biological criteria reference stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU. The turbidity values collected at the biological criteria reference streams ranged from 14.0 to 182.0 NTU and had a median value of 38.9 NTU.

3.4.3.4 Nitrogen

Total nitrogen was slightly elevated at test station #1 and the duplicate samples collected at the Castile Creek regional control station during the fall 2005 sampling season. However, it was not elevated during the spring 2006 sampling season at these stations. Total nitrogen ranged from 0.34 mg/L at test station #3 to 1.52 mg/L at test station #1. During the spring 2006 sampling season, total nitrogen ranged from 0.43 mg/L at test station #3 to 0.75 mg/L at test station #2. The higher total nitrogen values at test station #1 and the duplicate samples at Castile Creek during the fall 2005 sampling season were in the range of values collected at all biological criteria reference stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU. The total nitrogen values collected at the biological criteria reference streams ranged from 0.53 to 9.45 mg/L and had a median value of 2.19 mg/L.

Table 10
Physicochemical Variables for the Third Fork of the Platte River (TFPR) Test Stations and the Castile Creek Regional Control Station During the Fall 2005 Sampling Season

Variable-Station	TFPR #1, Test Fall 2005	TFPR #2, Test Fall 2005	TFPR #3, Test Fall 2005	TFPR #4, Test Fall 2005	TFPR #5, Test Fall 2005	TFPR #6, Test Fall 2005	Castile Creek #1a, Control Fall 2005	Castile Creek #1b, Control Fall 2005
Sample Number	05-05689	05-05690	05-05691	05-05692	05-05693	05-05694	05-05695	05-05696
Sample Date	09/19/05	09/20/05	09/20/05	09/20/05	09/21/05	09/21/05	09/22/05	09/22/05
Sample Time	1345	1100	1530	1730	1210	1525	1300	1305
pH (Units)	7.87	7.50	8.29	7.94	8.12	8.48	8.13	8.13
Temperature (C^0)	23.0	20.5	29.0	26.0	25.0	29.0	24.5	25.5
Conductivity (uS)	410	424	346	3.58	386	355	339	339
Dissolved O_2	8.48	8.14	10.70	5.98	8.44	8.44	9.60	9.60
Discharge (cfs)	6.72	4.85	0.15	0.15	<0.05	<0.05	6.30	6.30
Turbidity (NTUs)	21.0	37.0	12.0	19.0	**93.0**	57.0	20.0	19
Ammonia-N	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Nitrate/Nitrite-N	0.80	0.53	0.01	0.04	0.01	0.08	0.49	0.49
Total Nitrogen	**1.52**	1.12	0.34	0.62	0.97	1.19	**1.48**	**1.45**
Chloride	13.9	13.2	9.86	10.20	11.30	14.40	10.4	10.5
Total Phosphorus	0.19	0.2	0.09	0.11	0.32	0.18	0.18	0.16

Units mg/L unless otherwise noted. Values in bold are possibly elevated compared to normal conditions.

Table 11
Physicochemical Variables for the Third Fork of the Platte River (TFPR) Test Stations and the Castile Creek Regional Control Station During the Spring 2006 Sampling Season

Variable-Station	TFPR #1a, Test Fall 2005	TFPR #1b, Test Fall 2005	TFPR #2, Test Fall 2005	TFPR #3, Test Fall 2005	TFPR #4, Test Fall 2005	TFPR #5, Test Fall 2005	TFPR #6, Test Fall 2005	Castile Creek #1, Control Fall 2005
Sample Number	06-03175	06-03176	06-03177	06-03178	06-03179	06-03180	06-03181	06-03182
Sample Date	03/27/06	03/27/06	03/27/06	03/28/06	03/28/06	03/28/06	03/28/06	03/29/06
Sample Time	1410	1415	1630	1015	1215	1420	1615	1040
pH (Units)	8.26	8.26	8.42	8.44	8.27	8.65	8.46	8.22
Temperature (C^0)	9.0	9.0	8.0	7.50	7.50	11.0	13.0	9.0
Conductivity (uS)	482	482	499	454	496	430	427	454
Dissolved O_2	12.10	12.10	12.90	13.60	11.30	14.90	13.20	13.40
Discharge (cfs)	21.0	21.0	16.5	3.56	1.80	0.15	0.08	15.3
Turbidity (NTUs)	10.7	11.9	17.2	13.4	19.2	8.4	14.5	6.2
Ammonia-N	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Nitrate/Nitrite-N	0.21	0.21	0.22	0.01	0.07	0.01	0.01	0.14
Total Nitrogen	0.73	0.66	0.75	0.43	0.56	0.49	0.58	0.64
Chloride	20.1	20.1	19.3	19.5	22.2	12.7	13.9	17.7
Total Phosphorus	0.07	0.08	0.08	0.06	0.05	0.09	0.10	0.05

Units mg/L unless otherwise noted. Values in bold are possibly elevated compared to normal conditions.

4.0 Discussion

4.1 Land Use and Its Possible Effect on Water Quality.

The Third Fork of the Platte River watershed, like the entire Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU, was made up of primarily row crops and grassland (Table 1). Downstream test stations #1-#4 had more grassland and less row crops than the entire EDU and two HU of the biological criteria reference streams. Personal observations during this study indicated that row crops were the dominant land use adjacent to the stream channel at test stations #3-#6. There was also evidence of past channelization, a presence of a levee on one bank at test station #6, and poor agriculture practices at or near these test stations. The most common poor agriculture practice was row crops planted up to the stream bank with little or no riparian zone. This could indicate a source of human stress on the stream since a high percentage of row crops in a watershed can often lead to water quality and runoff problems. This possibly could have impacted the macroinvertebrate community at the upstream test stations, which showed impairment at test stations #4-#6 during the fall 2005 sampling season and test station #5 during the spring 2006 sampling season.

4.2 Stream Habitat Condition

The results of the stream habitat assessments indicated that the Third Fork of the Platte River was habitat impaired at test stations #5 and #6 and very close to habitat impaired at test station #3 (Tables 2 and 3). The individual habitat parameters indicated that bank stability, vegetative protection of the banks, and the riparian zone was poor or marginal for at least one bank at all of the test stations. Pool variability was generally very low at test stations #3-#6 and these stations had very little SG and RM habitat. For example, test station #3 had very steep banks that had marginal vegetative cover, instream habitat that was like a long run with shallow water depths for most of the sampling reach, and channel that looked like it had downcut from past channelization. The lack of good habitat at some or all of the upstream test stations may have led to the low MSCI scores at test stations #4-#6 during the fall 2005 sampling season and test station #5 during the spring 2006 sampling season.

4.3 Sinuosity

Sinuosity was low or close to 1.0 only at test stations #4 and #5 (Table 4). The higher sinuosity values of the other test stations did not indicate that channelization had occurred at those stations. But personal observations during the study, topographic maps, and stream habitat conditions indicated that some channelization had occurred in a larger section of stream that included test stations #3-#6. Topographic maps showed that the majority of the stream section starting about two river miles upstream of test station #2 was fairly straight, even though there were some stream sections that still had a natural sinuous pattern. Other evidence of channelization was a levee that was observed on one stream bank at test station #6 and a topographic map showing a levee located just upstream of test station #3.

4.4 Channel Measurements

Channel widths and wetted widths in the Third Fork of the Platte River test stations generally increased in size moving in an upstream to downstream direction and were smaller than values collected in the reference/control stations (Table 4 and Figure 2). Test stations #1 and #2 had much higher water depths and variation of water depths than the other test stations. At the other test stations, water depth, variation of water depth, and maximum depth were much lower and the ratio of wetted width to water depth was much higher than the reference/control stations. These results indicate that the Third Fork of the Platte River test stations #3-#6 had a narrower channel and shallower water depths with lower variation than the reference/control stations (Table 2; Figures 3 and 4). This may or may not result from channelization since it has been hypothesized that some channelized streams in northern Missouri would have wide channels and shallow water depths with little variation in water depth (MDNR 2005d). The shallow water depths, lower variation of water depth, and lower maximum depth values at test stations #3-#6 give some indication of the effects of past channelization, but the narrow channel widths do not.

4.5 Macroinvertebrate Community Condition and Composition

The MSCI scores for the macroinvertebrate samples collected for this study showed impairment at test stations #4-#6 during the fall 2005 sampling season and test station #5 during the spring 2006 sampling season (Tables 6 and 7). *Caenis latipennis*, a tolerant mayfly taxa, made up a large percentage of the individuals collected at test stations #3-#6 during both sampling seasons (Tables 8 and 9). This taxa was especially abundant at test station #5 during both sampling seasons, making up 71.7 percent of the sample during the fall 2005 sampling season and 47.4 percent during the spring 2006 sampling season. The high abundance of *Caenis latipennis* most likely caused the low SDI values at test station #5 during both sampling seasons. Other taxa, besides *Caenis latipennis*, that had high BI values and were generally common at test stations #4-#6 were *Physella* and *Hyalella azteca* during the fall 2005 sampling season and Ceratopogoninae, *Physella*, *Hyalella azteca*, and *Dicrotendipes* during the spring 2006 sampling season. Test stations #1 and #2 and the Castile Creek regional control station generally had a higher percentage of other EPTT, besides *Caenis latipennis*, in the families Leptoceridae, Baetidae, Heptageniidae, and Hydropsychidae during the fall 2005 sampling season and Heptageniidae and Hydropyschidae during the spring 2006 sampling season.

The degradation of stream habitat caused by past channelization could have been the primary source of the lower MSCI scores at test stations #4-#6 during the fall 2005 sampling season and test station #5 during the spring 2006 sampling season. But another possible source, especially at test stations #5 and #6 is watershed size (Table 4). These two stations had watershed sizes that were much smaller than the other sampling stations and discharge was very low at these stations during both sampling seasons (Tables 10 and 11).

Macroinvertebrates did show impairment at some stations during this study. There is evidence that macroinvertebrates may not be sensitive to water depth habitat alterations

caused by channelization. However, macroinvertebrates are sensitive to bottom substrate quality (Zweig and Rabeni 2001). Based on personal observations, stream habitat assessments, and the channel measurements, test stations #3, #5, and #6 had poor or borderline habitat conditions, but only test station #5 consistently had low MSCI scores. The fish community could be a better indicator of water depth habitat alteration caused by channelization. Previous studies have shown differences in the fish community between channelized and unchannelized streams (Congdon 1971; Vokoun and Rabeni 2003). Many fish species, especially top level predators, require habitat that includes deeper water in pools, large pieces of woody debris, and rootmat. The upstream test stations on Third Fork of the Platte River had very little of this type of habitat and would most likely have a fish community that showed impairment.

5.0 Conclusions

Four null hypotheses were stated in the introduction section of this report: 1) the macroinvertebrate community will not differ between longitudinally separate reaches of the Third Fork of the Platte River; 2) the macroinvertebrate community in the Third Fork of the Platte River will not differ from data collected from biological criteria reference streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU and the Castile Creek regional control station; 3) stream habitat assessment scores and channel measurements collected will not differ substantially between longitudinally separate reaches of the Third Fork of the Platte River; and 4) stream habitat assessment scores and channel measurements collected in the Third Fork of the Platte River will not differ substantially from data collected from biological criteria reference streams in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU and the Castile Creek regional control station.

All four hypotheses were rejected. The first two null hypotheses related to the macroinvertebrate community were rejected since test stations #4-#6 during the fall 2005 sampling season and test station #5 during the spring 2006 sampling season had MSCI scores that were in the partially sustainable category. All of the test stations and the Castile Creek regional control station for both sampling seasons had MSCI scores that were in the fully sustainable category. The last two null hypotheses were rejected since the Third Fork of the Platte River test stations #5 and #6 had stream habitat assessment scores that were below 75 percent of the habitat scores at the reference/control stations. They were also rejected because test stations #3-#6 had significantly narrower channels and much shallower water depths than the reference/control stations. Visual observations and topographic maps also provide evidence that parts of the Third Fork of the Platte River had been channelized in the past. Topographic maps showed large sections of the stream that were straighter than normal, a levee just upstream of test station #3, and a levee on one bank at test station #6.

6.0 Recommendations

Conduct a fish community bioassessment study of the Third Fork of the Platte River. Determine if habitat alterations to the Third Fork of the Platte River have affected the fish community, especially top predators.

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Appendix A

Statistical Analyses Comparing Watershed Size, Sinuosity, and Stream Channel Metrics Between the Third Fork of the Platte River Test Stations and the Reference/Control Stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU

t-test Wednesday, January 03, 2007, 12:57:19

Data source: T-test comparing sinuosity between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.556)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	4	0	1.353	0.236	0.118
Test	6	0	1.427	0.513	0.210

Difference -0.0742

t = -0.267 with 8 degrees of freedom. (P = 0.796)

95 percent confidence interval for difference of means: -0.715 to 0.567

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.796).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

t-test Wednesday, January 03, 2007, 12:59:49

Data source: T-test comparing watershed size between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.450)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	4	0	68.500	48.720	24.360
Test	6	0	115.833	84.018	34.300

Difference -47.333

t = -1.007 with 8 degrees of freedom. (P = 0.343)

95 percent confidence interval for difference of means: -155.719 to 61.053

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.343).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

t-test Thursday, January 11, 2007, 10:30:29

Data source: T-test comparing channel width between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P = 0.196)

Equal Variance Test: Passed (P = 0.022)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	40	0	44.487	14.742	2.331
Test	60	0	35.720	10.031	1.295

Difference 8.767

t = 3.542 with 98 degrees of freedom. (P = <0.001)

95 percent confidence interval for difference of means: 3.855 to 13.680

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = <0.001).

Power of performed test with alpha = 0.050: 0.938

t-test Thursday, January 11, 2007, 10:32:48

Data source: T-test comparing wetted width between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.045)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	40	0	25.775	11.424	1.806
Test	60	0	19.377	8.643	1.116

Difference 6.398

t = 3.184 with 98 degrees of freedom. (P = 0.002)

95 percent confidence interval for difference of means: 2.411 to 10.386

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = 0.002).

Power of performed test with alpha = 0.050: 0.867

t-test Thursday, February 01, 2007, 10:25:25

Normality Test: Failed (P = <0.001)

Test execution ended by user request, Rank Sum Test begun

Mann-Whitney Rank Sum Test Thursday, February 01, 2007, 10:25:25

Data source: Mann-Whitney rank sum test comparing the ratio between channel width to wetted width between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Group	N	Missing	Median	25%	75%
Reference	40	0	1.701	1.061	2.703
Test	60	0	1.635	1.314	2.941

T = 1887.500 n(small)= 40 n(big)= 60 (P = 0.353)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.353).

t-test Thursday, February 01, 2007, 10:41:15

Data source: T-test comparing $\log_{10}$ transformed water depth between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P = 0.045)

Equal Variance Test: Passed (P = 0.465)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	120	0	-0.0801	0.311	0.0284
Test	180	0	-0.294	0.335	0.0250

Difference 0.214

t = 5.567 with 298 degrees of freedom. (P = <0.001)

95 percent confidence interval for difference of means: 0.138 to 0.289

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = <0.001).

Power of performed test with alpha = 0.050: 1.000

t-test Thursday, January 11, 2007, 14:03:29

Data source: T-test comparing standard deviation of water depths between the Third Fork of the Platte River test stations, except test stations #1-#2 and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.
Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.126)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	4	0	0.537	0.123	0.0613
Test	4	0	0.203	0.0274	0.0137

Difference 0.333

t = 5.309 with 6 degrees of freedom. (P = 0.002)

95 percent confidence interval for difference of means: 0.180 to 0.487

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = 0.002).

Power of performed test with alpha = 0.050: 0.992

t-test Wednesday, January 03, 2007, 13:01:36

Data source: T-test comparing maximum water depth between the Third Fork of the Platte River test stations, except test station #1 and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P = 0.014)

Equal Variance Test: Passed (P = 0.373)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	4	0	2.250	0.573	0.287
Test	5	0	1.160	0.699	0.312

Difference 1.090

t = 2.509 with 7 degrees of freedom. (P = 0.040)

95 percent confidence interval for difference of means: 0.0625 to 2.117

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = 0.040).

Power of performed test with alpha = 0.050: 0.505

The power of the performed test (0.505) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

t-test Thursday, January 11, 2007, 10:41:43

Data source: T-test comparing the $\log_{10}$ transformed ratio of wetted width to water depth between the Third Fork of the Platte River test stations and the reference/control stations in the Plains/Missouri Tributaries between Nishnabotna and Platte Drainages EDU.

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.171)

Group Name	N	Missing	Mean	Std Dev	SEM
Reference	40	0	1.497	0.245	0.0388
Test	60	0	1.639	0.302	0.0390

Difference -0.141

t = -2.462 with 98 degrees of freedom. (P = 0.016)

95 percent confidence interval for difference of means: -0.255 to -0.0274

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = 0.016).

Power of performed test with alpha = 0.050: 0.603

The power of the performed test (0.603) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

Appendix B

Third Fork of the Platte River Bioassessment Study Macroinvertebrate Bench Sheets

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503093], Station #1, Sample Date: 9/19/2005 12:00:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
"HYDRACARINA"			
Acarina	1		
AMPHIPODA			
Hyalella azteca		8	7
COLEOPTERA			
Berosus		2	1
Dubiraphia	5	6	
Hydroporus		2	1
Macronychus glabratus		8	17
Scirtidae		1	4
DIPTERA			
Ablabesmyia	2	4	7
Anopheles		2	
Ceratopogoninae	6	1	
Chironomus	11		
Cladotanytarsus	4		
Cricotopus bicinctus		2	
Cricotopus/Orthocladius	1		
Cryptochironomus	8	1	
Cryptotendipes	13		
Dicrotendipes	5	6	132
Dolichopodidae		1	
Forcipomyiinae			10
Harnischia	2		
Hemerodromia			1
Labrundinia		8	
Paralauterborniella	6		
Paratanytarsus		3	
Polypedilum fallax grp			2
Polypedilum halterale grp	4		
Polypedilum illinoense grp	4	24	23
Polypedilum scalaenum grp			2
Procladius	25		
Pseudochironomus			3
Rheotanytarsus	1	20	3
Stelechomyia			5
Stempellinella	5		
Stenochironomus		1	3
Tanytarsus	12	19	15
Thienemannimyia grp.		4	19
Tipulidae	1		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503093], Station #1, Sample Date: 9/19/2005 12:00:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Tribelos		1	5
EPHEMEROPTERA			
Acerpenna		2	2
Baetis		7	13
Caenis hilaris	1	1	
Caenis latipennis	65	44	11
Callibaetis		2	
Hexagenia limbata	3		
Leptophlebiidae		6	
Paracloeodes	3	7	9
Procloeon	13		
Stenacron	4	18	6
Stenonema femoratum			3
Tricorythodes	4	22	7
HEMIPTERA			
Belostoma		-99	
Corixidae	46	11	4
Neoplea		2	
Ranatra fusca		-99	
Ranatra nigra		1	
Trichocorixa	1	3	
LIMNOPHILA			
Physella		2	1
LUMBRICINA			
Lumbricidae	-99		
ODONATA			
Argia		12	3
Calopteryx		2	
Enallagma		2	
Gomphidae	4		
Gomphus	-99	-99	
Ischnura		2	
Macromia	1	-99	
Nasiaeschna pentacantha		-99	
Progomphus obscurus	-99		
RHYNCHOBDELLIDA			
Glossiphoniidae		-99	
TRICHOPTERA			
Cheumatopsyche		5	2
Nectopsyche	10	89	1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503093], Station #1, Sample Date: 9/19/2005 12:00:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
TUBIFICIDA			
Branchiura sowerbyi	1		
Tubificidae	35		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503094], Station #2, Sample Date: 9/20/2005 8:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
"HYDRACARINA"				
Acarina		1	1	
AMPHIPODA				
Hyalella azteca			18	4
BRANCHIOBDELLIDA				
Branchiobdellida			2	
COLEOPTERA				
Berosus			2	
Dubiraphia		3	6	1
Helichus lithophilus			5	
Macronychus glabratus				2
Neoporus			2	
Scirtidae			2	
Stenelmis	3	1	1	
Tropisternus			-99	
DECAPODA				
Orconectes virilis			1	
DIPTERA				
Ablabesmyia		1		2
Ceratopogoninae	5	5	7	
Chrysops			3	
Cladotanytarsus	7	8		
Cricotopus/Orthocladius		2		
Cryptochironomus	2	8		1
Cryptotendipes		3		
Dicrotendipes	11	7	2	37
Diptera		5		
Forcipomyiinae		2		9
Glyptotendipes				1
Hemerodromia	1			3
Labrundinia			3	1
Nanocladius		1	1	
Paracladopelma		1		
Paralauterborniella		2		
Paratanytarsus		2	2	
Phaenopsectra				1
Polypedilum	1			
Polypedilum convictum grp	88		1	5
Polypedilum fallax grp				2
Polypedilum halterale grp	7	12		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503094], Station #2, Sample Date: 9/20/2005 8:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Polypedilum illinoense grp			4	1
Polypedilum scalaenum grp		6		
Procladius		2		
Rheocricotopus	3			
Rheotanytarsus	10	1	22	8
Saetheria	36			
Simulium	7		1	
Stempellina		1		
Stempellinella		21	1	
Stenochironomus				6
Stictochironomus	1	1		
Tabanus	2			
Tanytarsus	10	34	22	20
Thienemannimyia grp.	11		4	14
Tribelos				1
EPHEMEROPTERA				
Acentrella	1			
Acerpenna	31		7	11
Baetis	51		2	10
Caenis latipennis	129	100	196	59
Fallceon	113		5	10
Heptagenia	18		7	
Heptageniidae	32		27	6
Hexagenia limbata		1		
Isonychia rufa	18		2	1
Leptophlebiidae			9	
Leucrocuta	4			
Paracloeodes	47	3	3	7
Pseudocentroptiloides		1		
Pseudocloeon	3		3	1
Stenacron	1	4	3	14
Stenonema terminatum	18	1		5
Tricorythodes	21	3	26	10
HEMIPTERA				
Belostoma			-99	
Corixidae		1		
Rhagovelia	1		4	
LIMNOPHILA				
Physella		2	1	
ODONATA				
Argia		1	16	1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503094], Station #2, Sample Date: 9/20/2005 8:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Calopteryx			4	
Enallagma			3	
Gomphus	-99		-99	1
Ischnura			1	
Macromia			-99	
Progomphus obscurus	1	-99		
Stylurus		-99		
TRICHOPTERA				
Cheumatopsyche	185		32	17
Hydroptila	10			
Nectopsyche	2	3	26	
TUBIFICIDA				
Tubificidae	1	3	2	2

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503095], Station #3, Sample Date: 9/20/2005 12:30:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
"HYDRACARINA"			
Acarina	8	1	
AMPHIPODA			
Hyalella azteca	1	11	2
COLEOPTERA			
Berosus	2	11	11
Dubiraphia	1	10	1
Helichus basalis		1	3
Helichus lithophilus		1	
Macronychus glabratus		2	2
Peltodytes	2		
Scirtidae		6	
Stenelmis		1	1
Tropisternus		1	
DIPTERA			
Ablabesmyia	2	1	
Anopheles		2	
Ceratopogoninae	1	3	3
Chironomus	1		
Cladotanytarsus	7		1
Cricotopus bicinctus		1	
Cryptochironomus	1	2	1
Cryptotendipes	1		
Dicrotendipes	17	4	51
Forcipomyiinae		2	26
Labrundinia	1	4	2
Nanocladius	1		
Paratanytarsus	1	2	
Polypedilum convictum grp		1	
Polypedilum halterale grp	1		
Polypedilum illinoense grp	2	17	
Procladius	12		
Pseudochironomus			2
Rheotanytarsus		5	
Stempellina	1		
Stempellinella	2		
Stenochironomus			5
Tanypus	1		
Tanytarsus	25	6	10
Thienemannimyia grp.		11	24

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503095], Station #3, Sample Date: 9/20/2005 12:30:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Tribelos			1
EPHEMEROPTERA			
Acerpenna		1	
Caenis latipennis	275	97	130
Callibaetis	1		
Hexagenia limbata	4		
Isonychia		1	
Paracloeodes	5	1	2
Procloeon	2		
Stenacron			10
Stenonema terminatum		1	
Tricorythodes	1	4	2
HEMIPTERA			
Corixidae	22	1	3
Rheumatobates		3	
Trepobates		6	
LIMNOPHILA			
Lymnaeidae		3	
Physella	11	51	24
ODONATA			
Argia		9	8
Enallagma		7	
Gomphus	-99	-99	1
Ischnura			-99
Libellula		-99	
Macromia	-99	1	
Progomphus obscurus	1		
TRICHOPTERA			
Nectopsyche	1	19	
Oecetis	1		2
Oxyethira			1
Uenoidae	-99		
TUBIFICIDA			
Aulodrilus	1		5
Tubificidae	2		1
VENEROIDEA			
Sphaeriidae	1	2	2

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503096], Station #4, Sample Date: 9/20/2005 4:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
"HYDRACARINA"				
Acarina				4
AMPHIPODA				
Hyalella azteca			21	11
ARHYNCHOBDELLIDA				
Erpobdellidae		-99		
COLEOPTERA				
Berosus		3		1
Dubiraphia		8	6	
Helichus lithophilus			1	
Macronychus glabratus				1
Scirtidae			19	4
Stenelmis	19		8	1
Tropisternus		1		
DIPTERA				
Ablabesmyia		3		
Ceratopogoninae		4		2
Chrysops			2	
Cladotanytarsus		1		
Clinotanypus		1		
Cricotopus/Orthocladius	1			
Cryptochironomus		1		
Cryptotendipes		1		
Dicrotendipes	2	6	1	22
Diptera	4			
Forcipomyiinae	2			
Glyptotendipes			2	1
Hemerodromia	8			1
Labrundinia		1	1	1
Nanocladius			2	
Parachironomus			3	
Paratanytarsus				4
Polypedilum convictum grp	9			
Polypedilum illinoense grp	4		4	1
Polypedilum scalaenum grp			1	
Procladius		5		2
Pseudochironomus		1		
Rheocricotopus	1			
Rheotanytarsus	1			1
Stempellinella		1		1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503096], Station #4, Sample Date: 9/20/2005 4:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Stenochironomus				2
Tabanus	2	-99	1	
Tanypus		1		
Tanytarsus	7	16	4	6
Thienemannimyia grp.	46		14	14
EPHEMEROPTERA				
Acentrella	4			
Acerpenna	18		1	
Baetis	32			
Brachycercus		1		
Caenis latipennis	75	246	196	231
Fallceon	12			
Hexagenia limbata		2		
Isonychia	5			
Stenacron	12	3		11
Stenonema femoratum		4		4
Stenonema pulchellum	7			
Tricorythodes	23			3
HEMIPTERA				
Belostoma			1	
Microvelia				1
Neoplea			1	
Pelocoris		-99		
Ranatra fusca		1		
Trichocorixa		12		1
LIMNOPHILA				
Fossaria	1			
Helisoma			-99	
Physella		-99	8	1
MEGALOPTERA				
Corydalus	-99			
ODONATA				
Argia	2	1	15	8
Coenagrionidae		1		
Enallagma			3	
Gomphidae		1		
Gomphus		-99		
Macromia			1	
Progomphus obscurus		-99		
TRICHOPTERA				
Cheumatopsyche	221		2	1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503096], Station #4, Sample Date: 9/20/2005 4:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Chimarra	9			
Hydropsyche	7			
Oecetis			1	
Polycentropodidae	19			
TRICLADIDA				
Planariidae	54			
TUBIFICIDA				
Aulodrilus		1		
Limnodrilus hoffmeisteri		1		
Tubificidae	3	5		5
UNIONIDA				
Unionidae		-99		
VENEROIDEA				
Sphaeriidae	6	4		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503097], Station #5, Sample Date: 9/21/2005 9:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
"HYDRACARINA"			
Acarina	1		2
AMPHIPODA			
Hyalella azteca	9	55	10
ARHYNCHOBDELLIDA			
Erpobdellidae	1		
COLEOPTERA			
Dubiraphia	10	19	10
Hydroporus	1		
Paracymus		1	
Scirtidae	1	24	14
Stenelmis	1		
DECAPODA			
Orconectes virilis	-99		
DIPTERA			
Anopheles	3	3	
Ceratopogoninae	7		3
Chaoborus		1	
Chrysops			1
Cryptochironomus	1	1	
Culex		1	
Dicrotendipes			2
Forcipomyiinae			1
Labrundinia		2	1
Polypedilum		1	
Polypedilum fallax grp		1	
Polypedilum illinoense grp		8	2
Polypedilum scalaenum grp			1
Procladius	3		
Stenochironomus			2
Stratiomys		1	
Tabanus		-99	
Tanytarsus	3		2
Thienemannimyia grp.		2	10
EPHEMEROPTERA			
Brachycercus	1		
Caenis latipennis	405	305	212
Callibaetis	1	1	1
Fallceon		1	
Heptageniidae			1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503097], Station #5, Sample Date: 9/21/2005 9:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Hexagenia limbata	9		
Leptophlebiidae	1		
Stenacron	2	5	7
Stenonema femoratum	2	3	3
Tricorythodes			1
HEMIPTERA			
Belostoma		1	
Corixidae	7		8
Microvelia		2	
Neoplea		1	
Ranatra fusca		1	
Rheumatobates		1	
LIMNOPHILA			
Ferrissia		1	
Helisoma		-99	
Physella	7	19	12
ODONATA			
Argia		6	3
Enallagma		4	
Gomphus	2		
TRICHOPTERA			
Cheumatopsyche		1	
Helicopsyche			1
Nectopsyche		4	
Oecetis	4	1	
TRICLADIDA			
Planariidae			1
TUBIFICIDA			
Aulodrilus	5		
Tubificidae	6		
VENEROIDEA			
Sphaeriidae	5		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503098], Station #6, Sample Date: 9/21/2005 1:00:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
AMPHIPODA			
Hyalella azteca	3	30	18
ARHYNCHOBDELLIDA			
Erpobdellidae		1	
COLEOPTERA			
Berosus	3	3	5
Dubiraphia	8	28	3
Helichus lithophilus			1
Hydroporus	1	2	
Laccophilus		2	
Scirtidae	1	12	16
Tropisternus	-99	-99	
DECAPODA			
Orconectes virilis	-99		
DIPTERA			
Ablabesmyia	7	3	2
Anopheles		4	
Ceratopogoninae	2	3	1
Chrysops		2	
Cladotanytarsus	6		2
Clinotanypus		3	
Cryptochironomus	12		
Dicrotendipes	21	2	55
Forcipomyiinae	1		8
Glyptotendipes		1	7
Labrundinia	1	2	
Nanocladius		1	4
Ormosia			1
Parachironomus		2	1
Paratanytarsus	1	1	
Phaenopsectra			2
Polypedilum fallax grp			1
Polypedilum halterale grp	1		
Polypedilum illinoense grp		17	7
Polypedilum scalaenum grp	1		
Procladius	27	9	7
Psychoda			4
Stempellinella	1		
Stenochironomus			1
Tanytarsus	34	2	30

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0503098], Station #6, Sample Date: 9/21/2005 1:00:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Thienemannimyia grp.		1	16
EPHEMEROPTERA			
Caenis latipennis	223	74	41
Callibaetis		3	
Hexagenia limbata	32		1
Leptophlebiidae			1
Paracloeodes	3	1	
Stenacron	4		8
Stenonema femoratum	3		8
HEMIPTERA			
Belostoma	-99	1	
Corixidae	42	3	11
Neoplea		1	
Trepobates	1		
Trichocorixa	8	1	
LIMNOPHILA			
Fossaria	1		
Physella	12	43	5
ODONATA			
Argia		3	5
Enallagma		6	1
Ischnura		1	
Progomphus obscurus	1		
TRICHOPTERA			
Oecetis	1	2	
TUBIFICIDA			
Aulodrilus	1	2	
Limnodrilus cervix	1		
Tubificidae	10	23	
VENEROIDEA			
Sphaeriidae	18	4	2

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0503099], Station #1a, Sample Date: 9/22/2005 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
AMPHIPODA				
Hyalella azteca			11	
ARHYNCHOBDELLIDA				
Erpobdellidae	1		-99	
COLEOPTERA				
Berosus	1			
Dubiraphia		6	13	1
Helichus lithophilus				3
Macronychus glabratus			3	6
Stenelmis sexlineata	40	8	1	
DECAPODA				
Orconectes virilis		1	-99	
DIPTERA				
Ablabesmyia		1		
Ceratopogoninae	1	1		
Chironomus		1		
Corynoneura	1			
Cricotopus bicinctus			1	
Cricotopus/Orthocladius	9		1	9
Cryptochironomus	3	1		
Dicrotendipes	1		1	10
Forcipomyiinae				13
Glyptotendipes	1		5	6
Gonomyia				1
Hemerodromia				3
Labrundinia			3	1
Microtendipes			1	
Nanocladius				2
Nilotanypus	4			
Parachironomus	2		2	
Paracladopelma		3		
Parametriocnemus	1			
Pentaneura	2		1	
Polypedilum	3			2
Polypedilum convictum grp	76	13		10
Polypedilum halterale grp	1	2		
Polypedilum illinoense grp	2	4	1	4
Psychoda				2
Rheotanytarsus	15	3	6	6
Simulium	3		1	

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0503099], Station #1a, Sample Date: 9/22/2005 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Stempellinella		8		1
Stenochironomus				9
Stictochironomus	2	1		
Tabanus	-99			
Tanytarsus	11	5	22	16
Thienemanniella	1		1	1
Thienemannimyia grp.	8		14	
EPHEMEROPTERA				
Acerpenna	39	7	3	20
Baetis	63	10		6
Caenis latipennis	55	140	253	46
Fallceon	65	10	1	7
Heptagenia	2			
Heptageniidae	2	3		8
Isonychia rufa	5	1	1	1
Leucrocuta	14	5		
Paracloeodes			1	
Procloeon		3		
Stenacron	25	7	3	19
Stenonema femoratum	14	4		6
Tricorythodes	2		1	1
HEMIPTERA				
Belostoma			-99	
MEGALOPTERA				
Corydalus	-99			
ODONATA				
Argia		1	11	1
Enallagma			3	
Gomphus		1		
Macromia			-99	
Progomphus obscurus		-99		
TRICHOPTERA				
Cheumatopsyche	54	28	5	17
Helicopsyche				1
Hydropsyche	1			1
Hydroptila	1			
Nectopsyche		1	3	
Nyctiophylax				2
TUBIFICIDA				
Enchytraeidae	1			

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0503099], Station #1a, Sample Date: 9/22/2005 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Tubificidae	8	10		
VENEROIDEA				
Sphaeriidae	10	4	5	

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0503100], Station #1b, Sample Date: 9/22/2005 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
N/A				
Gordiidae			1	
AMPHIPODA				
Hyalella azteca	2		12	1
ARHYNCHOBDELLIDA				
Erpobdellidae	1			1
COLEOPTERA				
Berosus			1	
Dubiraphia	1	8	9	
Hydroporus			1	
Macronychus glabratus			1	
Stenelmis	31	1		
DIPTERA				
Ablabesmyia		3		
Ceratopogoninae		1		
Chrysops	1			
Cladotanytarsus		8		1
Corynoneura		1		
Cricotopus/Orthocladius	1		1	7
Cryptochironomus		8		
Dicrotendipes	1	1		26
Dolichopodidae		1		
Glyptotendipes			2	6
Hemerodromia	2			1
Labrundinia	1		2	1
Nanocladius		3	1	
Nilotanypus	1			
Pentaneura			1	
Phaenopsectra			1	
Polypedilum	1			
Polypedilum convictum grp	49			3
Polypedilum halterale grp	4	6	1	
Polypedilum illinoense grp	5	2	4	1
Pseudochironomus		1		
Rheotanytarsus	8		4	10
Saetheria	1			
Stempellinella		3		
Stenochironomus				14
Stictochironomus		1		
Tabanus	5			

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0503100], Station #1b, Sample Date: 9/22/2005 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Tanytarsus	5	9	9	12
Thienemanniella	1			
Thienemannimyia grp.	7	1	10	6
Tribelos				2
EPHEMEROPTERA				
Acerpenna	49		5	19
Baetis	70			2
Brachycercus		1		
Caenis latipennis	60	216	194	42
Fallceon	34		1	3
Isonychia rufa	6			1
Leucrocuta	20	1		
Paracloeodes				1
Procloeon	1	1		
Pseudocloeon			2	
Stenacron	22		6	15
Stenonema femoratum	10	5		1
Tricorythodes	5			3
LIMNOPHILA				
Physella	2		2	
LUMBRICINA				
Lumbricina	-99		1	
MEGALOPTERA				
Corydalus	-99			
ODONATA				
Argia	1		14	1
Calopteryx			5	
Enallagma			11	
Ischnura	1			
Macromia			-99	
Progomphus obscurus		2		
RHYNCHOBDELLIDA				
Glossiphoniidae				1
TRICHOPTERA				
Cheumatopsyche	142		1	4
Nectopsyche			10	
Oecetis			2	
TRICLADIDA				
Planariidae	3		1	
TUBIFICIDA				

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0503100], Station #1b, Sample Date: 9/22/2005 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Enchytraeidae	1			
Limnodrilus hoffmeisteri	2			
Tubificidae	57	7	2	5
VENEROIDEA				
Sphaeriidae	39		2	1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602619], Station #1a, Sample Date: 3/27/2006 11:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
AMPHIPODA			
Hyalella azteca	4	10	-99
COLEOPTERA			
Dineutus		-99	
Dubiraphia		1	1
Helichus lithophilus		1	
Hydroporus	4		
Macronychus glabratus			1
Peltodytes	3		
Scirtidae		2	
DIPTERA			
Ablabesmyia	15	1	1
Ceratopogoninae	4	5	1
Cladotanytarsus	1		
Corynoneura	2	1	
Cricotopus bicinctus	1	16	3
Cricotopus/Orthocladius	11	23	48
Cryptochironomus	6		
Cryptotendipes	1		
Dicrotendipes	4	2	46
Diptera	1		
Glyptotendipes			1
Gonomyia	1		
Hemerodromia			2
Hydrobaenus	37	1	19
Nanocladius		4	
Ormosia		1	
Paracladopelma	1		
Parakiefferiella			1
Paralauterborniella	1		
Paraphaenocladius	1	3	
Paratanytarsus	5	9	4
Polypedilum convictum grp		3	8
Polypedilum illinoense grp	4	12	6
Polypedilum scalaenum grp	2		
Procladius	6		
Rheotanytarsus	4	17	12
Simulium	4	23	34
Stenochironomus			8
Tabanus		-99	

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602619], Station #1a, Sample Date: 3/27/2006 11:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Tanytarsus	44	62	54
Thienemanniella		14	6
Thienemannimyia grp.	5	14	14
Tipula		-99	
Zavrelimyia	4	1	
EPHEMEROPTERA			
Acerpenna	3	17	2
Caenis latipennis	79	23	20
Heptagenia	2	6	3
Hexagenia	2		
Isonychia		1	
Leptophlebia	1	4	-99
Stenacron	6	8	3
Stenonema femoratum			-99
Stenonema terminatum	3		3
Tricorythodes	1		
HEMIPTERA			
Belostoma		-99	
Trichocorixa	3		
LIMNOPHILA			
Physella		3	
LUMBRICINA			
Lumbricina		1	
ODONATA			
Argia	4	3	1
Calopteryx	1	1	
Enallagma		1	
Gomphus	3		
Ischnura	-99	1	1
TRICHOPTERA			
Cheumatopsyche	2	10	21
Nectopsyche	4	6	1
TUBIFICIDA			
Enchytraeidae	1	1	
Limnodrilus cervix	2		
Limnodrilus hoffmeisteri	2	2	
Tubificidae	3		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602620], Station #1b, Sample Date: 3/27/2006 11:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
AMPHIPODA			
Hyalella azteca		15	2
COLEOPTERA			
Dineutus		-99	
Dubiraphia		2	
Hydroporus	3		
Macronychus glabratus			1
Peltodytes	9	-99	
Scirtidae		2	1
Stenelmis	1		
DIPTERA			
Ablabesmyia	4	1	1
Ceratopogoninae	11	11	
Cladotanytarsus	1	2	1
Corynoneura	1	2	
Cricotopus bicinctus	1	6	2
Cricotopus/Orthocladius	5	10	36
Cryptochironomus	5		1
Cryptotendipes	6	1	
Diamesa			1
Dicrotendipes	3	3	75
Diptera	1		1
Glyptotendipes			1
Hemerodromia		1	
Hydrobaenus	46	2	17
Labrundinia		3	
Nanocladius	1	1	1
Paracladopelma	2		
Paralauterborniella	9	1	
Paraphaenocladius		2	
Paratanytarsus	4	13	7
Phaenopsectra		2	8
Polypedilum		1	
Polypedilum convictum grp	1	5	5
Polypedilum fallax grp			4
Polypedilum halterale grp	1		1
Polypedilum illinoense grp	4	18	4
Polypedilum scalaenum grp	7		8
Procladius	9	1	
Rheotanytarsus		27	6

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602620], Station #1b, Sample Date: 3/27/2006 11:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Saetheria			2
Simulium		21	7
Stenochironomus			3
Tabanus		1	
Tanytarsus	42	54	94
Thienemanniella	1	7	2
Thienemannimyia grp.	3	17	28
Tribelos			1
Zavrelimyia			1
EPHEMEROPTERA			
Acerpenna	1	19	1
Caenis latipennis	18	42	9
Callibaetis	1		
Fallceon			1
Heptagenia		6	2
Hexagenia limbata	5	1	
Leptophlebia	-99	3	-99
Stenacron	1	7	10
Stenonema terminatum	1	5	1
Tricorythodes		1	
HEMIPTERA			
Belostoma		-99	-99
Ranatra fusca		1	
Trichocorixa	50		
LIMNOPHILA			
Physella		1	-99
ODONATA			
Argia		3	2
Calopteryx		-99	
Enallagma		-99	
Gomphidae	-99	-99	
Ischnura		2	
TRICHOPTERA			
Cheumatopsyche		5	3
Hydropsyche		1	
Nectopsyche		8	
TUBIFICIDA			
Branchiura sowerbyi	3	1	
Enchytraeidae		1	1
Limnodrilus cervix	2		
Limnodrilus claparedianus	2		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602620], Station #1b, Sample Date: 3/27/2006 11:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Limnodrilus hoffmeisteri	3	2	
Tubificidae	7		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602626], Station #2, Sample Date: 3/27/2006 3:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
AMPHIPODA				
Crangonyx			-99	
Hyalella azteca		1	5	4
COLEOPTERA				
Berosus			3	
Dubiraphia	2		8	1
Helichus lithophilus	1		4	1
Hydroporus		2	1	
Macronychus glabratus			2	
Peltodytes		7		
Scirtidae			1	
DIPTERA				
Ablabesmyia			5	1
Ceratopogoninae	2	5	3	
Chrysops	-99		-99	1
Cladotanytarsus	2	10		1
Corynoneura	3	1	4	1
Cricotopus bicinctus	10	4	9	6
Cricotopus/Orthocladius	146	9	18	67
Cryptochironomus	2	5	2	
Cryptotendipes		8		
Diamesa	5			1
Dicrotendipes	26	7	6	27
Diplocladius	1			
Diptera				1
Gonomyia				1
Hemerodromia	1			
Hydrobaenus	89	24	4	44
Labrundinia			1	
Larsia	2			
Nanocladius			8	
Ormosia	8	2	2	2
Paracladopelma		3		
Paralauterborniella		2		
Parametriocnemus	7			1
Paraphaenocladius	1			
Paratanytarsus	1	1	10	
Paratendipes	2	3		
Phaenopsectra				1
Polypedilum convictum grp	41		4	7

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602626], Station #2, Sample Date: 3/27/2006 3:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Polypedilum fallax grp				3
Polypedilum halterale grp	10	13		
Polypedilum illinoense grp	4	1	3	4
Polypedilum scalaenum grp	4	6		
Procladius		6		1
Rheotanytarsus	10		15	4
Saetheria	55	2	1	
Simulium	63	1	2	12
Stenochironomus				5
Stictochironomus	1	1		
Tabanus	-99		1	
Tanytarsus	61	51	47	22
Thienemanniella	34	1	8	4
Thienemannimyia grp.	13	1	15	7
Tipula			-99	
Zavrelimyia		1	2	
EPHEMEROPTERA				
Acerpenna	38	1	11	4
Caenis latipennis	41	105	239	29
Callibaetis				1
Fallceon	4			
Heptagenia	5		4	11
Hexagenia limbata		8	-99	
Leptophlebia		-99	-99	
Stenacron	2	3	4	10
Stenonema femoratum		-99		
Stenonema terminatum	7	1	1	2
Tricorythodes	2		1	1
HEMIPTERA				
Trichocorixa		3		
LIMNOPHILA				
Physella			-99	
ODONATA				
Argia			13	1
Calopteryx			-99	1
Enallagma			1	
Gomphus		-99	-99	-99
Ischnura			1	
Progomphus obscurus		-99		-99
TRICHOPTERA				
Cheumatopsyche	3		12	10

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602626], Station #2, Sample Date: 3/27/2006 3:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Hydroptila	2			
Nectopsyche		1	10	1
TUBIFICIDA				
Branchiura sowerbyi		-99		
Enchytraeidae	4	1	2	
Limnodrilus cervix		1		
Limnodrilus claparedianus	1	1		
Limnodrilus hoffmeisteri	2			1
Tubificidae	4	4	1	3
VENEROIDEA				
Sphaeriidae			-99	

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602627], Station #3, Sample Date: 3/28/2006 8:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
"HYDRACARINA"			
Acarina			1
AMPHIPODA			
Hyalella azteca	4	6	11
COLEOPTERA			
Berosus	1	1	
Dubiraphia		1	
Helichus basalis		1	
Hydroporus	1		2
Laccophilus		2	
Peltodytes		1	
Tropisternus		-99	
DIPTERA			
Ablabesmyia	7	1	1
Ceratopogoninae	4	2	
Cladotanytarsus	3		2
Clinocera	1	1	
Corynoneura	2		
Cricotopus bicinctus	8	46	24
Cricotopus/Orthocladius	12	20	46
Cryptochironomus	1		
Cryptotendipes	1		
Dicrotendipes	10	3	20
Hemerodromia			1
Hydrobaenus	10	3	24
Labrundinia			1
Larsia		1	
Nanocladius			3
Ormosia	7		1
Paraphaenocladius		4	3
Paratanytarsus		3	2
Phaenopsectra	2		2
Polypedilum convictum grp	1		1
Polypedilum halterale grp	4		
Polypedilum illinoense grp	3	10	9
Polypedilum scalaenum grp	1		
Pseudochironomus	1		1
Simulium		5	2
Stenochironomus			1
Tanytarsus	16	9	4

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602627], Station #3, Sample Date: 3/28/2006 8:30:00 AM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Thienemanniella			1
Thienemannimyia grp.	6	9	9
Tipula		1	
EPHEMEROPTERA			
Acerpenna	4		2
Caenis latipennis	160	216	84
Hexagenia limbata		-99	
Isonychia rufa			1
Leptophlebia		-99	
Stenacron	2		8
Stenonema femoratum	1	2	11
Stenonema terminatum	1		5
Tricorythodes			1
HEMIPTERA			
Trichocorixa	5		
LIMNOPHILA			
Fossaria	1		1
Physella			4
ODONATA			
Argia			1
Calopteryx		-99	
Gomphus	-99		
Ischnura		1	
Macromia	-99		
Progomphus obscurus	-99	-99	
TRICHOPTERA			
Cheumatopsyche	1		5
Hydroptila			1
Uenoidae	-99		
TUBIFICIDA			
Enchytraeidae	2		
Tubificidae	3		1
VENEROIDEA			
Sphaeriidae	-99		

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602628], Station #4, Sample Date: 3/28/2006 10:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
"HYDRACARINA"				
Acarina	1		1	
AMPHIPODA				
Crangonyx			1	
Hyalella azteca	3	8	24	2
COLEOPTERA				
Dineutus		-99	-99	
Dubiraphia		2	3	3
Enochrus			1	
Gyrinus			1	
Hydroporus		2	4	2
Peltodytes		2	1	
Scirtidae			5	
Stenelmis	2			
Tropisternus			-99	
DIPTERA				
Ablabesmyia		3	1	
Ceratopogoninae	16	29	4	5
Chrysops	1		1	
Cladotanytarsus		9		2
Clinotanypus	1			
Corynoneura	3			
Cricotopus bicinctus	25	4	13	4
Cricotopus/Orthocladius	126	9	16	10
Cryptochironomus	4	7		1
Diamesa	2			
Dicrotendipes	11	6	5	30
Endochironomus				1
Glyptotendipes				3
Gonomyia			2	
Hemerodromia	6			
Hydrobaenus	52	34	16	9
Kiefferulus				1
Labrundinia			1	
Larsia	2	1		
Nanocladius	2		12	
Ormosia	7			
Paracladopelma		1		1
Parametriocnemus	2		1	
Paraphaenocladius	6		6	3

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602628], Station #4, Sample Date: 3/28/2006 10:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Paratanytarsus		1	6	2
Paratendipes	1	1		
Phaenopsectra			1	1
Polypedilum convictum grp	16	1		
Polypedilum halterale grp	2	2		1
Polypedilum illinoense grp	8	1	4	3
Polypedilum scalaenum grp	2	1		
Procladius	1	4	2	1
Pseudosmittia				1
Rheotanytarsus			2	
Simulium	80		1	3
Stenochironomus				6
Stictochironomus		1		
Tabanus	-99			
Tanytarsus	34	18	12	8
Thienemanniella	2			
Thienemannimyia grp.	25	3	16	18
Tipula	-99			
EPHEMEROPTERA				
Acerpenna	10			
Caenis latipennis	128	178	194	105
Fallceon	3			
Hexagenia limbata		1		
Leptophlebia			-99	
Stenacron	2			5
Stenonema femoratum	2	1		2
Tricorythodes	2			
HEMIPTERA				
Belostoma			2	
Microvelia			1	
Sigara		3		
Trichocorixa		6		4
LEPIDOPTERA				
Noctuidae	1			
LIMNOPHILA				
Fossaria	-99		11	12
Physella		1	10	3
ODONATA				
Argia			6	
Calopteryx			-99	
Enallagma		-99	3	

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602628], Station #4, Sample Date: 3/28/2006 10:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Gomphus		-99		
Ischnura			-99	
Libellula		-99		
Progomphus obscurus		-99		
PLECOPTERA				
Perlidae	1			
TRICHOPTERA				
Cheumatopsyche	9		-99	3
Hydroptila	1			
Nectopsyche			1	
TRICLADIDA				
Planariidae	5			
TUBIFICIDA				
Limnodrilus claparedianus				1
Limnodrilus hoffmeisteri	2	1	1	
Tubificidae	1	6		1
VENEROIDEA				
Sphaeriidae	2	8	2	1

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602629], Station #5, Sample Date: 3/28/2006 1:15:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
"HYDRACARINA"			
Acarina	1	1	1
AMPHIPODA			
Crangonyx		-99	
Hyalella azteca	2	81	80
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
COLEOPTERA			
Berosus	1	1	
Dubiraphia	8	8	1
Enochrus			1
Helichus lithophilus		1	
Hydroporus	1	1	
Laccophilus		3	
Peltodytes		1	
Scirtidae		2	
Tropisternus		1	
DIPTERA			
Ablabesmyia	5		1
Ceratopogoninae	3	1	
Chrysops	1		
Cricotopus bicinctus		2	
Cricotopus/Orthocladius	3	6	
Cryptochironomus	1		
Dicrotendipes	3	1	6
Hydrobaenus	11	4	1
Nanocladius	2	2	1
Paraphaenocladius	1	1	1
Paratanytarsus	1	2	2
Phaenopsectra			1
Polypedilum halterale grp	10		
Polypedilum illinoense grp	2	8	1
Procladius	4	2	2
Stenochironomus			7
Tanytarsus	15	3	1
Thienemannimyia grp.	2	9	5
Tipula			1
EPHEMEROPTERA			
Caenis latipennis	373	106	66
Hexagenia limbata	4	-99	

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602629], Station #5, Sample Date: 3/28/2006 1:15:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Leptophlebia		-99	
HEMIPTERA			
Belostoma		-99	
Microvelia			1
Ranatra		1	
Trichocorixa	2		1
LIMNOPHILA			
Ancylidae		1	
Fossaria		18	2
Physella	5	44	15
ODONATA			
Gomphus	-99	1	
Plathemis	-99		
Progomphus obscurus	-99		
TRICHOPTERA			
Oecetis	1		
TUBIFICIDA			
Aulodrilus	1	1	1
Ilyodrilus templetoni		1	
Limnodrilus cervix		1	
Limnodrilus hoffmeisteri		5	
Tubificidae	1	8	
UNIONIDA			
Unionidae	-99		
VENEROIDEA			
Sphaeriidae	3		7

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602630], Station #6, Sample Date: 3/28/2006 2:45:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
"HYDRACARINA"			
Acarina			1
AMPHIPODA			
Hyalella azteca	3	6	3
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BRANCHIOBDELLIDA			
Branchiobdellida			1
COLEOPTERA			
Berosus	1	1	
Dubiraphia	10	9	6
Enochrus		2	1
Helichus lithophilus		5	4
Hydrobius		1	
Hydroporus	3		1
Laccophilus		2	1
Paracymus		2	
Scirtidae		9	4
Stenelmis		7	
Tropisternus		2	
DECAPODA			
Orconectes virilis	1		
DIPTERA			
Ablabesmyia	3	1	3
Ceratopogoninae	64	4	1
Chrysops	1	2	
Cladotanytarsus	10	1	
Cricotopus bicinctus	1	10	1
Cricotopus/Orthocladius	13	3	2
Cryptochironomus	8	5	
Cryptotendipes	1		
Dicrotendipes	15	5	56
Glyptotendipes			15
Hydrobaenus	20	4	11
Labrundinia		1	
Microtendipes	1		
Nanocladius		15	1
Paralauterborniella	1		
Parametriocnemus		1	
Paraphaenocladius		5	12

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602630], Station #6, Sample Date: 3/28/2006 2:45:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
Paratanytarsus	2		4
Phaenopsectra	1	1	
Polypedilum convictum grp	1		
Polypedilum fallax grp			1
Polypedilum halterale grp	9		
Polypedilum illinoense grp	8	11	4
Polypedilum scalaenum grp	2		
Procladius	11	3	1
Tanytarsus	40	15	21
Thienemannimyia grp.	4	18	18
Tipula			1
Tribelos			3
EPHEMEROPTERA			
Caenis latipennis	111	44	48
Hexagenia limbata	7	1	
Stenacron	3	2	4
Stenonema femoratum	1	2	2
HEMIPTERA			
Microvelia		2	
Sigara	1		
Trichocorixa	1		
LIMNOPHILA			
Fossaria		11	10
Physella	4	55	18
ODONATA			
Argia		1	1
Gomphus	-99		
Ischnura			1
Progomphus obscurus	-99		
RHYNCHOBDELLIDA			
Glossiphoniidae	-99		
TRICLADIDA			
Planariidae		1	
TUBIFICIDA			
Aulodrilus	1		
Enchytraeidae		1	
Ilyodrilus templetoni		1	
Limnodrilus cervix		1	1
Limnodrilus hoffmeisteri	2	5	
Tubificidae	20	23	4

Aquid Invertebrate Database Bench Sheet Report
Third Fk Platte R [0602630], Station #6, Sample Date: 3/28/2006 2:45:00 PM
NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	NF	RM	SG
VENEROIDEA			
Sphaeriidae	5	15	2

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0602631], Station #1, Sample Date: 3/29/2006 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
AMPHIPODA				
Hyalella azteca	1		26	1
ARHYNCHOBDELLIDA				
Erpobdellidae	1		-99	
COLEOPTERA				
Dubiraphia			2	1
Neoporus			2	
Stenelmis	26			
DECAPODA				
Orconectes virilis		-99	-99	
DIPTERA				
Ablabesmyia		5	2	3
Ceratopogoninae		1	2	
Chrysops		-99	1	
Cladotanytarsus		4		
Corynoneura	5	2	3	
Cricotopus bicinctus	1		8	2
Cricotopus/Orthocladius	449	80	52	262
Cryptochironomus	5	5		1
Cryptotendipes		9		
Diamesa	19			3
Dicrotendipes				22
Diptera				1
Eukiefferiella brevicalcar grp	24		2	5
Glyptotendipes				2
Hydrobaenus	12	76	3	15
Kiefferulus				1
Labrundinia			3	
Nanocladius	7	3	21	7
Nilotanypus	1			
Paralauterborniella		8		
Paraphaenocladius	1	1	1	2
Paratanytarsus		2	5	3
Phaenopsectra	1		3	3
Polypedilum				2
Polypedilum convictum grp	23		1	1
Polypedilum fallax grp				2
Polypedilum halterale grp		8		1
Polypedilum illinoense grp	21	1	26	30
Polypedilum scalaenum grp		4		

Aquid Invertebrate Database Bench Sheet Report
Castile Ck [0602631], Station #1, Sample Date: 3/29/2006 8:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; SG = Woody Debris; -99 = Presence

ORDER: TAXA	CS	NF	RM	SG
Pseudochironomus				1
Rheocricotopus	1			1
Rheotanytarsus	12	1	11	9
Saetheria	18			1
Simulium	60		5	7
Stenochironomus				1
Stictochironomus		4		
Tabanus	-99			
Tanytarsus	9	30	21	32
Thienemanniella	1			3
Thienemannimyia grp.	11	1	6	13
EPHEMEROPTERA				
Acerpenna	21		8	2
Caenis latipennis	6	32	81	30
Fallceon	16		3	2
Heptagenia	1			1
Heptageniidae	1	4		
Stenacron	5	10	1	30
Stenonema femoratum	4	2	2	4
LIMNOPHILA				
Physella			-99	
ODONATA				
Argia			4	2
Enallagma			4	
Epicordulia				1
Libellula			1	
Nasiaeschna pentacantha			-99	
PLECOPTERA				
Allocapnia	1			
TRICHOPTERA				
Cheumatopsyche	5	2	1	4
Nectopsyche			1	
TRICLADIDA				
Planariidae	1			
TUBIFICIDA				
Enchytraeidae	15			3
Limnodrilus hoffmeisteri	2			
Tubificidae	18	1	1	
VENEROIDEA				
Sphaeriidae	2		-99	