IDENTIFICATION OF REFUGIA HABITAT, FAUNAL SURVEY OF COLLECTION AREAS, AND MONITORING OF RIPARIAN AND STREAM HABITAT AND BIOTIC COMMUNITIES IN THE WICHITA RIVER BASIN, TEXAS

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STUDY OBJECTIVES

The objectives of this study are to (1) conduct a faunal survey of brine emission areas (Areas VII, VIII, and X) in the North Wichita River, the Middle Fork of the Wichita River, and South Wichita River; (2) identify locations of refugia pools in the North and South Wichita river; (3) provide updated physical and chemical profiles of the Wichita River, including baseline habitat and fishery data for refugia pools; (4) update stream fisheries community information for the Wichita River and its major tributaries (North Wichita River, the Middle Fork of the Wichita River, and South Wichita River); and (5) document and characterize stream habitats in the Wichita River and its major tributaries. This information will be used to assess potential affects of the Red River Chloride Control Project, Wichita River Only Portion on aquatic communities within the Wichita River drainage.

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SUMMARY

Locations of potential salt springs in the chloride brine emission areas (Areas VII, VIII, and X) of the Red River Chloride Control Project, Wichita River Only Portion, in the Wichita River drainage, Texas, were surveyed. Seventeen distinct springs were located in the North and South Wichita rivers, of which four were large enough to allow sampling of aquatic organisms during spring, summer, and fall 2005. These springs generally were small, saline, and contained no zooplankton and a depauperate invertebrate fauna composed of cosmopolitan forms. Seventeen permanent sampling sites were established in the Wichita River and its major tributaries. The sites were marked with permanent monuments, for which GPS coordinates were recorded, to allow long-term sampling and monitoring of the fish assemblage and stream characteristics at fixed locations. Fish assemblages were sampled during spring, summer, and fall 2005 at these sites and assessed stream channel characteristics. Thirty species of fishes and one hybrid combination were collected. Red River pupfish was the most commonly collected species and represented 62% of fishes collected. Other common fishes included plains killifish (13% of fishes collected) red shiner (5%), Red River shiner (2%), speckled chub (2%), and mosquitofish (2%). Collectively these seven species represented 92% of the fishes collected. Most measures of stream size and vegetative cover decreased from the lower Wichita River upstream to the upper reaches of the North Wichita River, Middle Fork of the Wichita River, and South Wichita River. Because the summer and fall of 2005 was unusually wet, the river channel dried in only a few locations, precluding identification and sampling of stream refugia. An aerial survey of the Wichita River and its major tributaries was conducted in March 2006. Video footage shot during this survey was used to identify a minimum of 505 potential dry-season refugia within the areas most likely to be affected by chloride control projects in the Wichita

River system. During August and September 2006, pools formed in the South Fork Wichita River. Habitat variables were measured in refugia pools in three locations and fish assemblages were sampled until flows resumed. Species richness, abundance, and presence of fish changed dramatically over time in the sampled refugia. No systematic changes in water chemistry were noted; however, morning dissolved oxygen concentrations in several refugia were less than 0.5 mg/l. Changes in the fish assemblage appear to be related to transient periods of low oxygen concentrations.

1.0 INTRODUCTION

During the Permian period, which lasted from 290 to 248 million years ago, inland seas covered extensive portions of southern Oklahoma and Texas. At the end of the Permian, these seas receded leaving behind extensive deposits of marine evaporites (Joerns 1961; Sonnenfeld 1984). Much of the Red River drainage basin of southern Oklahoma and north-central Texas is underlain by these ancient marine deposits. As a result of spring seepage and dissolution of exposed deposits, many tributaries of the Red River, including the Wichita River of north-central Texas (Lewis and Dalquest 1957; Joerns 1961), contain high loads of dissolved solids, particularly sodium chloride that limits their usefulness as water supplies for agricultural, industrial, and municipal uses.

Within the Wichita River drainage basin naturally occurring brines are composed primarily of sodium chloride with a high sulfate concentration (USACE 1972), which reflects their marine origin. Chloride concentrations in springs and seeps within the drainage range from 5,000 to 30,000 mg/l, but chloride concentrations in deep aquifers may exceed 100,000 mg/l (Garza 1983). Chloride concentrations in localized springs can be as high as 170,000 mg/l (Lewis and Dalquest 1957).

The U.S. Army Corps of Engineers, Tulsa District, has begun construction of a number of chloride control facilities to intercept and dispose of these saline inflows to the Wichita River and its tributaries (USACE 2002). Construction and operation of the Wichita River portion of the authorized Red River Chloride Control Project will intercept naturally occurring brines using a combination of dikes and inflatable weirs and will pump these brines to the Truscott brine disposal lake. Operation of these control structures is

expected to considerably reduce salinity in the Wichita River and affected tributaries (e.g., Baldys et al. 1996).

The Red River Chloride Control Project, Wichita River Only Portion will comprise three chloride control structures within the Wichita River basin: the Y Ranch low flow dam (North Wichita River), the Lowrance low flow dam (Middle Fork of the Wichita River), and the Bateman low flow dam (South Wichita River). Construction of the Bateman Collection Dam, pumping facility, and pipeline (Area VIII) began in 1976 and the facility became operational in 1987. The Lowrance low flow dam and pump station have been constructed, but have never been operated. Construction has not yet begun on the Y Ranch collection facility, pumping station, or pipeline.

Baldys et al. (1996) examined concentrations of total dissolved solids and chloride at several sites on the South Wichita and Wichita rivers. They reported that operation of the Bateman chloride control facility had significantly reduced chloride and dissolved solids concentrations at all sites studied. Because the fish fauna of the Wichita River is adapted to the variable salinities and flow regimes of the river and its tributaries; the composition of local assemblages often is strictly defined by salinity tolerances (Echelle et al. 1972; Higgins and Wilde 2005). Therefore, any change in either salinity concentrations or variability in salinity may alter species interactions, causing displacements or other changes in the fish assemblage (Echelle et al. 1972; Taylor et al. 1993; Ostrand and Wilde 2002, 2004). Additionally, hydrologic models indicate that reductions in base flows associated with chloride control projects would increase the number of days, in an average year, that no-flow conditions occur in most reaches of the river. During periods of no flow, fishes would be restricted to various refugia including

pools and backwaters. An increase in the duration and intensity of competitive and, especially, predator-prey interactions in these restricted habitats may affect the composition and structure of local fish assemblages. Prolonged restriction of fishes to pools may increase their exposure to high water temperatures and low dissolved oxygen concentrations common in isolated pools, potentially resulting in changes in the structure and composition of local assemblages (Matthews 1984; Ostrand and Wilde 2002, 2004).

The purposes of this study are to conduct a faunal survey of chloride collection areas (Areas VII, VIII, and X) in the North Wichita River, the Middle Fork of the Wichita River, and South Wichita River; (2) identify locations of refugia pools in the North and South Wichita river; (3) provide updated physical and chemical profiles of the Wichita River, including baseline data for refugia pools; and (4) update stream fisheries community information for the Wichita River and its major tributaries (North Wichita River, the Middle Fork of the Wichita River, and South Wichita River).

2.0 STUDY AREA

The Wichita River drains approximately 8,909 km^2 of arid and semi-arid grasslands in north-central Texas. The river rises in intermittent streams and springs on the east slope of the Llano Estacado and flows generally east and northeast for approximately 402 km before discharging into the Red River. The Wichita River has three main forks: the North Wichita River, the Middle Fork of the Wichita River, and the South Wichita River. The North Wichita River rises 10 km east of East Afton in northeast Dickens County and flows east and southeast about 160 km before joining the South Wichita River 24 km northwest of Seymour, in northeast Knox County, to form the Wichita River proper. The Middle Fork of the Wichita River rises near U.S. Highway 83, north of Fourmile Hill in north central King County, and flows northeast 56 km where it joins the North Wichita River, 10 km southwest of Foard City. The South Wichita River rises 16 km east of Dickens in east central Dickens County and flows east for 176 km before joining the North Wichita River. A map of the study area, in north-central Texas is presented as Figure 1.

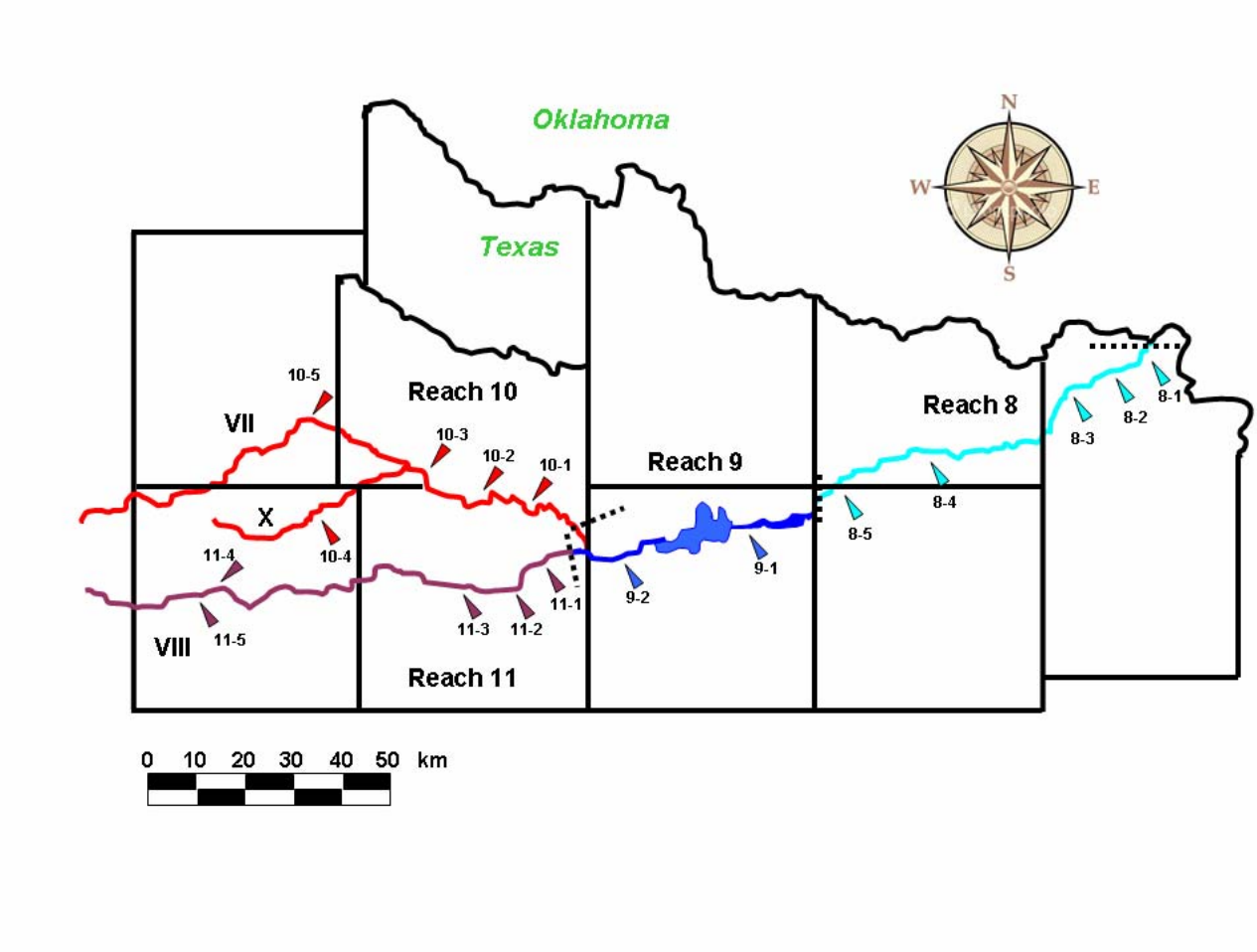

Figure 1. Map of the Wichita River (Reaches 8 and 9) study area including the North Wichita River (Reach 10), Middle Fork of the Wichita River (Reach 10), and South Wichita River (Reach 11). Reach boundaries are denoted by dashed lines and sampling sites are indicated by arrows. Hyphenated numbers indicate sampling sites within each reach. Salt spring and seep areas are labeled with Roman numerals denoting areas VII, VIII, and X.

3.0 METHODS

3.1 Faunal Surveys of Brine Collection Areas

Faunal surveys were conducted in identifiable spring sources within brine collection areas in the North Wichita River (area VII, Figure 1), Middle Fork of the Wichita River (area VIII), and South Wichita River (area VIII). The purpose of these surveys was to determine species composition and relative abundance of algae, aquatic invertebrates, fish, aquatic reptiles and amphibians. Springs were located using site descriptions presented by Lewis and Dalquest (1957) and by walking or canoeing the river.

Faunal surveys of spring sources were conducted during three seasons (spring, summer, and fall of 2005) using a variety of gears to insure that all species present would be sampled. Zooplankton and other micro-invertebrates were sampled using a 63 μm-mesh plankton net. Because of the small size of the springs, zooplankton samples were collected disturbing the spring substrate to dislodge benthic forms and then filtering 4 to 5 l of water through the plankton net. Larger invertebrates, fishes, amphibians, and reptiles were sampled with seines and dip nets. Depending on the size of the spring, sampling effort for invertebrates ranged from 5 to 20 min. Voucher specimens collected at each site were anesthetized in a lethal dose (500 mg/l) of MS-222 and preserved in 10% buffered formalin (fish) or 70% ethanol (invertebrates, amphibians, and reptiles). Collection methods for algae, aquatic invertebrates, and fish followed the methods recommended by (Moulton et al. 2002). Reptiles and amphibians were sampled with seines and dip nets. GPS coordinates of springs were recorded and on each sampling date, a digital photograph

of each spring area was taken to document the nature, size, and general condition of spring habitats.

3.2 Fish Community Structure and Composition in the Wichita River in Reaches 8, 9, 10, 11

An attempt was made to establish four to five baseline sampling sites within each target river reach (Reach 8- Wichita River downstream from Lake Diversion, Reach 9- Wichita River upstream from Lake Diversion, Reach 10- North Wichita River and Middle Fork of the Wichita River, and Reach 11 (South Wichita River). Sampling sites were chosen based on (i) access, (ii) long-term availability, (iii) the likelihood of obtaining representative samples of the fish assemblage, and (iv) the diversity of habitat types present with and among sites within reaches. Site collection criteria included a history of sampling at that site and an attempt was made to distribute sampling sites throughout each reach. Site descriptions are presented in Appendix A.

The fish community structure and composition was sampled at each site during three seasons (spring, summer, and fall 2005). At each site, fish were collected from a 150 to 300-m length of stream at wadeable sites and a 500 to 1000-m length of stream at nonwadeable sites following the methods of Fitzpatrick et al. (1998) and Meador et al. (1993). At each sampling location, sampling reaches were selected based on stream width, geomorphology (riffle, run, or pool), and presence/absence of local habitat disturbances (bridges or pipelines). Stream wetted-channel width was measured at three sites within each proposed reach. The length of the sampling reach was determined as the mean wetted-channel width multiplied by 20. For sites with exceptionally narrow or wide

channels, the minimum and maximum reach lengths sampled were 150 and 300 m (Fitzpatrick et al. 1998; Meador et al. 1993), respectively. A permanent marker was placed at lower and upper ends of the sampling reach and GPS coordinates of the markers were recorded. Locations of sampling areas are shown in Figure 1.

Fishes were sampled using a 3 x 1.2-m seine with a mesh size of 6.4 mm. Seining was used because it is recommended for characterization of assemblages of small fishes (Bayley and Herendeen 2000). Each sampling reach was sampled in an upstream direction in order to minimize disturbances to un-sampled portions of the stream; however, seine sampling was conducted in a downstream direction, with the current. Water quality measurements (temperature, dissolved oxygen, conductivity, and turbidity) were made at each site. Within the reach boundaries, a minimum of nine 30-m seine hauls were made with an attempt made to include a representative sample of the geomorphic channel units present in the reach. After each seine haul, net time was recorded and the contents of each set of three seine hauls were combined (Fitzpatrick et al. 1998; Meador et al. 1993), and captured fishes were identified and enumerated. A representative sample of 30 individuals of each species, from each sampling reach was euthanized with a lethal dose of MS-222, preserved in 10% buffered formalin, and taken to the laboratory for measurement of length and weight. Once 30 specimens of a species were collected and preserved, additional individuals were enumerated and released. Fishes larger than 150-mm total length were measured (total length, mm) in the field and released. In the laboratory, all collected specimens were weighed (g), measured (total length, mm), and examined for external anomalies.

On each sampling date, a digital photograph of the sampling site was taken to document the nature and general condition of the sampled reach.

3.3 Refugia Pool Identification North Wichita River (Reach 10) and South Wichita River (Reach 11)

Due to an unusually wet summer and fall in 2005, the Wichita River and its main tributaries (North Wichita River, Middle Fork of the Wichita River, and South Wichita River) remained wetted (with the exception of one site in the South Wichita River that was dry during one sampling period). This precluded direct visual location and identification of dry-season refugia. On 14 and 15 March 2006, the river was overflown by helicopter and a video recording of the river was made. During recording, the video footage was GPS referenced to allow location of potential refugia and access points. The video recording was reviewed to establish the location of potential refugia sites. Potential dry-season refugia were identified as relatively large, deep areas within the river channel. Because the river generally was clear, relative depth was easily determined. GPS coordinates of larger refugia were recorded as was relative size (large- exceeding 100 m in length, medium- between 10 and 100 m in length, and small- less than 10 m in length).

3.4 Refugia Pool Baseline Habitat Monitoring in the North Wichita River (Reach 10) and South Wichita River (Reach 11)

During the summer of 2005, refugia were not present and, hence, were not sampled. This decision was made in consultation with Weston Solutions, Inc. and U.S. Army Corps of Engineers, Tulsa District, personnel assigned to this project.

In late July-early August, a number of locations on the South Wichita River were dry and refugia were sampled. However, flow was continuous in the North Wichita River and the Middle Fork of the Wichita River; therefore, refugia could not be sampled in these rivers. In July 2006, refugia were surveyed at three locations in the South Wichita River (Reach 11), downstream from the Bateman low flow dam. These sites were chosen based on the presence and size of refugia as determined from the aerial videos, accessibility, and their proximity to riparian habitat and fish assemblage sampling sites. During the initial survey of refugia, all pools within a distance of 0.8 km upstream and downstream from the access point were sampled, photographed, and their GPS coordinates were recorded. Refugium habitat measurements included pool area, mean depth, maximum depth, and substrate type. Pool area, mean depth and maximum depth were measured at the upper, middle, and lower end of each pool and then were averaged for each pool. Substrate type was assessed at three locations within each pool and a composite estimate was recorded. Temperature and dissolved oxygen measurements were made at 10 cm depth intervals.

Based on a review of the habitat measurements, including temperature and dissolved oxygen profiles, only pools longer than 10 m in length were chosen for long-term monitoring, at two-week intervals. At each of the three sampling locations, three pools were selected at random for long-term monitoring during the period of no flow.

On each sampling date, temperature and dissolved oxygen profiles were recorded twice daily, in the evening and as early as possible in the morning, from the surface to the maximum depth in 10-cm intervals. In addition to temperature and dissolved oxygen profiles, air temperature, pH, turbidity, current velocity, and conductivity also were measured and recorded. Also on each sampling date, the fish assemblage in each pool

was sampled to assess any compositional changes resulting from, or associated with, physical and chemical changes in pool habitats. Fish sampling followed the methods recommended by Moulton et al. (2002).

3.5 Stream Variable Monitoring in the Wichita River Basin in Reaches 8, 9, 10, and 11

Stream habitat variables were assessed in each baseline sampling site described above in the section on Fish Community Structure and Composition in Reaches 8, 9, 10, 11 in the Wichita River during three seasons (spring, summer, and fall).

At each sampling reach, on each date, seven reach-level stream characteristics were assessed following the methods described in Fitzpatrick et al. (1998). These measurements and assessments included: instantaneous discharge (from USGS gauging station when possible), presence of channel modifications, mean channel width, curvilinear reach length, distance between transects, curvilinear distance from a permanent benchmark installed at the lower end of the reach, water-surface gradient within the reach. In addition, a sketch map of the sampling reach was drawn to show major channel features and took a digital photograph, facing upstream, at the lower end of the reach to document the nature and general condition of the sampled reach.

On each sampling date, within each sampling reach, 16 stream habitat variables were assessed in each of 11 equally spaced transects across the stream channel using the methods described in Fitzpatrick et al. (1998). These measurements included: transect number, habitat type (visually determined), wetted channel width (measured with a measuring tape or electronic [laser] range finder), bank-full channel width (measured with a measuring tape or electronic range finder), aspect, dominant riparian land use/land cover

(visually determined), channel features (visually determined), bank angle (measured with a clinometer), bank height (measured with a measuring tape or electronic range finder), bank substrate composition, bank vegetative cover (composition and percentage), stream depth (measuring staff or meter stick), current velocity (Marsh-McBirney flow meter), bed substrate (visually determined), embeddedness (visually determined), and presence of silt (visually determined).

Habitat type, depth, current velocity, bed substrate, embeddedness, and presence of silt were measured at three equally spaced sites across the river channel in each transect: one point was established in the middle of thalweg, and the remaining sites were spaced half-way between the thalweg and each bank. The remaining measurements were made at one site, or on each opposing bank.

3.6 Statistical Analyses

Length and weight measurements of sampled fishes, of which at least 15 specimens were collected, were log10-transformed and used to develop length-weight relationships using linear regression. These length-weight relationships were used to calculate LeCren's (1951) condition index for species of which at least 15 specimens were captured. An index of 100 represents a fish of average weight for its length; an index < 90 indicates fish that are in poor condition, either as a result of inadequate diet or other stresses.

In addition to relative abundance, species richness (number of species present), and Hurlbert's (1971) index of the probability of an interspecific encounter (PIE) were

calculated. Hurlbert's PIE gives the probability that two randomly sampled individuals from an assemblage represent two different species. PIE is calculated as:

$$PIE = \left(\frac{N}{N-1} \right) \left(1 - \sum p_i^2 \right),$$

where N is the total number of species in the assemblage, and p_i represents the proportion of the entire sample represented by species i. PIE is, essentially, a measure of species evenness and ranges from 0 to 1. It has the advantage of being unaffected by sample size.

Two ordination techniques were used to summarize, and demonstrate general patterns in, the fish assemblage and stream habitat data. The use of these analyses here is not to provide an analytical summary of the data, but to provide an illustration of the major patterns in these data. Canonical correspondence (ter Braak 1986) analysis was used to ordinate fish assemblages in response to three environmental variables (temperature, salinity, and dissolved oxygen concentration) at each site, on each date. This ordination was used to show the distribution of fishes, primarily in relation to among site differences in salinity. Relative salinity tolerances, described by Higgins and Wilde (2005), were used to characterize fish as having high (H), medium (M), or low (L) salinity tolerances. Detrended correspondence analysis was used to ordinate stream habitat variables, among sites, based on location along an upstream-downstream gradient. All ordinations were performed using PC-ORD (McCune and Mefford, 1999).

4.0 Results

4.1 Faunal Surveys of Brine Collection Areas

Faunal surveys of springs began in June 2005 and were completed in May 2006. In all, 16 springs were located (Table 1) along and in the North and South Wichita rivers within the brine emission areas. No springs were located on the Middle Fork of the Wichita River. Most of the located springs were too small, too diffuse, or submerged within the river (i.e., spring boils) to allow sampling. In addition to sampling the North and South Wichita rivers, springs located along the lower course of Salt Creek, a major tributary to the upper North Wichita River also were sampled. Lewis and Dalquest (1957) collected water samples from a relatively large number of springs, particularly in the North Wichita River; however, many of these springs could not be located. The water table near the confluence of the North Wichita River Salt Creek is very shallow. Several small springs that feed into the river and which were sampled by Lewis and Dalquest (1957) could not be located. In addition, it appeared that that some springs had changed location. This area appears to be hydrologically very dynamic and many of the springs sampled by Lewis and Dalquest apparently are either greatly reduced in volume or no longer issue water. Faunal surveys were conducted at four springs (numbers 7, 8, 10+11, and 13 in Table 1) large enough to allow sampling. Photographs of these four spring sites are presented in Figure 2.

Two additional large springs, outside the brine emission areas, were discovered during the flyover (Table 1). One spring was located on upper Salt Creek, a tributary of

the North Wichita River. The second spring appears to serve as the headwaters of the permanent potions of the Middle Fork of the Wichita River. Neither spring was sampled.

4.1.1 Phytoplankton and Zooplankton

A list and relative abundances of phytoplankton collected in the springs is presented in Table 2. Three major phytoplankton groups, Bacillariophyceae (diatoms), Chlorophyta (green algae), and Cyanobacteria (bluegreen algae), were present in the sampled springs. Members of the Bacillariophyceae genera *Navicula*, *Pleurosigma*, and Syndera were, by far, the most commonly encountered phytoplankton. These genera formed an encrusting layer, with bacteria, on various substrates in the springs. However, they were not abundant in our samples. Filamentous phytoplankton (*Mougoetia*, *Dactylococopsis*, and *Phormidium*) were uncommon. Counts of individual taxa, for each season, are presented in Appendix B. No zooplankton or other micro-invertebrates were found in the zooplankton samples.

4.1.2 Aquatic Invertebrates

A total of 408 invertebrates, representing 20 invertebrate families were collected from the four sampled springs (Table 3). Counts of individual taxa, for each season, are presented in Appendix B. All families collected are cosmopolitan in distribution. Five families of crustaceans were collected of which only two, Astacidae and Talitridae, are obligate aquatic forms. All other crustaceans are semi-aquatic. Among the 15 orders of insects collected, 15 are common aquatic forms, one is semi-aquatic, and five are obligate terrestrial forms. Across all samples, the three most numerous families were the

crustacean Talitridae (42% of collected individuals, all collected from a single spring), and the insect families Corixidae (25% of collected individuals, all collected from four springs), and Notonectidae (10% of collected individuals, all collected from a single spring).

4.1.3 Vertebrates

No vertebrates were collected from any of the springs. Red River pupfish were collected from the plunge pool of the large spring on the Bateman Ranch and were collected and observed in the lower course of one spring that feeds into Salt Creek on the Triangle Ranch.

Large spring (Spring 8, Table 1) on west bank of Salt Creek 40 m downstream from road crossing. The spring emerges from the rocks at left. Salt Creek is in the upper right-hand corner.

Brine seep (Spring 7, Table 1) from uphill with no surface flow into Salt Creek between confluence with Wichita and ranch road crossing. Salt Creek is approximately 100 m behind the photographer's back.

Figure 2. Photographs of spring locations on the North Wichita River and South Wichita River at which faunal surveys were conducted during 2005.

Primary large salt spring (Spring 9, Table 1) flowing from culvert embedded in hillside. The culvert, 45 to 50 cm in diameter, is the remnant of an early attempt to cap the spring.

Outflow creek from the spring shown above (Spring 10, Table 1). This creek flows about 60 m before discharging into the South Wichita River. At least one small subsurface boil (20 m upstream from the river) enters the creek.

Figure 2. Continued.

A small spring upstream from the low-water crossing on the Bateman Ranch, on north bank of the South Wichita River (Spring 12, Table 1). The spring source is 20 to 25 cm in diameter and has a very small discharge.

Figure 2. Concluded.

Table 1. Locations and water chemistry of salt springs located in the North Wichita River, the Middle Fork of the Wichita River, and the South Wichita River. All numbered sites were located and sampled in spring, summer, and fall 2005-2006.

North Wichita River	
1	Small spring at mouth of Cottonwood Creek:
2	200 m upstream of Cottonwood Creek (small spring inflow) (Site 14 of Lewis and Dalquest 1957)
3	Confluence of Wichita River and Salt Creek (Site 8 of Lewis and Dalquest 1957)
4	Wichita River 10 m above confluence with Salt Creek (Site 7 of Lewis and Dalquest 1957)
5	Salt Creek 10 m above confluence with Wichita River
6	Source of small spring entering west side of Salt Creek 20 m upstream from confluence with Wichita River
7	Brine seep from uphill with no surface flow into Salt Creek between confluence with Wichita and Road crossing
8	Large spring on west bank of Salt Creek 40 m downstream from road crossing (Site 11 of Lewis and Dalquest)
	Large spring on east bank of Salt Creek located during the helicopter flyover
Middle Fork of the Wichita River	
	Large spring located during the helicopter flyover
South Wichita River	
9	Primary large salt spring flowing from culvert embedded in hillside
10	Small spring/seep surfacing from under a rock on the north bank of the primary spring runoff
11	Confluence of spring and river
12	Small spring upstream from low-water crossing on north bank across from pump jack
13	Spring boil 100 m downstream from low-water crossing
14	Continuing downstream Spring site 13, above, there are multiple boils throughout the next 200 m stretch of river
15	Small spring at lower end of boil area
16	300 m downstream from Spring site 15, above

Table 1. Extended.

North Wichita River		GPS Coordinates	Conductivity (mS)	Temperature (˚C)	Dissolved Oxygen (mg/l)
	1	N 33˚ 58.095’ W 100˚ 06.755’	9.5	27.6	
	2	N 33˚ 58.112’ W 100˚ 06.824’	13.3	26.7	
	3	N 33˚ 57.573’ W 100˚ 09.409’	41.20	29.1	
	4		37.29	29.4	
	5		41.91	28.7	
	6	N 33˚ 57.472’ W 100˚ 09.382’	36.58	23.8	
	7	N 33˚ 57.747’ W 100˚ 09.787’	65.00	36.1	
	8	N 33˚ 57.941’ W 100˚ 09.891’			
		N 33˚ 58.479’ W 100˚ 10.918’			
Middle Fork of the Wichita River					
		N 33˚ 45.281’ W 100˚ 07.539’			
South Wichita River					
	9	N 33˚ 36.455’ W 100˚ 13.990’	85.2	19.4	3.12
	10	N 33˚ 37.386’ W 100˚ 13.327’			
	11	N 33˚ 36.505’ W 100˚ 13.971’	76.2	20.3	3.96
	12	N 33˚ 37.386’ W 100˚ 13.327’	13.47	20.0	0.12
	13	N 33˚ 37.416’ W 100˚ 12.948’	33.29	18.9	0.86
	14	N 33˚ 37.511’ W 100˚ 12.896’	17.24	20.0	0.85
	15	N 33˚ 37.710’ W 100˚ 12.799’	51.1	29.5	
	16				

Table 2. Relative abundance of phytoplankton collected during faunal surveys of salt springs in the North and South Wichita river drainages during 2005-2006. Spring locations are given in Table 1.

	South Wichita River		Salt Creek, North Wichita River	
	Spring 9	Spring 12	Spring 8	Spring 7
Cyanobacteria				
Dactylococopsis	0.5	0	0	0
Phormidium	0	3.7	5.5	0.9
Bacillariophyceae				
Cocconeis	0.8	2.2	0.3	0
Cymbella	0.3	0	1.3	0
Diatomella	1.3	0	7.1	0.4
Gryosigma	0.3	0	3.7	0.9
Navicula	59.6	12.6	11.5	3.8
Nitzschia	11.9	0	2.6	0.4
Pleurosigma	17.4	56.3	26.8	67.2
Synedra	7.9	23.7	41.2	26.4
Chlorophyta				
Mougeotia	0	1.5	0	0

Table 3. Invertebrate families collected during faunal surveys of salt springs in the North and South Wichita river drainages during 2005-2006.

Family	Common Name	Habitat
Armadillidae	Wood louse (isopod)	semi-aquatic
Asellidae	Isopod	semi-aquatic
Astacidae	Crayfish	aquatic
Porcellionidae	Sow bugs	semi-aquatic
Talitridae	Landhoppers (isopods)	semi-aquatic
Coenagrionidae	Damselflies	aquatic
Corixidae	Water boatmen	aquatic
Dytiscidae	Predaceous diving beetles	aquatic
Ephydridae	Brine Flies	aquatic
Hydrophilidae	Water scavenger beetles	aquatic
Notonectidae	Backswimmers	aquatic
Stratiomyidae	Soldier flies	aquatic
Tipulidae	Crane flies	aquatic
Veliidae	Water striders	aquatic
Carabidae	Tiger beetles	terrestrial
Cicadellidae	Leafhoppers	terrestrial
Formicidae	Ants	terrestrial
Gryllacrididae	Raspy crickets	terrestrial
Pentatomidae	Stink bugs	terrestrial
Saldidae	Shore bugs	semi-aquatic

4.2 Fish Community Structure and Composition in the Wichita River in Reaches 8, 9, 10, and 11

Across all sites and dates, a total of 5,885 fishes, representing 30 species plus one hybrid combination (bluegill sunfish x green sunfish), were collected during fish assemblage sampling (Table 4). Red River pupfish was the most common species, comprising 62% of all collected specimens. Plains killifish (13%) was the only other species to represent more than 10% of fishes captured. Red shiner represented 5% of the overall assemblage and plains minnow, Red River shiner, speckled chub, and mosquitofish each represented about 3% of fishes collected. In combination, these seven species represented 92% of the fishes collected. A list of all fishes captured and their abundances at each site on each date is presented in Appendix C.

At each site, on each sampling date, up to 30 specimens of each species were preserved for length and weight measurements. Mean lengths and weights are presented in Table 5. Length to weight relationships for species of which at least 15 specimens were collected are summarized in Table 6. LeCren's index of condition for each of these species is presented in Table 7. Means of LeCren's index ranged from 68 (Red River pupfish) to 121 (bluegill and orangespot sunfish). In general, mean condition indices exceeded 90, indicating the fish were in good relative condition. Red River pupfish showed low condition indices in the Wichita River (site 9-2 and in less saline portions of the North Wichita River (sites 10-1 and 10-2). Bluegill and orangespot sunfish, although generally in good condition, showed an inverse relationship between condition and salinity. No other patterns in condition were evident. There was a low incidence of infestation by external parasites and of other abnormalities. Anchor worms, *Lernaea cyprinacea* infested seven specimens of fish, representing four species (Table 8). Two

additional specimens, one channel catfish and one plains killifish each were infested by single specimens of unidentified (externally attached) nematodes.

Relative abundance of sampled fishes varied considerably among sites (Table 9). Red River pupfish, the most abundantly collected species overall, dominated the assemblage in the upper portions of the North Wichita River, Middle Fork of the Wichita River, and the South Wichita River. In contrast, the plains minnow was most abundant in the lower portions of these three streams. Both of these species, as well as the speckled chub, Red River shiner, and plains killifish were the dominant constituents of the fish assemblage of the North Wichita River, Middle Fork of the Wichita River, and the South Wichita River. Red shiner was the most widely distributed species in these collections, but was most abundant in the upper and lower portions of the Wichita River (Reaches 8 and 9). Although the red shiner and speckled chub were the most abundant species in some portions of the Wichita River, these sites generally had high species evenness (see below). Results of a canonical correspondence analysis ordination of fish abundance and three environmental variables (temperature, salinity, and dissolved oxygen concentration) is shown in Figure 3. The first two axes of this ordination account for 9.5% of the variation in fish abundance (axis 1 = 7.6%, axis 2 = 1.9%) and show a general difference in the distribution of fishes with high (H), medium (M), and low (L) salinity tolerances.

Species richness varied relatively little among seasons (Table 10) at most sampling sites. The smallest number of species sampled, two, occurred at sites 8-2, 8-3, and 9.1. Low species richness at sites 8-2 and 8-3 on the lower Wichita River was due to high water conditions and ineffectiveness of seines at these sites. Species richness consistently was greatest at site 11-1, the lowermost site on the South Wichita River. Hurlbert's (1971) PIE index of species evenness ranged from 0.26 at site 11-5 (upper South Wichita

River) to 0.97 at site 8-1 (lower Wichita River) (Table 11). Generally, values of PIE exceeded 0.80, which suggests that in most portions of the Wichita River drainage, once a specimen is collected there is a probability of 0.80 that the next specimen collected will represent a different species. PIE values were lowest at sites 10-3, 10-4, 10-5, and 11-5, indicating that the assemblage at these sites was dominated by a single species.

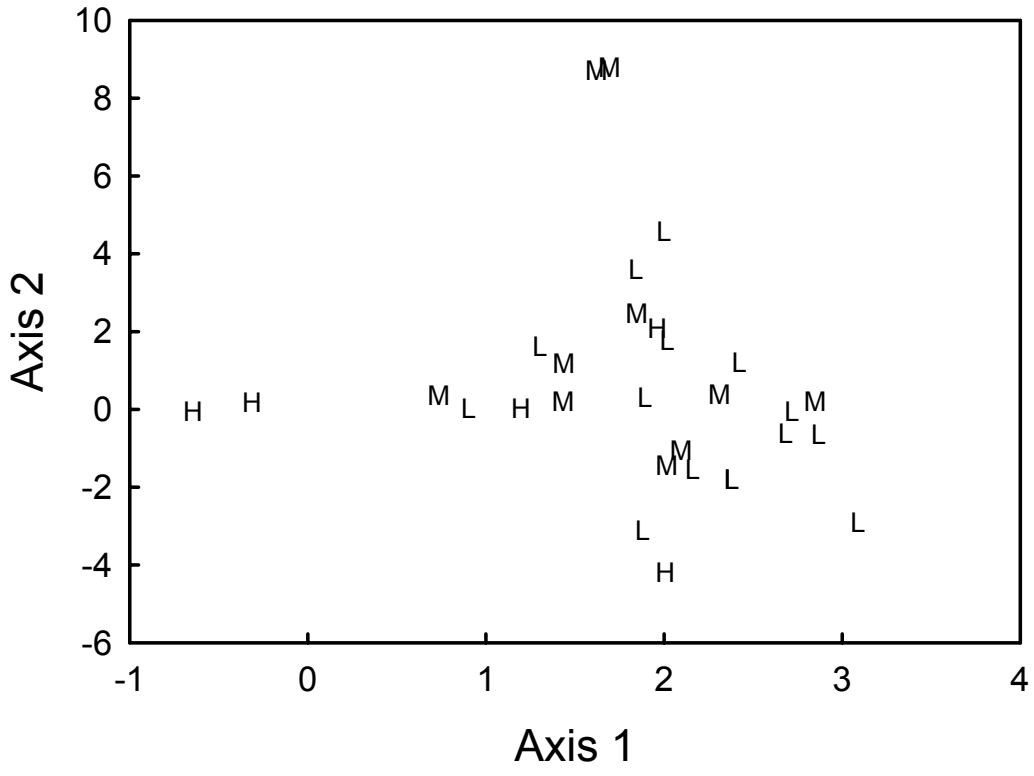

Figure 3. Canonical correspondence analysis ordination of Wichita River fish assemblages. The first two axes account for 9.5% of the variation in fish abundances across all sampled sites. Letters denote the salinity tolerances H = High, M = Medium, L = Low) of fishes based on the results of Higgins and Wilde (2005).

Table 4. Fish species collected and their relative abundances (%) in the North Wichita River, Middle Fork of the Wichita River, and South Wichita River (combined) during 2005 fish assemblage sampling.

Species	Relative Abundance (%)
Black bullhead *Ictalurus melas*	0.1
Blue catfish *Ictalurus furcatus*	0.0
Bluegill *Lepomis macrochirus*	1.4
Bluntnose minnow *Pimephales notatus*	0.0
Bullhead minnow *Pimphales vigilax*	0.3
Channel catfish *Ictalurus punctatus*	0.1
Common carp *Cyprinus carpio*	0.6
Emerald shiner *Notropis atherinoides*	0.3
Fathead minnow *Pimephales promelas*	0.4
Freshwater drum *Aplodinotus grunniens*	0.1
Ghost shiner *Notropis buchanani*	0.2
Gizzard shad *Dorosoma cepedianum*	0.8
Green sunfish *Lepomis cyanellus*	0.5
Hybrid sunfish *Lepomis macrochirus x L. cyanellus*	0.1
Inland silverside *Menidia beryllina*	0.4
Largemouth bass *Micropterus salmoides*	0.0
Longear sunfish *Lepomis megalotis*	0.1
Longnose gar *Lepisosteus osseus*	0.0
Mosquitofish *Gambusia affinis*	2.7
Orangespot sunfish *Lepomis humilis*	2.0
Plains killifish *Fundulus zebrinus*	13.6
Plains minnow *Hybognathus placitus*	3.2
Red River pupfish *Cyprinodon rubrofluviatilis*	62.4
Red River shiner *Notropis bairdi*	2.8
Red shiner *Cyprinella lutensis*	5.1
River carpsucker *Carpiodes carpio*	0.1
Sand shiner *Notropis stramineus*	0.1
Smallmouth buffalo*Ictiobus bubalus*	0.0
Speckled chub *Macrhybopsis hyostoma*	2.7
Suckermouth minnow *Phenacobius mirabilis*	0.0
White bass *Morone chrysops*	0.0
Total Number Collected	5,885

Table 5. Means and standard errors (SE) of lengths (mm) and weights (g) of Wichita River fishes collected during fish assemblage sampling in 2005. Samples from all sites and dates are combined.

Species	Total length (mm)	SE length	Weight (g)	SE weight
Black bullhead	95.3	8.30	12.5	4.00
Blue catfish	70.0		2.9	
Bluegill	43.3	6.13	1.9	0.71
Bluntnose minnow	36.2		0.5	
Bullhead minnow	42.6	4.23	0.9	0.31
Channel catfish	154.2	41.49	217.1	204.47
Common carp	68.0	10.79	5.7	2.26
Emerald shiner	49.6	10.41	1.1	0.59
Fathead minnow	45.3	4.39	1.3	0.46
Freshwater drum	44.1		0.9	
Ghost shiner	31.2	3.26	0.3	0.10
Gizzard shad	72.5	11.88	5.5	1.45
Green sunfish	50.2	4.45	3.5	0.97
Hybrid sunfish	50.3		2.9	
Inland silverside	44.1	0.92	0.5	0.03
Largemouth bass	50.3		2.0	
Longear sunfish	72.6	3.94	8.0	2.20
Longnose gar	1224.6		5443.1	
White bass	35.4		0.4	
Mosquitofish	33.7	1.24	0.5	0.07
Orangespot sunfish	48.1	1.48	2.1	0.23
Plains killifish	44.7	1.43	1.3	0.16
Plains minnow	69.2	3.92	3.8	0.55
Red River pupfish	39.4	4.99	1.6	0.51
Red River shiner	48.1	0.42	1.3	0.07
Red shiner	41.2	0.59	0.9	0.06
River carpsucker	61.2	6.68	4.2	2.01
Sand shiner	41.8	11.19	1.0	0.76
Smallmouth buffalo	481.6		1474.2	
Speckled chub	47.6	2.46	1.0	0.17
Suckermouth minnow	58.2	8.18	2.2	0.93
Warmouth sunfish	69.7		6.1	
White bass	35.4		0.43	

Table 6. Regression statistics for length to mass relationships for Wichita River fishes, all sites and dates combined, for which at least 15 specimens were collected during fish assemblage sampling in 2005.

Species	N	r^2	Intercept	Slope	*P*
Bluegill	65	0.98	-4.91	3.07	0.0001
Bullhead minnow	16	0.99	-5.43	3.27	0.0001
Emerald shiner	17	0.97	-5.13	3.04	0.0001
Fathead minnow	21	0.98	-5.48	3.35	0.0001
Ghost shiner	18	0.99	-5.36	3.22	0.0001
Gizzard shad	45	0.98	-4.75	2.86	0.0001
Green sunfish	28	0.99	-5.10	3.18	0.0001
Inland silverside	19	0.99	-5.17	2.94	0.0001
Mosquitofish	120	0.91	-5.04	3.08	0.0001
Orangespot sunfish	110	0.97	-5.14	3.20	0.0001
Plains killifish	601	0.93	-5.03	3.08	0.0001
Plains minnow	188	0.96	-4.93	2.96	0.0001
Red River pupfish	735	0.97	-5.02	3.28	0.0001
Red River shiner	239	0.94	-5.12	3.09	0.0001
Red shiner	406	0.90	-4.90	2.97	0.0001
Speckled chub	159	0.90	-5.22	3.08	0.0001

Table 7. Means of LeCren's index of condition for Wichita River fishes collected during fish assemblage sampling in 2005. Samples from all sites and dates are combined.

Site	Bluegill	Bullhead minnow	Emerald shiner	Fathead minnow	Ghost shiner	Gizzard shad	Green sunfish	Inland silverside
8-1			100		99	110		
8-2			102		102	117		
8-3					103			
8-4	121	101	92	96	119	106		
8-5	103	108		98	90			
9-1	113	107				140	95	100
9-2	85					107	107	
10-1						86	97	
10-2								
10-3	89						118	
10-4				104		93		
10-5								
11-1	90	102					97	
11-2						120	107	
11-3	90						95	
11-4						107		
11-5								

Table 7 (Extended).

Site	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner	Red shiner	Speckled chub
8-1				94			91	95
8-2							108	97
8-3	112						100	95
8-4	116	121		102			96	
8-5	111	107	88				94	
9-1	91	116					101	
9-2	113			102	68	100	101	95
10-1	106	93	95	97	78	94	99	98
10-2	95		94	126	71	101	108	114
10-3	104	93	104	107	107	102	105	78
10-4	100		108		102		108	
10-5			108		104			
11-1	106	94	89	92		93		105
11-2		95		110		91		86
11-3	106		97	106	77	105		103
11-4	95		102		119			
11-5	108		101		106			

Table 8. External parasites observed on Wichita River fishes collected during fish assemblage sampling in 2005. Results for all sites and dates are combined.

Species	Number and type of parasite
Common Carp	3 *Lernaea cyprinacea*
Red Shiner	1 *Lernaea cyprinacea*
Red Shiner	1 *Lernaea cyprinacea*
Mosquitofish	1 *Lernaea cyprinacea*
Mosquitofish	1 *Lernaea cyprinacea*
Orangespot sunfish	1 *Lernaea cyprinacea*
Orangespot sunfish	1 *Lernaea cyprinacea*
Channel catfish	unidentified nematode on left pectoral fin
Plains killifish	unidentified nematode

Table 9. Relative abundance of fishes captured at each sampling site in the Wichita River drainage during fish assemblage sampling in 2005. Results for all seasons combined.

	Sampling Site						
Species	8.1	8.2	8.3	8.4	8.5	9.1	9.2
Black bullhead							
Blue catfish		5.9	1.7				
Bluegill				5.2	30.7	1.6	1.0
Bluntnose minnow							
Bullhead minnow			1.7	10.4	0.6	3.3	
Channel catfish		5.9	3.4	2.6			1.0
Common carp					2.3	14.8	2.9
Emerald shiner	30.4			1.3			
Fathead minnow	2.2			3.9	6.8		
Freshwater drum	2.2	29.4	1.7				
Ghost shiner	8.7	5.9	3.4	1.3	0.6		
Gizzard shad	8.7	11.8		11.7		1.6	4.9
Green sunfish						1.6	1.0
Hybrid sunfish					3.4		
Inland silverside					1.7	34.4	
Largemouth bass							
Longear sunfish				2.6			
Longnose gar					0.6		
Mosquitofish			13.6	1.3	2.8	3.3	1.0
Orangespot sunfish				5.2	48.3	4.9	
Plains killifish					0.6		34.3
Plains minnow	2.2			7.8			1.0
Red River pupfish							2.0
Red River shiner							13.7
Red shiner	15.2	35.3	49.2	44.2	0.6	34.4	22.5
River carpsucker	2.2						1.0
Sand shiner	2.2						
Smallmouth buffalo	2.2						
Speckled chub	23.9	5.9	25.4				13.7
Suckermouth minnow				2.6			
White bass					1.1		
Total Number Collected	46	17	59	77	176	61	102

Table 9 (Extended).

	Sampling Site				
Species	10.1	10.2	10.3	10.4	10.5
Black bullhead					
Blue catfish					
Bluegill		0.5	0.9		
Bluntnose minnow					
Bullhead minnow					
Channel catfish					
Common carp	0.9				
Emerald shiner					
Fathead minnow				1.0	
Freshwater drum					
Ghost shiner					
Gizzard shad	0.9				
Green sunfish	0.5		0.2		
Hybrid sunfish					
Inland silverside					
Largemouth bass					
Longear sunfish					
Longnose gar					
Mosquitofish		1.0	0.6	6.2	4.8
Orangespot sunfish	0.5		0.3		
Plains killifish	18.6	24.2	16.2	5.3	64.9
Plains minnow	21.8	8.6	0.4		
Red River pupfish	12.3	15.7	77.8	81.2	30.3
Red River shiner	2.3	38.9	1.2		
Red shiner	20.9	2.5	2.2	6.3	
River carpsucker					
Sand shiner					
Smallmouth buffalo					
Speckled chub	21.4	8.6	0.1		
Suckermouth minnow					
White bass					
Total Number Collected	220	198	982	680	271

Table 9 (Extended).

	Sampling Site				
Species	11.1	11.2	11.3	11.4	11.5
Black bullhead	1.2	2.2			
Blue catfish					
Bluegill	3.5		1.1		
Bluntnose minnow			1.1		
Bullhead minnow	1.2				
Channel catfish					
Common carp	7.0				
Emerald shiner					
Fathead minnow					
Freshwater drum					
Ghost shiner					
Gizzard shad	6.6	2.2		0.3	
Green sunfish	5.8	5.4	2.2		
Hybrid sunfish	0.4				
Inland silverside					
Largemouth bass				0.2	
Longear sunfish	0.4				
Longnose gar					
Mosquitofish	1.2	5.4		5.5	0.3
Orangespot sunfish	0.8	22.6			
Plains killifish	1.2		12.9	22.7	1.7
Plains minnow	30.0	25.8	14.0		
Red River pupfish			26.9	71.4	98.0
Red River shiner	9.7	23.7	11.8		
Red shiner	12.1	11.8	23.7		
River carpsucker	0.8				
Sand shiner			2.2		
Smallmouth buffalo					
Speckled chub	18.3	1.1	4.3		
Suckermouth minnow					
White bass					
Total Number Collected	257	93	93	1174	1379

Table 10. Species richness of Wichita River fishes as assessed during fish assemblage sampling during 2005.

Site	Spring	Summer	Fall
8-1	5	6	6
8-2	4	3	2
8-3	6	4	2
8-4	7	10	5
8-5	9	4	8
9-1	5	2	7
9-2	4	11	8
10-1	5	6	10
10-2	6	7	6
10-3	7	8	7
10-4	5	5	4
10-5	3	3	3
11-1	12	12	11
11-2	4	9	4
11-3	8	*	7
11-4	4	4	3
11-5	3	3	2

*Site was dry on this date.

Table 11. Hurlbert's PIE index of species evenness for Wichita River fishes as assessed during fish assemblage sampling during 2005.

Site	Spring	Summer	Fall
8-1	0.97	0.88	0.74
8-2	0.75	0.86	*
8-3	0.71	0.84	*
8-4	0.75	0.88	0.90
8-5	0.94	0.80	0.69
9-1	0.65	*	0.87
9-2	0.88	0.81	0.86
10-1	0.89	0.97	0.89
10-2	0.60	0.94	0.84
10-3	0.69	0.60	0.37
10-4	0.71	0.67	0.80
10-5	0.44	0.46	0.48
11-1	0.91	0.69	0.90
11-2	0.82	0.90	0.89
11-3	0.88	**	0.94
11-4	0.63	0.45	0.68
11-5	0.40	0.33	0.26

*Only two species present in sample, PIE could not be calculated.

**Site was dry on this date.

4.3 Refugia Pool Identification North Wichita River (Reach 10) and South Wichita River (Reach 11)

Aerial video footage of the North Wichita River, Middle Fork of the Wichita River, South Wichita River, and the Wichita River upstream from Wichita Falls, Texas, was recorded on 14 and 15 March 2006. The channels of all four streams generally were wetted making it impossible to definitively determine the location of potential refugia. Nevertheless, the video footage is sufficiently clear, as was much of the water in these rivers, so as to allow an initial assessment of refugia based on apparent depth of the surveyed rivers.

Initially, it was believed that potential refugia might occur at the mouths of tributary streams. Few potential refugia were observed at these sites. Rather than creating scour holes at their mouths, the tributaries generally deposited large quantities of suspended solids into the receiving river, reducing the channel depth for several hundred meters downstream. Consequently, river channels generally were deeper upstream from tributaries.

Five-hundred five potential refugia were located in the North Wichita River (257), Middle Fork of the Wichita River (72), and South Wichita River (176) from existing or proposed inflatable (diversion) weirs on each river downstream to the confluence of the North and South Wichita rivers. Because the river was not dry when the aerial video was taken, these estimates must be taken as conservative. Video of the river during dry periods would almost certainly reveal a greater number of refugia, especially of smaller refugia. During inspection of the aerial video, refugia were characterized as large (exceeding 100 m in length), medium (between 10 and 100 m in length), or small (less

than 10 m in length). Estimates of the number of potential refugia of various sizes in each river are presented in Table 12. A complete listing of refugia is presented in Appendix D.

Most potential refugia were located in the vicinity of steeply cut banks, particularly those formed where the surveyed rivers have cut through, or along, hills or the numerous escarpments lining these rivers. In canyon bound portions of the surveyed rivers, potential refugia, based on apparent depth and likelihood that these sites would remain wetted during extensive dry periods, were very common. Relatively few potential refugia sites were observed in the lower gradient reaches of the surveyed rivers. These potential refugia generally occurred at sharp bends, where the river bank was undercut, and occasionally in mid-channel.

4.4 Refugia Pool Baseline Habitat Monitoring in the North Wichita River (Reach 10) and South Wichita River (Reach 11)

Because the river was wet throughout the summer of 2005, baseline habitat monitoring of pools was not conducted. Portions of the South Wichita River began to dry in late July 2006. An initial survey of refugia was conducted at three locations on the South Wichita River on 1-3 August 2006. A total of 29 refugia were observed within a distance of 0.8 km upstream and downstream from the point at which the river was accessed (Table 13). Maximum depths ranged from 19 to 95 cm (mean = 45.7 cm) and surface areas ranged from 28 to 1402 m^2 (mean = 303 m^2). Temperatures in these refugia ranged from 24.1 to 39.0 ^oC (mean = 28.2 ^oC). Three refugia from each site were chosen at random for time series monitoring. These sites were: (Site 1) County Road 3065, north of Vera; (Site 2) Highway 6, north of Benjamin, Highway 6; and (Site 3), downstream from inflatable weir on the Bateman Ranch.

Repeated time-series sampling of refugia in the South Wichita River showed that a consistent decrease in the species richness, abundance, and ultimately presence of fishes changed through time (Table 14). Across all sites, and combining fish counts for morning (AM) and evening (PM) sampled, a total of 15 species of fish were collected from the sampled refugia The most common fish in the sampled refugia were plains killifish, plains minnow, red shiner, Red River shiner, and Red River pupfish. These five species generally represented over 80% of the fish in each sample. Other species collected from the sampled refugia included common carp, black bullhead, fathead minnow, gizzard shad, green sunfish, largemouth bass, mosquitofish, orangespot sunfish, river carpsucker, and speckled chub. All 15 species were present on the first sampling date, but only three (orangespot sunfish, Red River pupfish, and plains killfish) were present in the final samples.

Across all sites and refugia, 3,688 fish (205 per sample) were collected on the first date that refugia were sampled, 1,624 fish (162 per sample) were collected on the second date, 363 fish (36 per sample) were collected on the third date, and only 34 fish (8.5 per sample) were collected in the final sample. There was no systematic change in water quality during the period of sampling. However, transient periods of low or anoxic conditions were encountered in morning samples at several sites. In several cases, once refugia had been observed to have low dissolved oxygen concentrations on one or more occasions, fishes became absent from those refugia. Although fish also disappeared from refugia in which low dissolved oxygen concentrations were not observed, this may represent a sampling artifact. Refugia were sampled at two-week intervals and it is possible that critical periods of low oxygen concentrations went not observed. The

observed changes fish assemblages in refugia, at this time, are attributed to low oxygen concentrations.

4.5 Stream Variable Monitoring in the Wichita River Basin in Reaches 8, 9, 10, 11

A detrended correspondence analysis ordination of the stream habitat variables showed a systematic upstream-downstream gradient in most variables (Figure 4). From the lower Wichita River (Reach 8) upstream to the upper reaches of the North Wichita River and Middle Wichita River (Reach 10) and the South Wichita River (Reach 11), there was a gradual change in stream morphology (channel width, bank angle, bank height) and in vegetation coverage. Lower reaches of all streams generally were wider, deeper, and had higher and steeper banks, and greater vegetation coverage. Moving upstream, stream channels in each reach became narrower, with less steep banks, and had reduced vegetation coverage. Stream habitat measurements for all sampling reaches on each date are summarized in Table 15 and a full presentation of the results is made in Appendix E.

For most stream habitat variables, there was relatively little variation, among sampling dates, at any given site. The exceptions were for water depth and current velocity, which vary with precipitation events, and bank full width. Variation among sampling dates in bank full width at some sites was most likely due to inconsistency in defining the bank full stream.

Table 12. Estimates of the numbers of potential refugia in the North Wichita River, Middle Fork of the Wichita River, and South Wichita River based on analysis of aerial video taken on 14-15 March 2006. Estimates are for reaches that extend from existing or proposed inflatable (diversion) weirs on each river downstream to the confluence of the North and South Wichita rivers. Potential refugia were characterized as large (exceeding 100 m in length), medium (between 10 and 100 m in length), or small (less than 10 m in length).

	North Wichita River	Middle Fork Wichita River	South Wichita River
Large	76	17	54
Medium	68	35	101
Small	32	20	102
Total	176	72	257

Table 13. Refugia encountered within 0.8 km, upstream and downstream, from three sites on the South Wichita River, 1-3 August 2006. Site 1 = N of Vera, County Road 3065; Site 2 = N of Benjamin, Highway 6; Site 3 = Bateman Ranch, downstream from inflatable weir.

Site	Date	Time (hrs)	Water Temperature (^{o}C)	Dissolved Oxygen (mg/ l)	Length (m)	Maximum Depth (cm)	Pool Area (m^2)
1	26 July	19:16	32.1	7.2	26.0	29	113
1	26 July	18:52	34.2	6.2	82.0	22	291
1	26 July	18:49	33.7	5.9	72.0	69	378
1	26 July	18:35	31.7	6.6	31.0	51	114
1	26 July	18:29	31.8	6.6	57.0	50	254
1	26 July	18:22	38.0	8.0	35.0	34	140
1	26 July	18:14	34.1	6.4	60.6	40	312
1	26 July	19:50	27.2	4.8	54.0	90	282
1	26 July	19:45	31.5	6.6	75.0	73	452
1	26 July	19:37	28.6	6.2	51.0	25	186
1	26 July	19:24	32.0	6.6	35.0	40	140
2	27 July	9:38	25.1	5.9	12.0	37	28
2	27 July	9:32	26.3	3.7	20.0	40	44
2	27 July	9:28	26.8	7.3	38.0	74	91
2	27 July	9:21	27.3	8.6	48.0	38	189
2	27 July	9:20	25.4	5.8	215.0	41	1402
2	27 July	8:19	24.7	4.9	16.0	25	28
2	27 July	8:09	24.1	5.7	31.0	28	57
2	27 July	8:07	24.5	5.8	26.0	21	50
2	27 July	7:58	24.3	5.9	27.0	19	119
2	27 July	7:57	25.3	5.3	77.0	58	318
3	26 July	11:11	26.3	5.9	78.0	61	612
3	26 July	11:11	27.6	11.2	20.1	37	123
3	26 July	10:58	25.3	1.1	29.4	31	239
3	26 July	10:56	24.9	2.2	77.4	55	700
3	26 July	10:26	27.1	3.6	118.0	95	1326
3	26 July	10:24	25.6	0.8	35.7	44	200
3	26 July	10:14	27.7	2.4	37.5	57	449
3	26 July	9:58	26.3	4.7	22.6	44	170

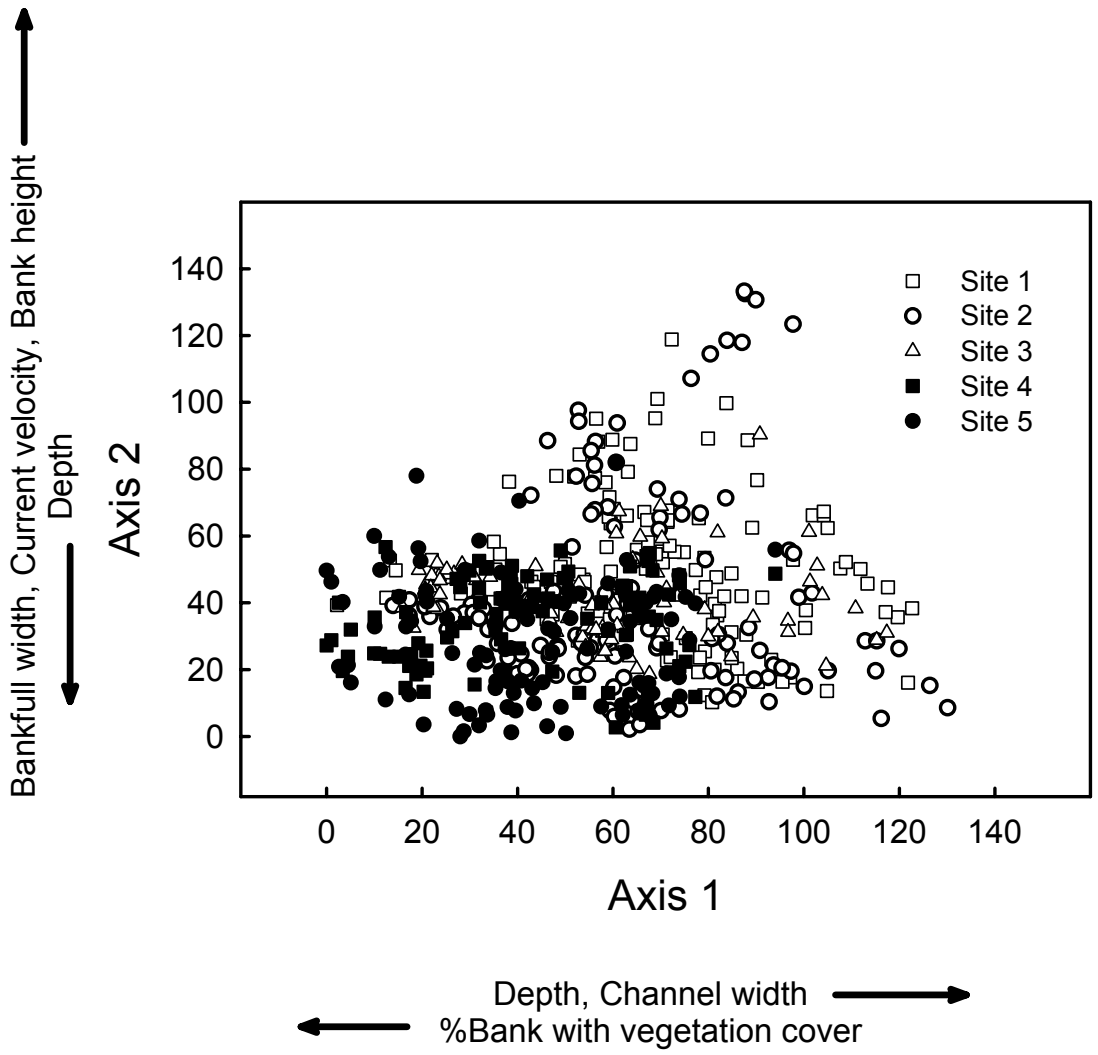

Figure 4. Detrended correspondence analysis ordination of habitat variables at sites sampled in reaches 8 (lower Wichita River), 9 (Wichita River upstream from Lake Diversion), 10 (North Wichita River and Middle Fork of the Wichita River), and 11 (South Wichita River) of the Wichita River system. Sites are labeled, within each reach, from 1 (downstream) to 5 (upstream).

Table 14. Fish assemblages and habitat conditions in South Wichita River refugia sampled in summer 2006.

Date	Site	Pool	Time	Maximum depth (m)	Area (m^2)	Water temperature (° C)	Dissolved oxygen (mg/l)	Conductivity (mS)	Plains killifish (%)	Plains minnow (%)	Red shiner (%)	Red River shiner (%)	Red River pupfish (%)	All other species (%)	Total fish captured
8/1/2006	3	D1	PM	28.0	26.1	36.7	7.2	20.0	43.0	0.9	4.4	7.0	31.6	13.2	114
8/1/2006	3	U1	PM	29.0	19.7	35.4	6.8	8.0	61.3	3.6	0.0	6.2	27.3	1.5	194
8/1/2006	3	U4	PM	17.0	50.9	33.4	6.5	4.0	15.6	11.0	1.8	0.9	60.6	10.1	109
8/1/2006	1	D1	PM	86.0	372.4	31.0	6.9	10.5	0.8	22.3	4.1	57.9	0.0	14.9	121
8/1/2006	1	U2	PM	24.0	207.5	34.3	7.0	10.8	8.6	22.9	17.1	34.3	0.0	17.1	35
8/1/2006	1	U4	PM	49.0	109.1	31.4	7.1	6.3	40.9	18.2	0.0	27.3	0.0	13.6	22
8/2/2006	3	D1	AM	29.0	24.7	23.6	5.9	16.2	43.7	0.0	7.0	5.6	38.0	5.6	71
8/2/2006	3	U1	AM	32.0	19.2	23.6	4.9	6.5	71.7	3.0	0.0	4.0	21.2	0.0	99
8/2/2006	3	U4	AM	15.0	38.5	22.9	4.9	3.4	8.7	13.0	1.1	0.0	69.6	7.6	92
8/2/2006	1	D1	AM	84.0	385.5	25.5	6.4	9.6	0.0	34.1	6.1	52.4	0.0	7.3	82
8/2/2006	1	U4	AM	40.0	105.8	26.4	6.8	5.9	19.0	23.8	4.8	52.4	0.0	0.0	21
8/2/2006	1	U2	AM	24.0	207.5	25.7	7.3	9.3	0.0	16.7	22.2	33.3	0.0	27.8	18
8/2/2006	4	U7	PM	44.0	425.8	33.4	12.6	42.7	1.8	0.0	0.0	0.0	97.6	0.6	500
8/2/2006	4	U5	PM	89.0	1157.6	30.3	11.5	56.4	1.0	0.0	0.0	0.0	98.4	0.5	764
8/2/2006	4	U2	PM	27.0	84.7	33.9	10.1	37.9	0.0	0.0	0.0	0.0	100.0	0.0	162
8/3/2006	4	U7	AM	0.0	425.8	27.5	4.1	38.9	1.9	0.0	0.0	0.0	97.9	0.2	515
8/3/2006	4	U5	AM	89.0	1157.6	27.6	0.3	53.9	0.2	0.0	0.0	0.0	99.8	0.0	619
8/3/2006	4	U2	AM	27.0	84.7	24.5	0.3	32.5	0.0	0.0	0.0	0.0	100.0	0.0	150
8/15/2006	3	D1	PM	22.0	12.3	33.9	5.6	24.1	61.7	0.0	5.3	0.0	21.3	11.7	94
8/15/2006	3	U1	PM	25.0	11.1	32.7	9.8	8.5	79.1	1.6	0.8	0.0	16.3	2.3	129
8/16/2006	3	D1	AM	20.0	12.1	24.9	5.9	20.7	0.0	0.0	0.0	0.0	0.0	0.0	0
8/16/2006	3	U1	AM	23.0	8.3	24.4	3.2	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0
8/16/2006	4	U7	PM	30.0	290.9	31.1	9.4	57.9	9.3	0.0	0.0	0.0	90.7	0.0	474
8/16/2006	4	U5	PM	69.0	886.2	27.9	9.6	65.3	1.9	0.0	0.0	0.0	98.1	0.0	531
8/16/2006	4	U2	PM	13.0	20.0	31.3	8.6	72.9	0.0	0.0	0.0	0.0	100.0	0.0	396
8/17/2006	4	U7	AM	28.0	283.6	23.8	4.5	50.4	0.0	0.0	0.0	0.0	0.0	0.0	0
8/17/2006	4	U5	AM	72.0	915.6	24.8	0.3	61.4	0.0	0.0	0.0	0.0	0.0	0.0	0
8/17/2006	4	U2	AM	13.0	20.0	22.0	0.3	60.7	0.0	0.0	0.0	0.0	0.0	0.0	0

Table 14 (Concluded).

Date	Site	Pool	Time	Maximum depth (m)	Area (m^2)	Water temperature (° C)	Dissolved oxygen (mg/l)	Conductivity (mS)	Plains killifish (%)	Plains minnow (%)	Red shiner (%)	Red River shiner (%)	Red River pupfish (%)	All other species (%)	Total fish captured
8/31/2006	3	U1	PM	10.0	2.8	28.9	4.7	11.7	60.6	0.0	0.0	0.0	35.2	4.2	71
8/31/2006	3	D1	PM	11.0	2.0	30.4	8.3	31.4	80.6	0.0	3.2	0.0	16.1	0.0	31
9/1/2006	3	U1	AM	10.0	2.8	22.1	7.0	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0
9/1/2006	3	D1	AM	11.0	2.0	22.4	5.3	26.3	0.0	0.0	0.0	0.0	0.0	0.0	0
9/1/2006	1	D1	AM	68.0	239.9	25.4	5.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0
9/1/2006	1	U2	AM	15.0	38.3	27.5	6.3	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0
9/1/2006	1	U4	AM	25.0	22.7	26.7	9.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0
9/1/2006	1	D1	PM	68.0	239.9	24.3	6.2	2.1	0.0	18.8	0.6	69.9	0.0	10.8	176
9/1/2006	1	U2	PM	15.0	38.3	22.7	5.1	4.0	35.0	12.5	15.0	30.0	0.0	7.5	40
9/1/2006	1	U4	PM	25.0	22.7	22.4	6.2	1.2	48.9	11.1	8.9	13.3	0.0	17.8	45
9/16/2006	3	D1	PM	0.2	14.3	32.5	7.6	3.6	0.0	0.0	0.0	80.0	20.0	0.0	15
9/16/2006	3	U1	PM	28.0	14.0	30.7	7.6	4.5	0.0	0.0	0.0	42.1	52.6	5.3	19
9/17/2006	3	D1	AM	0.2	14.3	23.7	5.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0
9/17/2006	3	U1	AM	28.0	14.0	23.7	6.7	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0

Table 15. Summary of stream channel characteristics at sampling sites in the Wichita River basin in 2005.

Site	Season	Channel width (m)	Bank full width (m)	Water depth (cm)	Current velocity (m/s)	Bank angle (^{o})	Canopy angle (^{o})	Canopy closure (^{o})	Bank height (m)	Bank vegetative (%)
8-1	Spring	23.64	30.66	44.30	0.27	41.22	51.77	16.64	3.01	48.64
8-1	Summer	23.38	29.45	46.48	0.30	38.87	45.98	15.77	2.23	70.68
8-1	Fall	22.54	30.81	60.82	0.22	34.24	35.59	15.23	3.05	5.23
8-2	Spring	23.42	27.65	96.58	0.08	56.08	46.73	15.27	2.34	72.73
8-2	Summer	24.29	27.95	90.61	0.18	58.42	46.57	16.77	1.93	72.73
8-2	Fall	21.51	25.91	105.67	0.14	58.10	36.38	15.55	1.87	23.86
8-3	Spring	18.56	25.85	56.91	0.19	46.16	51.94	13.27	2.57	62.95
8-3	Summer	19.67	26.50	62.91	0.27	49.36	47.16	16.55	2.28	71.59
8-3	Fall	18.05	25.82	71.36	0.22	40.11	41.22	15.50	2.12	21.14
8-4	Spring	15.35	22.89	19.97	0.17	40.68	61.09	11.27	2.45	79.77
8-4	Summer	15.95	23.69	31.09	0.31	36.34	53.72	14.82	2.36	91.59
8-4	Fall	16.05	22.50	38.09	0.28	44.99	47.08	15.05	2.16	44.55
8-5	Spring	8.57	11.85	67.70	0.03	18.76	34.57	12.73	0.84	94.77
8-5	Summer	9.03	16.35	56.88	0.01	26.16	33.53	15.14	1.26	96.59
8-5	Fall	10.50	15.04	67.27	0.03	28.26	32.00	16.27	1.43	96.36

Table 15 (Continued).

Site	Season	Channel width (m)	Bank full width (m)	Water depth (cm)	Current velocity (m/s)	Bank angle (^{o})	Canopy angle (^{o})	Canopy closure (^{o})	Bank height (m)	Bank vegetative (%)
9-1	Spring	23.01	31.74	89.97	0.22	41.35	22.14	12.59	1.08	74.09
9-1	Summer	22.80	30.78	86.00	0.21	41.09	22.46	15.23	1.02	82.73
9-1	Fall	19.21	22.98	55.55	0.00	31.35	15.40	10.68	1.13	38.41
9-2	Spring	12.63	39.54	8.52	0.11	21.06	16.87	3.32	1.60	25.18
9-2	Summer	18.71	42.38	13.58	0.22	22.82	17.47	5.50	1.95	28.95
9-2	Fall	32.91	43.77	42.59	0.43	29.50	13.26	7.55	1.70	48.64
10-1	Spring	10.40	40.56	21.52	0.10	30.89	24.36	4.18	1.75	27.50
10-1	Summer	11.95	39.65	29.70	0.15	25.90	20.53	6.86	1.62	39.59
10-1	Fall	14.80	43.75	30.30	0.30	35.63	21.17	7.64	1.59	49.77
10-2	Spring	9.87	11.55	24.36	0.12	61.00	37.46	11.59	1.31	83.41
10-2	Summer	10.23	11.78	22.94	0.14	49.20	34.93	14.18	1.27	84.55
10-2	Fall	9.88	11.81	45.15	0.10	50.17	30.34	13.91	1.26	72.05
10-3	Spring	19.60	28.06	38.85	0.02	38.98	19.65	2.73	1.64	79.55
10-3	Summer	21.05	29.68	38.48	0.04	36.34	20.79	10.86	1.42	79.64
10-3	Fall	21.35	29.55	42.48	0.08	34.13	19.97	8.50	1.53	76.82
10-4	Spring	9.45	17.58	43.09	0.05	38.24	36.25	5.41	1.87	49.55
10-4	Summer	9.59	14.25	42.79	0.04	36.33	35.53	9.77	1.17	64.36
10-4	Fall	8.55	15.28	39.82	0.08	32.86	35.54	6.27	1.45	55.23

Table 15 (Concluded).

Site	Season	Channel width (m)	Bank full width (m)	Water depth (cm)	Current velocity (m/s)	Bank angle (^{o})	Canopy angle (^{o})	Canopy closure (^{o})	Bank height (m)	Bank vegetative (%)
10-5	Spring	18.50	24.45	38.09	0.05	27.63	18.71	5.95	1.40	76.55
10-5	Summer	18.72	25.14	39.76	0.03	27.92	22.15	6.91	0.98	71.55
10-5	Fall	18.24	25.25	38.21	0.06	30.80	21.21	10.36	1.21	74.32
11-1	Spring	7.26	19.40	15.08	0.04	30.31	23.08	3.18	1.65	43.00
11-1	Summer	6.86	19.48	12.48	0.04	31.00	22.98	6.55	1.69	49.41
11-1	Fall	13.73	20.15	30.64	0.32	40.95	19.95	10.91	1.64	62.50
11-2	Spring	6.79	9.26	40.30	0.00	42.49	30.45	8.82	1.07	66.82
11-2	Summer	6.65	9.47	34.30	0.00	45.02	33.67	13.36	1.15	71.14
11-2	Fall	8.35	10.35	69.94	0.14	39.36	28.19	14.55	0.96	81.82
11-3	Spring	17.22	23.50	12.79	0.26	40.97	17.88	6.09	2.18	94.77
11-3	Summer	**no flow**								
11-3	Fall	14.04	20.60	12.03	0.25	37.77	15.37	11.73	1.58	82.27
11-4	Spring	3.44	13.06	19.38	0.00	23.45	31.70	1.59	0.55	78.41
11-4	Summer	3.99	12.81	17.79	0.09	17.48	32.04	4.86	0.75	82.05
11-4	Fall	4.28	13.15	24.06	0.25	21.76	26.54	2.68	0.75	75.68
11-5	Spring	5.49	14.05	17.48	0.00	19.30	41.31	2.09	1.27	53.64
11-5	Summer	5.47	14.50	18.94	0.01	16.79	36.00	4.59	0.82	53.73
11-5	Fall	6.36	11.49	23.03	0.14	22.64	33.82	4.73	0.75	65.23

5.0 DISCUSSION

Among the 17 springs visited in this survey, only four were large enough to permit sampling. All sampled springs had low species richness and were not densely populated. Apparently, the combination of high salinity and small size of most springs precluded the development of large, or diverse, invertebrate and phytoplankton assemblages. None of the springs supported vertebrate populations. The spring that supported the greatest richness and abundance of invertebrates was the largest of those sampled, but this spring consisted of a diffuse series of small seeps. This spring was located on a hill, in an area in which the water table was very close to the surface. With the exception of this spring and Spring site 9, which has been extensively modified, all springs were located < 1 m above the river surface, suggesting they would be inundated during floods. This latter observation and the small size and high salinity of these springs argue against the possibility that they support any endemic species and none was observed.

In the earliest extensive survey of the Wichita River system, Lewis and Dalquest (1957) reported 50 species from the river and its impoundments. Wilde et al. (1996) documented the presence of 43 species of fish from the Wichita River and its tributaries. Forty-one species were documented from the Wichita River, 23 species from the North Wichita River and Middle Fork of the Wichita River, and 19 species from the South Wichita River. Twenty-seven species of fish were collected from the Wichita River, 13 species from the North Wichita River and Middle Fork of the Wichita River, and 19 species from the South Wichita River. Composition of these collections is comparable to that in other recent studies (Echelle et al. 1995; Gelwick et al. 2001); however, species richness in this study was less than that observed in historic and recent studies. Echelle et

al. (1995) collected 17 species from the North Wichita River, and Middle Fork of the Wichita River, and 19 South Wichita River and Gelwick et al. (2001) collected 45 species of fish from the Wichita River, its tributaries, tributaries to the Red River upstream from Lake Texoma. Differences in species richness between this study and that documented by Lewis and Dalquest (1957) and Wilde et al. (1996) is in large part due to the loss of several species from the system since the 1950s (Wilde et al. 1996). Differences between the present results and those of recent studies are probably related to differences in sampling methodology. The method used in this study is designed to characterize, in a consistent repeatable manner, the major constituents of the assemblages. It is not intended to provide a definitive sample of species richness or occurrence (Mike Meador, USGS personal communication).

The potential limitations of the current sampling protocol must be considered within the context of the current status of the Wichita River fish assemblage. That assemblage, as with many others in Texas, has seen substantial changes in composition, particularly with regard to the abundance and distribution of minnows and large river fishes (Anderson et al. 1995; Wilde et al. 1996; Hubbs et al. 1997). Further, given the strong effects salinity has in structuring West Texas stream fish assemblages (Echelle 1972; Taylor et al. 1993; Higgins and Wilde 2005) and that the primary goal of the Red River Chloride Control Project, Wichita River Only Portion is to reduce salinity in the river, the adequacy of the current sampling protocol, which has the strength of being replicable, should be carefully evaluated to insure that it will meet its intended goals.

The role of dry-season refugia in maintenance of stream fish populations has not been extensively studied. The importance of such refugia in the Wichita River is increased because operation of chloride control projects within the upper basin is expected to

increase the frequency and duration of periods in which the river is dry. Previous studies of fishes confined to dry-season pools have generally implicated changing physical and chemical conditions as the mechanism for changes in species composition (Capone and Kushlan 1991; Ostrand and Wilde 2002, 2004). In the present study, a small number of refugia were sampled for a six-week period, during which time the fish assemblages changed markedly. Low dissolved oxygen concentrations appear to be the most probable cause for these changes.

Because predatory (e.g., largemouth bass and ictalurids) and nonpredatory (primarily cyprinodontids and minnows) fishes will be confined in refugia pools, some concerns have been raised about predatory impacts on smaller fishes, particularly the Red River pupfish. However, the present results and those of other studies of the Wichita River (Lewis and Dalquest 1957; Echelle et al. 1995; Wilde et al. 1996; Gelwick et al. 2000) indicate that predatory fishes are not common in the upper Wichita River and its tributaries. Results of this survey shows that predatory fishes present in the upper Wichita River are smaller individuals. Therefore, predation may not be a problem in these refugia. Further, predatory species were present in low numbers in the sampled refugia and were among the first fish to disappear from these habitats.

Two other biotic interactions may affect fishes in dry-season refugia. Although many of the smaller fishes in the Wichita River are generalist feeders, related species in other west Texas streams show a high incidence of empty stomachs and evidence of decreased condition when confined to pools for extended periods (Marks et al. 2001; Wilde et al. 2001). Thus, food availability and interspecific competition might affect species composition in isolated pools. Although the incidence of parasitism by *Lernaea cyprinaceae* was low in Wichita River fishes, Durham et al. (2002) found an increased

incidence of infestations by *Lernaea cyprinaceae* on Arkansas River shiners and peppered chubs in the Canadian River, Texas when fish were restricted to isolated pools.

An aerial survey of the Wichita River and its main tributaries, upstream from Wichita Falls, conducted in March 2006 suggests that dry-season refugia will be common in most reaches of the river. The survey was conducted during a time in which the river channel was not dry. However, the Wichita River and its main tributaries were fairly clear and it is possible to discern areas within the river channel that appear to be deep enough to provide refuge during most dry periods. In general, these areas were located along hills and escarpments along which the river has scoured deep holes. Because the river channel was wet throughout the summer of 2005, a more definitive assessment of potential refugia or of physical and chemical conditions within these refugia could not be undertaken.

This study provides the first detailed description of stream channel characteristics of the Wichita River and its main tributaries. The Wichita River and its tributaries are characterized by fairly narrow, shallow channels, with steep banks. Channel size decreases from lower reaches to upper reaches as is typical of most rivers. Riparian vegetation and the proportion of the channel covered by the riparian canopy also decrease from lower to upper reaches of the river. This may reflect a greater volume of water in lower reaches and a general west to east gradient of increasing precipitation in Texas (Ground and Groeger 1994; Ramos 1995). The suite of stream channel measurements made in this study should allow recognition and monitoring of such potential changes and should allow an assessment of their potential affects on aquatic organisms

6.0 LITERATURE CITED

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APPENDICES

The following abbreviations occasionally are used in this appendix:

Habitat	Aquatic cover features	Bed Substrate
BW- backwater	PW- pondweed	GR- gravel
SC- side channel	WG- widgeon grass	BR- bedrock
MC- main channel	SG- salt grass	CB- cobble
		BLD- boulder

APPENDIX A

WICHITA RIVER FISH AND STREAM HABITAT SAMPLING LOCATION DESCRIPTIONS

Site descriptions for Wichita River fish and habitat sampling locations

Site	Sampling Site	Reach Length (m)	Longitude	Latitude
8-1	Wichita River upstream from bridge on FM 171	300	N 34 ^{o} 05.242’	W 98 ^{o} 12.162’
8-2	Wichita River upstream from bridge on FM 810	300	N 34 ^{o} 03.346’	W 98 ^{o} 17.727’
8-3	Wichita River upstream from bridge on FM 2393	300	N 34 ^{o} 01.448’	W 98 ^{o} 22.221’
8-4	Wichita River downstream from bridge on FM 368	300	N 33 ^{o} 53.902’	W 98 ^{o} 42.355’
8-5	Wichita River upstream	150	N 33 ^{o} 50.425’	W 98 ^{o} 53.416’
9-1	Wichita River downstream from bridge on State Highway	300	N 33 ^{o} 45.653’	W 99 ^{o} 8.526’
9-2	Wichita River upstream from bridge on FM 1919	240	N 33 ^{o} 41.993’	W 99 ^{o} 23.400’
10-1	North Wichita River downstream from bridge on FM 267	183	N 33 ^{o} 47.221’	W 99 ^{o} 35.663’
10-2	North Wichita River downstream from bridge on State Highway 6	180	N 33 ^{o} 49.209’	W 99 ^{o} 47.145’
10-3	North Wichita River downstream from County Road low-water crossing west of Foard City	300	N 33 ^{o} 51.891’	W 99 ^{o} 52.144’

Site descriptions for Wichita River fish and habitat sampling locations (concluded)

Site	Sampling Site	Reach Length (m)	Longitude	Latitude
10-4	Middle Fork Wichita River at fence crossing on Lowrance Ranch	150	N 33°48.543’	W 100 ° 03.584’
10-5	North Wichita River downstream from bridge on the Y Ranch	300	N 33 ° 56.970’	W 100 ° 03.888’
11-1	South Wichita River downstream from crossing on County Road north of Vera	260	N 33 ° 41.119’	W 99 ° 35.070’
11-2	South Wichita River downstream from bridge on FM 267	150	N 33 ° 38.710’	W 100 ° 39.914’
11-3	South Wichita River upstream from bridge on State Highway 6	164	N 33 ° 38.643’	W 100 ° 48.111’
11-4	South Wichita River downstream from 3rd crossing below Bateman pumping station	150	N 33 ° 38.069’	W 100 ° 10.824’
11-5	South Wichita River upstream from 2nd crossing below Bateman pumping station	150	N 33 ° 37.686’	W 100 ° 11.763’

APPENDIX B

BIOTIC SURVEYS OF SPRINGS:

PHYTOPLANKTON AND INVERTEBRATES

DURING SPRING, SUMMER, AND FALL 2005

Phytoplankton

Spring Site 9: Primary large salt spring flowing from culvert embedded in hillside, South Wichita River. Relative abundance of phytoplankton is expressed as number of cells counted in three to seven one-ml preserved subsamples from a single composite sample collected at the site. An attempt was made to count and identify at least 100 cells.

	Spring	Summer	Fall
Cyanobacteria			
Dactylococopsis			2
Phormidium			
Bacillariophyceae			
Cocconeis			3
Cymbella			1
Diatomella	4	1	
Gryosigma	0.3	1	
Navicula	27	61	138
Nitzschia			45
Pleurosigma	12	35	19
Synedra	11	19	
Chlorophyta			
Mougeotia			

Phytoplankton

Spring Site 12: Small spring upstream from low-water crossing on north bank across from pump jack South Wichita River. Relative abundance of phytoplankton is expressed as number of cells counted in three to seven one-ml preserved subsamples from a single composite sample collected at the site. An attempt was made to count and identify at least 100 cells.

	Spring	Summer	Fall
Cyanobacteria			
Dactylococopsis			
Phormidium	2	3	
Bacillariophyceae			
Cocconeis	3		
Cymbella			
Diatomella			
Gryosigma			
Navicula		14	3
Nitzschia			
Pleurosigma		26	50
Synedra	1	25	6
Chlorophyta			
Mougeotia	1	1	

Phytoplankton

Spring Site 8: Large spring on west bank of Salt Creek 40 m downstream from road crossing (Site 11 of Lewis and Dalquest), North Fork Wichita River. Relative abundance of phytoplankton is expressed as number of cells counted in three to seven one-ml preserved subsamples from a single composite sample collected at the site. An attempt was made to count and identify at least 100 cells.

	Spring	Summer	Fall
Cyanobacteria			
Dactylococopsis			
Phormidium	1		20
Bacillariophyceae			
Cocconeis	1		
Cymbella	5		
Diatomella		15	12
Gryosigma	8	6	
Navicula	18	9	17
Nitzschia		7	3
Pleurosigma	50	18	34
Synedra	49	76	32
Chlorophyta			
Mougeotia			

Phytoplankton

Spring Site 7: Brine seep from uphill with no surface flow into Salt Creek between confluence with Wichita and Road crossing, North Wichita River. Relative abundance of phytoplankton is expressed as number of cells counted in three to seven one-ml preserved subsamples from a single composite sample collected at the site. An attempt was made to count and identify at least 100 cells.

	Spring	Summer	Fall
Cyanobacteria			
Dactylococopsis			
Phormidium		2	
Bacillariophyceae			
Cocconeis			
Cymbella			
Diatomella		1	
Gryosigma		2	
Navicula	9		
Nitzschia	1		
Pleurosigma	78	80	
Synedra	38	24	
Chlorophyta			
Mougeotia			

Invertebrates

Spring Site 9: Primary large salt spring flowing from culvert embedded in hillside, South Wichita River. Relative abundance of phytoplankton is expressed as number of cells counted in three to seven one-ml preserved subsamples from a single composite sample collected at the site. An attempt was made to count and identify at least 100 cells.

Species	Spring 2005	Summer 2005	Fall 2005
Armadillidae	0	0	1
Carabidae	0	1	0
Corixidae	0	2	0
Ephydridae	4	0	0
Gryllacrididae	1	0	0
Hydrophilidae	2	10	0
Porcellionidae	0	9	6
Saldidae	2	1	0
Tipulidae	2	0	0

Spring creek of the above spring

Species	Spring 2006	Summer 2005	Fall 2005
Corixidae		56	
Formicidae		1	
Stratiomyidae		1	

Invertebrates

Spring Site 12: Small spring upstream from low-water crossing on north bank across from pump jack South Wichita River

Species	Spring 2005	Summer 2005	Fall 2005
Asellidae	0	1	0
Cicadellidae	0	1	0
Coenagrionidae	2	4	1
Hydrophilidae	3	0	0
Dytiscidae	5	0	0
Pentatomidae	0	1	0
Porcellionidae	2	0	0
Talitridae	21	144	5
Veliidae	1	0	0

Invertebrates

Spring Site 8: Large spring on west bank of Salt Creek 40 m downstream from road crossing (Site 11 of Lewis and Dalquest), North Fork Wichita River

Species	Spring 2005	Summer 2005	Fall 2005
Astacidae	3	2	3
Corixidae	1	13	0
Hydrophilidae	2	18	8

Invertebrates

Spring Site 7: Brine seep from uphill with no surface flow into Salt Creek between confluence with Wichita and Road crossing, North Wichita River

Species	Spring 2006	Summer 2005	Fall 2005
Coenagrionidae	3	0	0
Corixidae	0	21	8
Hydrophilidae	9	11	0
Notonectidae	42	0	0
Stratiomyidae	1	1	1

APPENDIX C

WICHITA RIVER FISH ASSEMBLAGE:

DURING SPRING, SUMMER, AND FALL 2005

Site	Date	Sample number	Conditions	Time (hrs)	Temperature (° C)	Conductivity (µS)	Dissolved oxygen (mg/l)
8-1	06/17/05	1	Partly cloudy	1130-1304	28.6	2978	6.27
8-1	06/17/05	2	Partly cloudy	1130-1304	28.6	2978	6.27
8-1	06/17/05	3	Partly cloudy	1130-1304	28.6	2978	6.27
8-1	06/17/05	4	Partly cloudy	1130-1304	28.6	2978	6.27
8-2	06/17/05	1	Clear	0915-1050	27.6	2996	5.23
8-2	06/17/05	2	Clear	0915-1050	27.6	2996	5.23
8-2	06/17/05	3	Clear	0915-1050	27.6	2996	5.23
8-2	06/17/05	4	Clear	0915-1050	27.6	2996	5.23
8-3	06/17/05	1	Cloudy	0715-0850	27.0	2959	5.01
8-3	06/17/05	2	Cloudy	0715-0850	27.0	2959	5.01
8-3	06/17/05	3	Cloudy	0715-0850	27.0	2959	5.01
8-3	06/17/05	4	Cloudy	0715-0850	27.0	2959	5.01
8-4	06/16/05	1	Partly cloudy	2015-2128	31.0	4545	7.18
8-4	06/16/05	2	Partly cloudy	2015-2128	31.0	4545	7.18
8-4	06/16/05	3	Partly cloudy	2015-2128	31.0	4545	7.18
8-4	06/16/05	4	Partly cloudy	2015-2128	31.0	4545	7.18
8-5	06/16/05	1	Partly cloudy Clear	1823-1951	33.6	3881	7.56
8-5	06/16/05	2	Clear	1823-1951	33.6	3881	7.56
8-5	06/16/05	3	Clear	1823-1951	33.6	3881	7.56
9-1	06/17/05	1	Clear	1740-1856	31.1	5420	7.71
9-1	06/17/05	2	Clear	1740-1856	31.1	5420	7.71
9-1	06/17/05	3	Clear	1740-1856	31.1	5420	7.71
9-1	06/17/05	4	Clear	1740-1856	31.1	5420	7.71
9-2	06/17/05	1	Clear	1930-2021	30.2	11850	5.82
9-2	06/17/05	2	Clear	1930-2021	30.2	11850	5.82
9-2	06/17/05	3	Clear	1930-2021	30.2	11850	5.82
9-2	06/17/05	4	Clear	1930-2021	30.2	11850	5.82
10-1	06/18/05	1	Clear	0815-0915	25.6	12800	6.81
10-1	06/18/05	2	Clear	0815-0915	25.6	12800	6.81
10-1	06/18/05	3	Clear	0815-0915	25.6	12800	6.81
10-1	06/18/05	4	Clear	0815-0915	25.6	12800	6.81

Site	Date	Sample number	Turbidity (NTU)	Habitat	Net time (sec)	Black bullhead	Blue catfish	Bluegill	Bluntnose minnow	Bullhead minnow
8-1	06/17/05	1	53.30	Run	92	0	0	0	0	0
8-1	06/17/05	2	53.30	Run	73	0	0	0	0	0
8-1	06/17/05	3	53.30	Run	115	0	0	0	0	0
8-1	06/17/05	4	53.30	Run	125	0	0	0	0	0
8-2	06/17/05	1	28.40	Riffle	75	0	0	0	0	0
8-2	06/17/05	2	28.40	Run	123	0	0	0	0	0
8-2	06/17/05	3	28.40	Run	82	0	0	0	0	0
8-2	06/17/05	4	28.40	Run	78	0	0	0	0	0
8-3	06/17/05	1	222.00	Run	121	0	0	0	0	0
8-3	06/17/05	2	222.00	Run	100	0	0	0	0	0
8-3	06/17/05	3	222.00	Run	112	0	0	0	0	1
8-3	06/17/05	4	222.00	Run	115	0	0	0	0	0
8-4	06/16/05	1	43.10	Run	165	0	0	0	0	0
8-4	06/16/05	2	43.10	Run	102	0	0	0	0	1
8-4	06/16/05	3	43.10	Run	86	0	0	0	0	1
8-4	06/16/05	4	43.10	Riffle	99	0	0	0	0	0
8-5	06/16/05	1	58.50	Pool	153	0	0	0	0	0
8-5	06/16/05	2	58.50	Pool	147	0	0	1	0	0
8-5	06/16/05	3	58.50	Pool	153	0	0	1	0	0
9-1	06/17/05	1	3.77	Pool	77	0	0	0	0	0
9-1	06/17/05	2	3.77	Run	86	0	0	1	0	0
9-1	06/17/05	3	3.77	Run	78	0	0	0	0	0
9-1	06/17/05	4	3.77	Pool	82	0	0	0	0	0
9-2	06/17/05	1	58.30	Riffle	51	0	0	0	0	0
9-2	06/17/05	2	58.30	Run	48	0	0	0	0	0
9-2	06/17/05	3	58.30	Run	48	0	0	0	0	0
9-2	06/17/05	4	58.30	Riffle	58	0	0	0	0	0
10-1	06/18/05	1	28.50	Run	67	0	0	0	0	0
10-1	06/18/05	2	28.50	Pool	41	0	0	0	0	0
10-1	06/18/05	3	28.50	Pool	42	0	0	0	0	0
10-1	06/18/05	4	28.50	Riffle	61	0	0	0	0	0

Site	Date	Sample number	Channel catfish	Common carp	emerald shiner	Fathead minnow	Freshwater drum	Ghost shiner
8-1	06/17/05	1	0	0	0	0	0	0
8-1	06/17/05	2	0	0	0	0	1	0
8-1	06/17/05	3	0	0	0	0	0	1
8-1	06/17/05	4	0	0	0	0	0	1
8-2	06/17/05	1	1	0	0	0	0	0
8-2	06/17/05	2	0	0	0	0	0	1
8-2	06/17/05	3	0	0	0	0	5	6
8-2	06/17/05	4	0	0	0	0	0	3
8-3	06/17/05	1	1	0	0	0	0	0
8-3	06/17/05	2	0	0	0	0	0	0
8-3	06/17/05	3	0	0	0	0	0	0
8-3	06/17/05	4	1	0	0	0	1	0
8-4	06/16/05	1	1	0	0	0	0	0
8-4	06/16/05	2	0	0	0	0	0	0
8-4	06/16/05	3	1	0	1	0	0	0
8-4	06/16/05	4	0	0	0	0	0	0
8-5	06/16/05	1	0	1	0	0	0	0
8-5	06/16/05	2	0	2	0	1	0	0
8-5	06/16/05	3	0	1	0	0	0	0
9-1	06/17/05	1	0	0	0	0	0	0
9-1	06/17/05	2	0	0	0	0	0	0
9-1	06/17/05	3	0	2	0	0	0	0
9-1	06/17/05	4	0	1	0	0	0	0
9-2	06/17/05	1	0	0	0	0	0	0
9-2	06/17/05	2	0	0	0	0	0	0
9-2	06/17/05	3	0	0	0	0	0	0
9-2	06/17/05	4	0	0	0	0	0	0
10-1	06/18/05	1	0	0	0	0	0	0
10-1	06/18/05	2	0	0	0	0	0	0
10-1	06/18/05	3	0	0	0	0	0	0
10-1	06/18/05	4	0	0	0	0	0	0

Site	Date	Sample number	Gizzard shad	Green sunfish	Hybrid sunfish	Inland silverside	Largemouth bass	Longear sunfish	Longnose gar
8-1	06/17/05	1	0	0		0	0	0	0
8-1	06/17/05	2	0	0	0	0	0	0	0
8-1	06/17/05	3	0	0	0	0	0	0	0
8-1	06/17/05	4	0	0	0	0	0	0	0
8-2	06/17/05	1	0	0	0	0	0	0	0
8-2	06/17/05	2	0	0	0	0	0	0	0
8-2	06/17/05	3	0	0	0	0	0	0	0
8-2	06/17/05	4	0	0	0	0	0	0	0
					0				
8-3	06/17/05	1	0	0		0	0	0	0
8-3	06/17/05	2	0	0	0	0	0	0	0
8-3	06/17/05	3	0	0	0	0	0	0	0
8-3	06/17/05	4	0	0	0	0	0	0	0
					0				
8-4	06/16/05	1	0	0		0	0	0	0
8-4	06/16/05	2	0	0	0	0	0	1	0
8-4	06/16/05	3	2	0	0	0	0	0	0
8-4	06/16/05	4	1	0	0	0	0	0	0
8-5	06/16/05	1	0	0	0	0	0	0	1
8-5	06/16/05	2	0	0	0	0	0	0	0
8-5	06/16/05	3	0	0	0	0	0	0	0
9-1	06/17/05	1	1	0	0	2	0	0	0
9-1	06/17/05	2	0	0	0	0	0	0	0
9-1	06/17/05	3	0	0	0	2	0	0	0
9-1	06/17/05	4	0	0	0	0	0	0	0
9-2	06/17/05	1	0	0	0	0	0	0	0
9-2	06/17/05	2	0	0	0	0	0	0	0
9-2	06/17/05	3	2	0	0	0	0	0	0
9-2	06/17/05	4	0	0	0	0	0	0	0
10-1	06/18/05	1	0	0	0	0	0	0	0
10-1	06/18/05	2	0	0	0	0	0	0	0
10-1	06/18/05	3	0	0	0	0	0	0	0
10-1	06/18/05	4	0	0	0	0	0	0	0

Site	Date	Sample number	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner	Red shiner
8-1	06/17/05	1	0	0	0	0	0	0	0
8-1	06/17/05	2	0	0	0	0	0	0	1
8-1	06/17/05	3	0	0	0	0	0	0	0
8-1	06/17/05	4	0	0	0	0	0	0	0
8-2	06/17/05	1	0	0	0	0	0	0	0
8-2	06/17/05	2	0	0	0	0	0	0	0
8-2	06/17/05	3	0	0	0	0	0	0	0
8-2	06/17/05	4	0	0	0	0	0	0	0
8-3	06/17/05	1	0	0	0	0	0	0	0
8-3	06/17/05	2	1	0	0	0	0	0	16
8-3	06/17/05	3	0	0	0	0	0	0	4
8-3	06/17/05	4	0	0	0	0	0	0	0
8-4	06/16/05	1	0	0	0	0	0	0	5
8-4	06/16/05	2	0	0	0	1	0	0	5
8-4	06/16/05	3	0	0	0	0	0	0	1
8-4	06/16/05	4	0	0	0	0	0	0	2
8-5	06/16/05	1	1	3	0	0	0	0	2
8-5	06/16/05	2	0	1	0	0	0	0	0
8-5	06/16/05	3	4	0	1	0	0	0	6
9-1	06/17/05	1	0	0	0	0	0	0	0
9-1	06/17/05	2	0	0	0	0	0	0	1
9-1	06/17/05	3	0	0	0	0	0	0	6
9-1	06/17/05	4	0	0	0	0	0	0	11
9-2	06/17/05	1	0	0	2	0	0	0	0
9-2	06/17/05	2	0	0	0	0	0	1	3
9-2	06/17/05	3	0	0	1	0	0	0	3
9-2	06/17/05	4	0	0	5	0	0	3	6
10-1	06/18/05	1	0	0	3	0	2	9	7
10-1	06/18/05	2	0	0	0	0	0	3	0
10-1	06/18/05	3	0	0	1	0	0	0	14
10-1	06/18/05	4	0	0	0	0	2	0	6

Site	Date	Sample number	River carpsucker	Sand shiner	Smallmouth buffalo	Speckled chub	Suckermouth minnow	Warmouth sunfish	White bass
8-1	06/17/05	1	0	0	0	1	0	0	0
8-1	06/17/05	2	0	0	0	0	0	0	0
8-1	06/17/05	3	1	0	0	0	0	0	0
8-1	06/17/05	4	0	0	0	0	0	0	0
8-2	06/17/05	1	0	0	0	0	0	0	0
8-2	06/17/05	2	0	0	0	1	0	0	0
8-2	06/17/05	3	0	0	0	0	0	0	0
8-2	06/17/05	4	0	0	0	0	0	0	0
8-3	06/17/05	1	0	0	0	0	0	0	0
8-3	06/17/05	2	0	0	0	0	0	0	0
8-3	06/17/05	3	0	0	0	9	0	0	0
8-3	06/17/05	4	0	0	0	2	0	0	0
8-4	06/16/05	1	0	0	0	0	0	0	0
8-4	06/16/05	2	0	0	0	0	0	0	0
8-4	06/16/05	3	0	0	0	0	0	0	0
8-4	06/16/05	4	0	0	0	0	0	0	0
8-5	06/16/05	1	0	0	0	0	0	0	1
8-5	06/16/05	2	0	0	0	0	0	0	0
8-5	06/16/05	3	0	0	0	0	0	0	1
9-1	06/17/05	1	0	0	0	0	0	0	0
9-1	06/17/05	2	0	0	0	0	0	0	0
9-1	06/17/05	3	0	0	0	0	0	0	0
9-1	06/17/05	4	0	0	0	0	0	0	0
9-2	06/17/05	1	0	0	0	0	0	0	0
9-2	06/17/05	2	0	0	0	0	0	0	0
9-2	06/17/05	3	0	0	0	0	0	0	0
9-2	06/17/05	4	0	0	0	0	0	0	0
10-1	06/18/05	1	0	0	0	12	0	0	0
10-1	06/18/05	2	0	0	0	0	0	0	0
10-1	06/18/05	3	0	0	0	1	0	0	0
10-1	06/18/05	4	0	0	0	5	0	0	0

Site	Date	Sample number	Conditions	Time (hrs)	Temperature (° C)	Conductivity (µS)	Dissolved oxygen (mg/l)
10-2	06/18/05	1	Clear	0945-1045	29.0	18070	6.09
10-2	06/18/05	2	Clear	0945-1045	29.0	18070	6.09
10-2	06/18/05	3	Clear	0945-1045	29.0	18070	6.09
10-3	06/22/05	1	Clear	1400-1545	35.0	29200	9.46
10-3	06/22/05	2	Clear	1400-1545	35.0	29200	9.46
10-3	06/22/05	3	Clear	1400-1545	35.0	29200	9.46
10-3	06/22/05	4	Clear	1400-1545	35.0	29200	9.46
10-4	06/22/05	1	Clear	1815-1900	32.5	15650	11.74
10-4	06/22/05	2	Clear	1815-1900	32.5	15650	11.74
10-4	06/22/05	3	Clear	1815-1900	32.5	15650	11.74
10-5	06/23/05	1	Clear	0820-1000	27.3	27420	4.03
10-5	06/23/05	2	Clear	0820-1000	27.3	27420	4.03
10-5	06/23/05	3	Clear	0820-1000	27.3	27420	4.03
10-5	06/23/05	4	Clear	0820-1000	27.3	27420	4.03
11-1	06/14/05	1	Cloudy	1015-1145	22.2	3420	6.46
11-1	06/14/05	2	Cloudy	1015-1145	22.2	3420	6.46
11-1	06/14/05	3	Cloudy	1015-1145	22.2	3420	6.46
11-1	06/14/05	4	Cloudy	1015-1145	22.2	3420	6.46
11-2	06/14/05	1	Cloudy	1245-1342	26.2	7660	5.68
11-2	06/14/05	2	Cloudy	1245-1342	26.2	7660	5.68
11-2	06/14/05	3	Cloudy	1245-1342	26.2	7660	5.68
11-3	06/14/05	1	Cloudy	1417-1530	29.1	9740	6.24
11-3	06/14/05	2	Cloudy	1417-1530	29.1	9740	6.24
11-3	06/14/05	3	Cloudy	1417-1530	29.1	9740	6.24
11-3	06/14/05	4	Cloudy	1417-1530	29.1	9740	6.24
11-4	06/15/05	1	Clear	0936-1036	26.7	9620	6.03
11-4	06/15/05	2	Clear	0936-1036	26.7	9620	6.03
11-4	06/15/05	3	Clear	0936-1036	26.7	9620	6.03
11-5	06/15/05	1	Clear	1115-1205	30.1	49350	7.76
11-5	06/15/05	2	Clear	1115-1205	30.1	49350	7.76
11-5	06/15/05	3	Clear	1115-1205	30.1	49350	7.76
11-5	06/15/05	4	Clear	1115-1205	30.1	49350	7.76

Site	Date	Sample number	Turbidity (NTU)	Habitat	Net time (sec)	Black bullhead	Blue catfish	Bluegill	Bluntnose minnow	Bullhead minnow
10-2	06/18/05	1		Pool	77	0	0	0	0	0
10-2	06/18/05	2		Run	137	0	0	0	0	0
10-2	06/18/05	3		Riffle	55	0	0	0	0	0
10-3	06/22/05	1	0.06	Run	135	0	0	0	0	0
10-3	06/22/05	2	0.06	Riffle	31	0	0	0	0	0
10-3	06/22/05	3	0.06	Pool	141	0	0	1	0	0
10-3	06/22/05	4	0.06	Pool	140	0	0	0	0	0
10-4	06/22/05	1	5.38	Riffle	32	0	0	0	0	0
10-4	06/22/05	2	5.38	Pool	48	0	0	0	0	0
10-4	06/22/05	3	5.38	Run	39	0	0	0	0	0
10-5	06/23/05	1	10.44	Pool	112	0	0	0	0	0
10-5	06/23/05	2	10.44	Riffle	61	0	0	0	0	0
10-5	06/23/05	3	10.44	Run	128	0	0	0	0	0
10-5	06/23/05	4	10.44	Run	155	0	0	0	0	0
11-1	06/14/05	1	9740.00	Run	90	0	0	0	0	2
11-1	06/14/05	2	9740.00	Riffle	39	2	0	0	0	0
11-1	06/14/05	3	9740.00	Riffle	41	1	0	1	0	0
11-1	06/14/05	4	9740.00	Pool	39	0	0	5	0	0
11-2	06/14/05	1	69.50	Pool	131	0	0	0	0	0
11-2	06/14/05	2	69.50	Pool	84	0	0	0	0	0
11-2	06/14/05	3	69.50	Pool	126	0	0	0	0	0
11-3	06/14/05	1	129.00	Pool	51	0	0	0	0	0
11-3	06/14/05	2	129.00	Riffle	63	0	0	0	0	0
11-3	06/14/05	3	129.00	Run	88	0	0	0	0	0
11-3	06/14/05	4	129.00	Run	77	0	0	0	0	0
11-4	06/15/05	1	79.80	Pool	46	0	0	0	0	0
11-4	06/15/05	2	79.80	Riffle	39	0	0	0	0	0
11-4	06/15/05	3	79.80	Run	66	0	0	0	0	0
11-5	06/15/05	1	11.60	Pool	69	0	0	0	0	0
11-5	06/15/05	2	11.60	Run	47	0	0	0	0	0
11-5	06/15/05	3	11.60	Run	58	0	0	0	0	0
11-5	06/15/05	4	11.60	Pool	69	0	0	0	0	0

Site	Date	Sample number	Channel catfish	Common carp	emerald shiner	Fathead minnow	Freshwater drum	Ghost shiner
10-2	06/18/05	1	0	0	0	0	0	0
10-2	06/18/05	2	0	0	0	0	0	0
10-2	06/18/05	3	0	0	0	0	0	0
10-3	06/22/05	1	0	0	0	0	0	0
10-3	06/22/05	2	0	0	0	0	0	0
10-3	06/22/05	3	0	0	0	0	0	0
10-3	06/22/05	4	0	0	0	0	0	0
10-4	06/22/05	1	0	0	0	0	0	0
10-4	06/22/05	2	0	0	0	0	0	0
10-4	06/22/05	3	0	0	0	1	0	0
10-5	06/23/05	1	0	0	0	0	0	0
10-5	06/23/05	2	0	0	0	0	0	0
10-5	06/23/05	3	0	0	0	0	0	0
10-5	06/23/05	4	0	0	0	0	0	0
11-1	06/14/05	1	0	0	0	0	0	0
11-1	06/14/05	2	0	0	0	0	0	0
11-1	06/14/05	3	0	0	0	0	0	0
11-1	06/14/05	4	0	0	0	0	0	0
11-2	06/14/05	1	0	0	0	0	0	0
11-2	06/14/05	2	0	0	0	0	0	0
11-2	06/14/05	3	0	0	0	0	0	0
11-3	06/14/05	1	0	0	0	0	0	0
11-3	06/14/05	2	0	0	0	0	0	0
11-3	06/14/05	3	0	0	0	0	0	0
11-3	06/14/05	4	0	0	0	0	0	0
11-4	06/15/05	1	0	0	0	0	0	0
11-4	06/15/05	2	0	0	0	0	0	0
11-4	06/15/05	3	0	0	0	0	0	0
11-5	06/15/05	1	0	0	0	0	0	0
11-5	06/15/05	2	0	0	0	0	0	0
11-5	06/15/05	3	0	0	0	0	0	0
11-5	06/15/05	4	0	0	0	0	0	0

Site	Date	Sample number	Gizzard shad	Green sunfish	Hybrid sunfish	Inland silverside	Largemouth bass	Longear sunfish	Longnose gar
10-2	06/18/05	1	0	0	0	0	0	0	0
10-2	06/18/05	2	0	0	0	0	0	0	0
10-2	06/18/05	3	0	0	0	0	0	0	0
10-3	06/22/05	1	0	0	0	0	0	0	0
10-3	06/22/05	2	0	0	0	0	0	0	0
10-3	06/22/05	3	0	1	0	0	0	0	0
10-3	06/22/05	4	0	0	0	0	0	0	0
10-4	06/22/05	1	0	0	0	0	0	0	0
10-4	06/22/05	2	0	0	0	0	0	0	0
10-4	06/22/05	3	0	0	0	0	0	0	0
10-5	06/23/05	1	0	0	0	0	0	0	0
10-5	06/23/05	2	0	0	0	0	0	0	0
10-5	06/23/05	3	0	0	0	0	0	0	0
10-5	06/23/05	4	0	0	0	0	0	0	0
11-1	06/14/05	1	0	0	0	0	0	0	0
11-1	06/14/05	2	0	2	0	0	0	0	0
11-1	06/14/05	3	0	1	0	0	0	0	0
11-1	06/14/05	4	0	5	0	0	0	1	0
11-2	06/14/05	1	0	0	0	0	0	0	0
11-2	06/14/05	2	0	0	0	0	0	0	0
11-2	06/14/05	3	0	0	0	0	0	0	0
11-3	06/14/05	1	0	2	0	0	0	0	0
11-3	06/14/05	2	0	0	0	0	0	0	0
11-3	06/14/05	3	0	0	0	0	0	0	0
11-3	06/14/05	4	0	0	0	0	0	0	0
11-4	06/15/05	1	0	0	0	0	2	0	0
11-4	06/15/05	2	0	0	0	0	0	0	0
11-4	06/15/05	3	0	0	0	0	0	0	0
11-5	06/15/05	1	0	0	0	0	0	0	0
11-5	06/15/05	2	0	0	0	0	0	0	0
11-5	06/15/05	3	0	0	0	0	0	0	0
11-5	06/15/05	4	0	0	0	0	0	0	0

Site	Date	Sample number	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner	Red shiner
10-2	06/18/05	1	0	0	1	3	3	11	2
10-2	06/18/05	2	0	0	1	9	0	43	0
10-2	06/18/05	3	0	0	0	0	0	0	0
10-3	06/22/05	1	1	0	14	0	35	9	1
10-3	06/22/05	2	0	0	2	0	6	7	2
10-3	06/22/05	3	0	0	2	0	16	0	1
10-3	06/22/05	4	0	0	0	0	11	0	5
10-4	06/22/05	1	0	0	1	0	22	0	18
10-4	06/22/05	2	0	0	0	0	17	0	24
10-4	06/22/05	3	10	0	0	0	41	0	22
10-5	06/23/05	1	2	0	10	0	31	0	0
10-5	06/23/05	2	0	0	4	0	28	0	0
10-5	06/23/05	3	0	0	9	0	47	0	0
10-5	06/23/05	4	0	0	8	0	49	0	0
11-1	06/14/05	1	0	0	0	4	0	8	3
11-1	06/14/05	2	1	6	0	0	0	5	2
11-1	06/14/05	3	0	0	0	1	0	7	5
11-1	06/14/05	4	0	9	0	1	0	0	0
11-2	06/14/05	1	0	7	0	0	0	1	2
11-2	06/14/05	2	0	3	0	0	0	0	2
11-2	06/14/05	3	0	0	0	2	0	1	0
11-3	06/14/05	1	0	0	3	2	18	0	1
11-3	06/14/05	2	0	0	0	0	0	0	3
11-3	06/14/05	3	0	0	3	1	3	3	6
11-3	06/14/05	4	0	0	0	0	0	1	5
11-4	06/15/05	1	2	0	41	0	135	0	0
11-4	06/15/05	2	0	0	2	0	9	0	0
11-4	06/15/05	3	26	0	29	0	78	0	0
11-5	06/15/05	1	0	0	41	0	275	0	0
11-5	06/15/05	2	1	0	11	0	143	0	0
11-5	06/15/05	3	0	0	22	0	144	0	0
11-5	06/15/05	4	2	0	34	0	27	0	0

Site	Date	Sample number	River carpsucker	Sand shiner	Smallmouth buffalo	Speckled chub	Suckermouth minnow	Warmouth sunfish	White bass
10-2	06/18/05	1	0	0	0	5	0	0	0
10-2	06/18/05	2	0	0	0	1	0	0	0
10-2	06/18/05	3	0	0	0	0	0	0	0
10-3	06/22/05	1	0	0	0	0	0	0	0
10-3	06/22/05	2	0	0	0	0	0	0	0
10-3	06/22/05	3	0	0	0	0	0	0	0
10-3	06/22/05	4	0	0	0	0	0	0	0
10-4	06/22/05	1	0	0	0	0	0	0	0
10-4	06/22/05	2	0	0	0	0	0	0	0
10-4	06/22/05	3	0	0	0	0	0	0	0
10-5	06/23/05	1	0	0	0	0	0	0	0
10-5	06/23/05	2	0	0	0	0	0	0	0
10-5	06/23/05	3	0	0	0	0	0	0	0
10-5	06/23/05	4	0	0	0	0	0	0	0
11-1	06/14/05	1	0	0	0	25	0	0	0
11-1	06/14/05	2	1	0	0	3	0	0	0
11-1	06/14/05	3	0	0	0	3	0	0	0
11-1	06/14/05	4	0	0	0	0	0	0	0
11-2	06/14/05	1	0	0	0	0	0	0	0
11-2	06/14/05	2	0	0	0	0	0	0	0
11-2	06/14/05	3	0	0	0	0	0	0	0
11-3	06/14/05	1	0	0	0	0	0	0	0
11-3	06/14/05	2	0	2	0	1	0	0	0
11-3	06/14/05	3	0	0	0	2	0	0	0
11-3	06/14/05	4	0	0	0	1	0	0	0
11-4	06/15/05	1	0	0	0	0	0	0	0
11-4	06/15/05	2	0	0	0	0	0	0	0
11-4	06/15/05	3	0	0	0	0	0	0	0
11-5	06/15/05	1	0	0	0	0	0	0	0
11-5	06/15/05	2	0	0	0	0	0	0	0
11-5	06/15/05	3	0	0	0	0	0	0	0
11-5	06/15/05	4	0	0	0	0	0	0	0

Site	Date	Sample number	Conditions	Time (hrs)	Temperature (° C)	Conductivity (µS)	Dissolved oxygen (mg/l)
8-1	08/09/05	1	Cloudy	1500-1600	29.9	3811	4.79
8-1	08/09/05	2	Cloudy	1500-1600	29.9	3811	4.79
8-1	08/09/05	3	Cloudy	1500-1600	29.9	3811	4.79
8-1	08/09/05	4	Cloudy	1500-1600	29.9	3811	4.79
8-2	08/09/05	1	Partly Cloudy	1120-1220	27.8	4474	5.35
8-2	08/09/05	2	Partly Cloudy	1120-1220	27.8	4474	5.35
8-2	08/09/05	3	Partly Cloudy	1120-1220	27.8	4474	5.35
8-2	08/09/05	4	Partly Cloudy	1120-1220	27.8	4474	5.35
8-3	08/09/05	1	Clear	0845-0930	27.0	4720	5.35
8-3	08/09/05	2	Clear	0845-0930	27.0	4720	5.35
8-3	08/09/05	3	Clear	0845-0930	27.0	4720	5.35
8-3	08/09/05	4	Clear	0845-0930	27.0	4720	5.35
8-4	08/08/05	1	Cloudy	1600-1700	30.3	5740	6.52
8-4	08/08/05	2	Cloudy	1600-1700	30.3	5740	6.52
8-4	08/08/05	3	Cloudy	1600-1700	30.3	5740	6.52
8-4	08/08/05	4	Cloudy	1600-1700	30.3	5740	6.52
8-5	08/08/05	1	Partly Cloudy	1345-1420	31.0	5820	6.30
8-5	08/08/05	2	Partly Cloudy	1345-1420	31.0	5820	6.30
8-5	08/08/05	3	Partly Cloudy	1345-1420	31.0	5820	6.30
9-1	08/08/05	1	Cloudy	0945-1015	28.0	5290	7.02
9-1	08/08/05	2	Cloudy	0945-1015	28.0	5290	7.02
9-1	08/08/05	3	Cloudy	0945-1015	28.0	5290	7.02
9-1	08/08/05	4	Cloudy	0945-1015	28.0	5290	7.02
9-2	08/10/05	1	Clear	0830-0905	24.8	5060	4.62
9-2	08/10/05	2	Clear	0830-0905	24.8	5060	4.62
9-2	08/10/05	3	Clear	0830-0905	24.8	5060	4.62
9-2	08/10/05	4	Clear	0830-0905	24.8	5060	4.62
10-1	08/10/05	1	Partly Cloudy	1115-1150	28.4	10740	4.56
10-1	08/10/05	2	Partly Cloudy	1115-1150	28.4	10740	4.56
10-1	08/10/05	3	Partly Cloudy	1115-1150	28.4	10740	4.56
10-1	08/10/05	4	Partly Cloudy	1115-1150	28.4	10740	4.56

Site	Date	Sample number	Turbidity (NTU)	Habitat	Net time (sec)	Black bullhead	Blue catfish	Bluegill	Bluntnose minnow
8-1	08/09/05	1	41.50	Run	74	0	0	0	0
8-1	08/09/05	2	41.50	Run	74	0	0	0	0
8-1	08/09/05	3	41.50	Run	74	0	0	0	0
8-1	08/09/05	4	41.50	Run	65	0	0	0	0
8-2	08/09/05	1	52.30	Riffle	101	0	0	0	0
8-2	08/09/05	2	52.30	Pool	97	0	0	0	0
8-2	08/09/05	3	52.30	Pool	74	0	0	0	0
8-2	08/09/05	4	52.30	Pool	83	0	1	0	0
8-3	08/09/05	1	46.00	Run	76	0	0	0	0
8-3	08/09/05	2	46.00	Run	77	0	1	0	0
8-3	08/09/05	3	46.00	Run	73	0	0	0	0
8-3	08/09/05	4	46.00	Run	64	0	0	0	0
8-4	08/08/05	1	24.20	Run	67	0	0	3	0
8-4	08/08/05	2	24.20	Run	78	0	0	1	0
8-4	08/08/05	3	24.20	Run	63	0	0	0	0
8-4	08/08/05	4	24.20	Run	70	0	0	0	0
8-5	08/08/05	1	33.90	Run	78	0	0	4	0
8-5	08/08/05	2	33.90	Run	72	0	0	5	0
8-5	08/08/05	3	33.90	Run	73	0	0	1	0
9-1	08/08/05	1	2.71	Run	74	0	0	0	0
9-1	08/08/05	2	2.71	Run	71	0	0	0	0
9-1	08/08/05	3	2.71	Run	65	0	0	0	0
9-1	08/08/05	4	2.71	Run	66	0	0	0	0
9-2	08/10/05	1	319.00	Run	74	0	0	0	0
9-2	08/10/05	2	319.00	Run	67	0	0	0	0
9-2	08/10/05	3	319.00	Run	85	0	0	0	0
9-2	08/10/05	4	319.00	Run	75	0	0	0	0
10-1	08/10/05	1	28.80	Riffle	61	0	0	0	0
10-1	08/10/05	2	28.80	Run	68	0	0	0	0
10-1	08/10/05	3	28.80	Run	76	0	0	0	0
10-1	08/10/05	4	28.80	Riffle	65	0	0	0	0

Site	Date	Sample number	Bullhead minnow	Channel catfish	Common carp	emerald shiner	Fathead minnow	Freshwater drum	Ghost shiner
8-1	08/09/05	1	0	0	0	0	0	0	0
8-1	08/09/05	2	0	0	0	0	0	0	1
8-1	08/09/05	3	0	0	0	0	0	0	0
8-1	08/09/05	4	0	0	0	0	0	0	0
8-2	08/09/05	1	0	0	0	0	0	0	0
8-2	08/09/05	2	0	0	0	0	0	0	0
8-2	08/09/05	3	0	0	0	0	0	0	0
8-2	08/09/05	4	0	0	0	0	0	0	0
8-3	08/09/05	1	0	0	0	0	0	0	0
8-3	08/09/05	2	0	0	0	0	0	0	1
8-3	08/09/05	3	0	0	0	0	0	0	1
8-3	08/09/05	4	0	0	0	0	0	0	0
8-4	08/08/05	1	0	0	0	0	0	0	0
8-4	08/08/05	2	1	0	0	0	1	0	0
8-4	08/08/05	3	1	0	0	0	0	0	1
8-4	08/08/05	4	0	0	0	0	2	0	0
8-5	08/08/05	1	0	0	0	0	0	0	0
8-5	08/08/05	2	0	0	0	0	10	0	0
8-5	08/08/05	3	0	0	0	0	0	0	0
9-1	08/08/05	1	0	0	0	0	0	0	0
9-1	08/08/05	2	0	0	0	0	0	0	0
9-1	08/08/05	3	0	0	0	0	0	0	0
9-1	08/08/05	4	0	0	0	0	0	0	0
9-2	08/10/05	1	0	0	0	0	0	0	0
9-2	08/10/05	2	0	0	0	0	0	0	0
9-2	08/10/05	3	0	0	0	0	0	0	0
9-2	08/10/05	4	0	0	1	0	0	0	0
10-1	08/10/05	1	0	0	0	0	0	0	0
10-1	08/10/05	2	0	0	0	0	0	0	0
10-1	08/10/05	3	0	0	0	0	0	0	0
10-1	08/10/05	4	0	0	0	0	0	0	0

Site	Date	Sample number	Gizzard shad	Green sunfish	Hybrid sunfish	Inland silverside	Largemouth bass	Longear sunfish	Longnose gar
8-1	08/09/05	1	3	0	0	0	0	0	0
8-1	08/09/05	2	1	0	0	0	0	0	0
8-1	08/09/05	3	0	0	0	0	0	0	0
8-1	08/09/05	4	0	0	0	0	0	0	0
8-2	08/09/05	1	0	0	0	0	0	0	0
8-2	08/09/05	2	0	0	0	0	0	0	0
8-2	08/09/05	3	0	0	0	0	0	0	0
8-2	08/09/05	4	2	0	0	0	0	0	0
8-3	08/09/05	1	0	0	0	0	0	0	0
8-3	08/09/05	2	0	0	0	0	0	0	0
8-3	08/09/05	3	0	0	0	0	0	0	0
8-3	08/09/05	4	0	0	0	0	0	0	0
8-4	08/08/05	1	4	0	0	0	0	0	0
8-4	08/08/05	2	0	0	0	0	0	0	0
8-4	08/08/05	3	0	0	0	0	0	0	0
8-4	08/08/05	4	2	0	0	0	0	0	0
8-5	08/08/05	1	0	0	0	0	0	0	0
8-5	08/08/05	2	0	0	0	1	0	0	0
8-5	08/08/05	3	0	0	0	0	0	0	0
9-1	08/08/05	1	0	0	0	5	0	0	0
9-1	08/08/05	2	0	0	0	0	0	0	0
9-1	08/08/05	3	0	0	0	0	0	0	0
9-1	08/08/05	4	0	0	0	0	0	0	0
9-2	08/10/05	1	0	0	0	0	0	0	0
9-2	08/10/05	2	0	0	0	0	0	0	0
9-2	08/10/05	3	1	1	0	0	0	0	0
9-2	08/10/05	4	0	0	0	0	0	0	0
10-1	08/10/05	1	0	0	0	0	0	0	0
10-1	08/10/05	2	0	0	0	0	0	0	0
10-1	08/10/05	3	0	0	0	0	0	0	0
10-1	08/10/05	4	0	0	0	0	0	0	0

Site	Date	Sample number	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner	Red shiner
8-1	08/09/05	1	0	0	0	0	0	0	0
8-1	08/09/05	2	0	0	0	1	0	0	1
8-1	08/09/05	3	0	0	0	0	0	0	1
8-1	08/09/05	4	0	0	0	0	0	0	3
8-2	08/09/05	1	0	0	0	0	0	0	4
8-2	08/09/05	2	0	0	0	0	0	0	0
8-2	08/09/05	3	0	0	0	0	0	0	0
8-2	08/09/05	4	0	0	0	0	0	0	0
8-3	08/09/05	1	1	0	0	0	0	0	1
8-3	08/09/05	2	3	0	0	0	0	0	0
8-3	08/09/05	3	2	0	0	0	0	0	1
8-3	08/09/05	4	1	0	0	0	0	0	1
8-4	08/08/05	1	1	2	0	1	0	0	1
8-4	08/08/05	2	0	0	0	2	0	0	8
8-4	08/08/05	3	0	0	0	2	0	0	4
8-4	08/08/05	4	0	0	0	0	0	0	3
8-5	08/08/05	1	0	19	0	0	0	0	0
8-5	08/08/05	2	0	5	0	0	0	0	0
8-5	08/08/05	3	0	2	0	0	0	0	0
9-1	08/08/05	1	0	0	0	0	0	0	0
9-1	08/08/05	2	0	0	0	0	0	0	0
9-1	08/08/05	3	0	1	0	0	0	0	0
9-1	08/08/05	4	0	0	0	0	0	0	0
9-2	08/10/05	1	1	0	7	1	1	0	4
9-2	08/10/05	2	0	0	6	0	0	0	5
9-2	08/10/05	3	0	0	8	3	0	0	1
9-2	08/10/05	4	0	0	3	6	1	1	0
10-1	08/10/05	1	0	0	0	4	4	1	2
10-1	08/10/05	2	0	0	11	1	8	1	4
10-1	08/10/05	3	0	0	2	5	0	3	2
10-1	08/10/05	4	0	0	0	1	6	0	3

Site	Date	Sample number	River carpsucker	Sand shiner	Smallmouth buffalo	Speckled chub	Suckermouth minnow	Warmouth sunfish	White bass
8-1	08/09/05	1	0	0	0	0	0	0	0
8-1	08/09/05	2	0	0	0	0	0	0	0
8-1	08/09/05	3	0	0	1	1	0	0	0
8-1	08/09/05	4	0	0	0	0	0	0	0
8-2	08/09/05	1	0	0	0	0	0	0	0
8-2	08/09/05	2	0	0	0	0	0	0	0
8-2	08/09/05	3	0	0	0	0	0	0	0
8-2	08/09/05	4	0	0	0	0	0	0	0
8-3	08/09/05	1	0	0	0	0	0	0	0
8-3	08/09/05	2	0	0	0	0	0	0	0
8-3	08/09/05	3	0	0	0	0	0	0	0
8-3	08/09/05	4	0	0	0	0	0	0	0
8-4	08/08/05	1	0	0	0	0	0	0	0
8-4	08/08/05	2	0	0	0	0	0	0	0
8-4	08/08/05	3	0	0	0	0	1	0	0
8-4	08/08/05	4	0	0	0	0	0	0	0
8-5	08/08/05	1	0	0	0	0	0	0	0
8-5	08/08/05	2	0	0	0	0	0	0	0
8-5	08/08/05	3	0	0	0	0	0	0	0
9-1	08/08/05	1	0	0	0	0	0	0	0
9-1	08/08/05	2	0	0	0	0	0	0	0
9-1	08/08/05	3	0	0	0	0	0	0	0
9-1	08/08/05	4	0	0	0	0	0	0	0
9-2	08/10/05	1	0	0	0	0	0	0	0
9-2	08/10/05	2	0	0	0	2	0	0	0
9-2	08/10/05	3	0	0	0	0	0	0	0
9-2	08/10/05	4	1	0	0	1	0	0	0
10-1	08/10/05	1	0	0	0	2	0	0	0
10-1	08/10/05	2	0	0	0	0	0	0	0
10-1	08/10/05	3	0	0	0	3	0	0	0
10-1	08/10/05	4	0	0	0	1	0	0	0

Site	Date	Sample number	Conditions	Time (hrs)	Temperature (° C)	Conductivity (µS)	Dissolved oxygen (mg/l)
10-2	08/12/05	1	Partly Cloudy	0910-0935	26.6	15160	5.89
10-2	08/12/05	2	Partly Cloudy	0910-0935	26.6	15160	5.89
10-2	08/12/05	3	Partly Cloudy	0910-0935	26.6	15160	5.89
10-3	08/11/05	1	Partly Cloudy	1500-1600	34.5	20500	10.11
10-3	08/11/05	2	Partly Cloudy	1500-1600	34.5	20500	10.11
10-3	08/11/05	3	Partly Cloudy	1500-1600	34.5	20500	10.11
10-3	08/11/05	4	Partly Cloudy	1500-1600	34.5	20500	10.11
10-4	08/11/05	1	Clear	1100-1215	28.8	14300	5.22
10-4	08/11/05	2	Clear	1100-1215	28.8	14300	5.22
10-4	08/11/05	3	Clear	1100-1215	28.8	14300	5.22
10-5	08/18/05	1	Clear	1400-1450	32.6	24030	9.55
10-5	08/18/05	2	Clear	1400-1450	32.6	24030	9.55
10-5	08/18/05	3	Clear	1400-1450	32.6	24030	9.55
10-5	08/18/05	4	Clear	1400-1450	32.6	24030	9.55
11-1	08/10/05	1	Partly Cloudy	1605-1650	34.4	30480	2.92
11-1	08/10/05	2	Partly Cloudy	1605-1650	34.4	30480	2.92
11-1	08/10/05	3	Partly Cloudy	1605-1650	34.4	30480	2.92
11-1	08/10/05	4	Partly Cloudy	1605-1650	34.4	30480	2.92
11-2	08/10/05	1	Cloudy	1345-1440	31.5	2306	3.10
11-2	08/10/05	2	Cloudy	1345-1440	31.5	2306	3.10
11-2	08/10/05	3	Cloudy	1345-1440	31.5	2306	3.10
11-3			**No flow**				
11-4	08/18/05	1	Clear	0845-0915	26.9	36930	3.43
11-4	08/18/05	2	Clear	0845-0915	26.9	36930	3.43
11-4	08/18/05	3	Clear	0845-0915	26.9	36930	3.43
11-5	08/18/05	1	Clear	1030-1105	28.7	42970	7.83
11-5	08/18/05	2	Clear	1030-1105	28.7	42970	7.83
11-5	08/18/05	3	Clear	1030-1105	28.7	42970	7.83

Site	Date	Sample number	Turbidity (NTU)	Habitat	Net time (sec)	Black bullhead	Blue catfish	Bluegill	Bluntnose minnow
10-2	08/12/05	1	16.10	Riffle	88	0	0	0	0
10-2	08/12/05	2	16.10	Pool	78	0	0	0	0
10-2	08/12/05	3	16.10	Run	53	0	0	0	0
10-3	08/11/05	1	13.30	Run	83	0	0	0	0
10-3	08/11/05	2	13.30	Riffle	55	0	0	0	0
10-3	08/11/05	3	13.30	Pool	64	0	0	0	0
10-3	08/11/05	4	13.30	Pool	69	0	0	0	0
10-4	08/11/05	1	7.62	Riffle	92	0	0	0	0
10-4	08/11/05	2	7.62	Pool	91	0	0	0	0
10-4	08/11/05	3	7.62	Run	104	0	0	0	0
10-5	08/18/05	1		Pool	90	0	0	0	0
10-5	08/18/05	2		Riffle	57	0	0	0	0
10-5	08/18/05	3		Run	75	0	0	0	0
10-5	08/18/05	4		Run	70	0	0	0	0
11-1	08/10/05	1	22.60	Riffle	46	0	0	0	0
11-1	08/10/05	2	22.60	Run	76	0	0	0	0
11-1	08/10/05	3	22.60	Run	64	0	0	0	0
11-1	08/10/05	4	22.60	Pool	77	0	0	1	0
11-2	08/10/05	1	25.40	Run	85	0	0	0	0
11-2	08/10/05	2	25.40	Run	99	1	0	0	0
11-2	08/10/05	3	25.40	Run	73	1	0	0	0
11-3									
11-4	08/18/05	1		Run	51	0	0	0	0
11-4	08/18/05	2		Pool	66	0	0	0	0
11-4	08/18/05	3		Riffle	53	0	0	0	0
11-5	08/18/05	1		Pool	52	0	0	0	0
11-5	08/18/05	2		Run	81	0	0	0	0
11-5	08/18/05	3		Riffle	56	0	0	0	0

Site	Date	Sample number	Bullhead minnow	Channel catfish	Common carp	emerald shiner	Fathead minnow	Freshwater drum	Ghost shiner
10-2	08/12/05	1	0	0	0	0	0	0	0
10-2	08/12/05	2	0	0	0	0	0	0	0
10-2	08/12/05	3	0	0	0	0	0	0	0
10-3	08/11/05	1	0	0	0	0	0	0	0
10-3	08/11/05	2	0	0	0	0	0	0	0
10-3	08/11/05	3	0	0	0	0	0	0	0
10-3	08/11/05	4	0	0	0	0	0	0	0
10-4	08/11/05	1	0	0	0	0	2	0	0
10-4	08/11/05	2	0	0	0	0	3	0	0
10-4	08/11/05	3	0	0	0	0	1	0	0
10-5	08/18/05	1	0	0	0	0	0	0	0
10-5	08/18/05	2	0	0	0	0	0	0	0
10-5	08/18/05	3	0	0	0	0	0	0	0
10-5	08/18/05	4	0	0	0	0	0	0	0
11-1	08/10/05	1	0	0	0	0	0	0	0
11-1	08/10/05	2	0	0	0	0	0	0	0
11-1	08/10/05	3	0	0	0	0	0	0	0
11-1	08/10/05	4	1	0	4	0	0	0	0
11-2	08/10/05	1	0	0	0	0	0	0	0
11-2	08/10/05	2	0	0	0	0	0	0	0
11-2	08/10/05	3	0	0	0	0	0	0	0
11-3									
11-4	08/18/05	1	0	0	0	0	0	0	0
11-4	08/18/05	2	0	0	0	0	0	0	0
11-4	08/18/05	3	0	0	0	0	0	0	0
11-5	08/18/05	1	0	0	0	0	0	0	0
11-5	08/18/05	2	0	0	0	0	0	0	0
11-5	08/18/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Gizzard shad	Green sunfish	Hybrid sunfish	Inland silverside	Largemouth bass	Longear sunfish	Longnose gar
10-2	08/12/05	1	0	0	0	0	0	0	0
10-2	08/12/05	2	0	0	0	0	0	0	0
10-2	08/12/05	3	0	0	0	0	0	0	0
10-3	08/11/05	1	0	0	0	0	0	0	0
10-3	08/11/05	2	0	0	0	0	0	0	0
10-3	08/11/05	3	0	1	0	0	0	0	0
10-3	08/11/05	4	0	0	0	0	0	0	0
10-4	08/11/05	1	0	0	0	0	0	0	0
10-4	08/11/05	2	0	0	0	0	0	0	0
10-4	08/11/05	3	0	0	0	0	0	0	0
10-5	08/18/05	1	0	0	0	0	0	0	0
10-5	08/18/05	2	0	0	0	0	0	0	0
10-5	08/18/05	3	0	0	0	0	0	0	0
10-5	08/18/05	4	0	0	0	0	0	0	0
11-1	08/10/05	1	0	0	0	0	0	0	0
11-1	08/10/05	2	0	5	0	0	0	0	0
11-1	08/10/05	3	0	0	0	0	0	0	0
11-1	08/10/05	4	13	1	0	0	0	0	0
11-2	08/10/05	1	0	2	0	0	0	0	0
11-2	08/10/05	2	0	2	0	0	0	0	0
11-2	08/10/05	3	2	0	0	0	0	0	0
11-3									
11-4	08/18/05	1	0	0	0	0	0	0	0
11-4	08/18/05	2	3	0	0	0	0	0	0
11-4	08/18/05	3	0	0	0	0	0	0	0
11-5	08/18/05	1	0	0	0	0	0	0	0
11-5	08/18/05	2	0	0	0	0	0	0	0
11-5	08/18/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner	Red shiner
10-2	08/12/05	1	0	0	0	0	4	3	2
10-2	08/12/05	2	2	0	13	3	0	2	0
10-2	08/12/05	3	0	0	1	2	4	1	0
10-3	08/11/05	1	0	0	26	3	98	57	0
10-3	08/11/05	2	0	0	6	1	15	21	7
10-3	08/11/05	3	1	0	17	0	135	0	0
10-3	08/11/05	4	0	0	40	0	82	0	0
10-4	08/11/05	1	12	0	6	0	16	0	112
10-4	08/11/05	2	4	0	5	0	263	0	52
10-4	08/11/05	3	3	0	0	0	50	0	46
10-5	08/18/05	1	1	0	6	0	46	0	0
10-5	08/18/05	2	0	0	4	0	56	0	0
10-5	08/18/05	3	0	0	13	0	122	0	0
10-5	08/18/05	4	0	0	46	0	81	0	0
11-1	08/10/05	1	0	0	0	1	0	0	0
11-1	08/10/05	2	0	1	1	11	0	0	1
11-1	08/10/05	3	0	0	0	38	0	2	1
11-1	08/10/05	4	0	3	0	21	0	1	7
11-2	08/10/05	1	4	2	0	3	0	8	0
11-2	08/10/05	2	1	3	0	15	0	7	5
11-2	08/10/05	3	0	6	0	3	0	2	1
11-3									
11-4	08/18/05	1	1	0	16	0	43	0	0
11-4	08/18/05	2	10	0	29	0	187	0	0
11-4	08/18/05	3	0	0	3	0	11	0	0
11-5	08/18/05	1	0	0	12	0	401	0	0
11-5	08/18/05	2	1	0	61	0	102	0	0
11-5	08/18/05	3	0	0	6	0	51	0	0

Site	Date	Sample number	River carpsucker	Sand shiner	Smallmouth buffalo	Speckled chub	Suckermouth minnow	Warmouth sunfish	White bass
10-2	08/12/05	1	0	0	0	0	0	0	0
10-2	08/12/05	2	0	0	0	6	0	0	0
10-2	08/12/05	3	0	0	0	0	0	0	0
10-3	08/11/05	1	0	0	0	1	0	0	0
10-3	08/11/05	2	0	0	0	0	0	0	0
10-3	08/11/05	3	0	0	0	0	0	0	0
10-3	08/11/05	4	0	0	0	0	0	0	0
10-4	08/11/05	1	0	0	0	0	0	0	0
10-4	08/11/05	2	0	0	0	0	0	0	0
10-4	08/11/05	3	0	0	0	0	0	0	0
10-5	08/18/05	1	0	0	0	0	0	0	0
10-5	08/18/05	2	0	0	0	0	0	0	0
10-5	08/18/05	3	0	0	0	0	0	0	0
10-5	08/18/05	4	0	0	0	0	0	0	0
11-1	08/10/05	1	0	0	0	0	0	0	0
11-1	08/10/05	2	0	0	0	3	0	0	0
11-1	08/10/05	3	0	0	0	2	0	0	0
11-1	08/10/05	4	1	0	0	3	0	0	0
11-2	08/10/05	1	0	0	0	1	0	0	0
11-2	08/10/05	2	0	0	0	0	0	0	0
11-2	08/10/05	3	0	0	0	0	0	0	0
11-3									
11-4	08/18/05	1	0	0	0	0	0	0	0
11-4	08/18/05	2	0	0	0	0	0	0	0
11-4	08/18/05	3	0	0	0	0	0	0	0
11-5	08/18/05	1	0	0	0	0	0	0	0
11-5	08/18/05	2	0	0	0	0	0	0	0
11-5	08/18/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Conditions	Time (hrs)	Temperature (° C)	Conductivity (µS)	Dissolved oxygen (mg/l)
8-1	10/23/05	1	Cloudy	1330-1450	15.9	2628	7.18
8-1	10/23/05	2	Cloudy	1330-1450	15.9	2628	7.18
8-1	10/23/05	3	Cloudy	1330-1450	15.9	2628	7.18
8-1	10/23/05	4	Cloudy	1330-1450	15.9	2628	7.18
8-2	10/23/05	1	Cloudy	1120-1300	16.7	2275	7.33
8-2	10/23/05	2	Cloudy	1120-1300	16.7	2275	7.33
8-2	10/23/05	3	Cloudy	1120-1300	16.7	2275	7.33
8-3	10/23/05	1	Cloudy	0900-1050	17.1	3186	6.71
8-3	10/23/05	2	Cloudy	0900-1050	17.1	3186	6.71
8-3	10/23/05	3	Cloudy	0900-1050	17.1	3186	6.71
8-3	10/23/05	4	Cloudy	0900-1050	17.1	3186	6.71
8-4	10/01/05	1	Clear	0845-1045	22.5	30800	5.91
8-4	10/01/05	2	Clear	0845-1045	22.5	30800	5.91
8-4	10/01/05	3	Clear	0845-1045	22.5	30800	5.91
8-4	10/01/05	4	Clear	0845-1045	22.5	30800	5.91
8-5	10/01/05	1	Partly Cloudy	1150-1350	25.2	4352	6.21
8-5	10/01/05	2	Partly Cloudy	1150-1350	25.2	4352	6.21
8-5	10/01/05	3	Partly Cloudy	1150-1350	25.2	4352	6.21
9-1	10/08/05	1	Clear	1230-1400	14.9	3649	6.04
9-1	10/08/05	2	Clear	1230-1400	14.9	3649	6.04
9-1	10/08/05	3	Clear	1230-1400	14.9	3649	6.04
9-1	10/08/05	4	Clear	1230-1400	14.9	3649	6.04
9-2	10/08/05	1	Clear	1045-1150	15.5	4464	7.99
9-2	10/08/05	2	Clear	1045-1150	15.5	4464	7.99
9-2	10/08/05	3	Clear	1045-1150	15.5	4464	7.99
10-1	10/01/05	1	Clear	1510-1600	26.8	3161	5.06
10-1	10/01/05	2	Clear	1510-1600	26.8	3161	5.06
10-1	10/01/05	3	Clear	1510-1600	26.8	3161	5.06
10-1	10/01/05	4	Clear	1510-1600	26.8	3161	5.06
10-2	10/02/05	1	Clear	0800-0945	23.0	12910	5.88
10-2	10/02/05	2	Clear	0800-0945	23.0	12910	5.88
10-2	10/02/05	3	Clear	0800-0945	23.0	12910	5.88

Site	Date	Sample number	Turbidity (NTU)	Habitat	Net time (sec)	Black bullhead	Blue catfish	Bluegill
8-1	10/23/05	1	178.00	Run	63	0	0	0
8-1	10/23/05	2	178.00	Run	56	0	0	0
8-1	10/23/05	3	178.00	Run	58	0	0	0
8-1	10/23/05	4	178.00	Run	61	0	0	0
8-2	10/23/05	1	136.00	Riffle	55	0	0	0
8-2	10/23/05	2	136.00	Pool	75	0	0	0
8-2	10/23/05	3	136.00	Run	59	0	0	0
8-3	10/23/05	1	43.30	Run	60	0	0	0
8-3	10/23/05	2	43.30	Run	55	0	0	0
8-3	10/23/05	3	43.30	Run	67	0	0	0
8-3	10/23/05	4	43.30	Run	52	0	0	0
8-4	10/01/05	1	333.00	Run	58	0	0	0
8-4	10/01/05	2	333.00	Run	74	0	0	0
8-4	10/01/05	3	333.00	Run	64	0	0	0
8-4	10/01/05	4	333.00	Run	80	0	0	0
8-5	10/01/05	1	53.20	Run	90	0	0	10
8-5	10/01/05	2	53.20	Run	100	0	0	13
8-5	10/01/05	3	53.20	Run	80	0	0	19
9-1	10/08/05	1	24.70	Pool	65	0	0	0
9-1	10/08/05	2	24.70	Pool	62	0	0	0
9-1	10/08/05	3	24.70	Pool	57	0	0	0
9-1	10/08/05	4	24.70	Pool	66	0	0	0
9-2	10/08/05	1		Run	68	0	0	0
9-2	10/08/05	2		Run	69	0	0	0
9-2	10/08/05	3		Run	59	0	0	1
10-1	10/01/05	1	4240.00	Run	50	0	0	0
10-1	10/01/05	2	4240.00	Run	65	0	0	0
10-1	10/01/05	3	4240.00	Riffle	45	0	0	0
10-1	10/01/05	4	4240.00	Pool	65	0	0	0
10-2	10/02/05	1	190.00	Riffle	60	0	0	0
10-2	10/02/05	2	190.00	Run	68	0	0	1
10-2	10/02/05	3	190.00	Run	56	0	0	0

Site	Date	Sample number	Bluntnose minnow	Bullhead minnow	Channel catfish	Common carp	emerald shiner	Fathead minnow	Freshwater drum
8-1	10/23/05	1	0	0	0	0	0	0	0
8-1	10/23/05	2	0	0	0	0	1	0	0
8-1	10/23/05	3	0	0	0	0	5	0	0
8-1	10/23/05	4	0	0	0	0	8	1	0
8-2	10/23/05	1	0	0	0	0	0	0	0
8-2	10/23/05	2	0	0	0	0	0	0	0
8-2	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	1	0	0	0	0	0	0	0
8-3	10/23/05	2	0	0	0	0	0	0	0
8-3	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	4	0	0	0	0	0	0	0
8-4	10/01/05	1	0	0	0	0	0	0	0
8-4	10/01/05	2	0	3	0	0	0	0	0
8-4	10/01/05	3	0	1	0	0	0	0	0
8-4	10/01/05	4	0	0	0	0	0	0	0
8-5	10/01/05	1	0	0	0	0	0	0	0
8-5	10/01/05	2	0	0	0	0	0	0	0
8-5	10/01/05	3	0	1	0	0	0	1	0
9-1	10/08/05	1	0	0	0	0	0	0	0
9-1	10/08/05	2	0	0	0	1	0	0	0
9-1	10/08/05	3	0	2	0	5	0	0	0
9-1	10/08/05	4	0	0	0	0	0	0	0
9-2	10/08/05	1	0	0	0	1	0	0	0
9-2	10/08/05	2	0	0	0	1	0	0	0
9-2	10/08/05	3	0	0	1	0	0	0	0
10-1	10/01/05	1	0	0	0	0	0	0	0
10-1	10/01/05	2	0	0	0	2	0	0	0
10-1	10/01/05	3	0	0	0	0	0	0	0
10-1	10/01/05	4	0	0	0	0	0	0	0
10-2	10/02/05	1	0	0	0	0	0	0	0
10-2	10/02/05	2	0	0	0	0	0	0	0
10-2	10/02/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Ghost shiner	Gizzard shad	Green sunfish	Hybrid sunfish	Inland silverside	Largemouth bass	Longear sunfish
8-1	10/23/05	1	1	0	0	0	0	0	0
8-1	10/23/05	2	0	0	0	0	0	0	0
8-1	10/23/05	3	0	0	0	0	0	0	0
8-1	10/23/05	4	0	0	0	0	0	0	0
8-2	10/23/05	1	0	0	0	0	0	0	0
8-2	10/23/05	2	0	0	0	0	0	0	0
8-2	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	1	0	0	0	0	0	0	0
8-3	10/23/05	2	0	0	0	0	0	0	0
8-3	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	4	0	0	0	0	0	0	0
8-4	10/01/05	1	0	0	0	0	0	0	1
8-4	10/01/05	2	0	0	0	0	0	0	0
8-4	10/01/05	3	0	0	0	0	0	0	0
8-4	10/01/05	4	0	0	0	0	0	0	0
8-5	10/01/05	1	1	0	0	3	1	0	0
8-5	10/01/05	2	0	0	0	1	0	0	0
8-5	10/01/05	3	0	0	0	2	1	0	0
9-1	10/08/05	1	0	0	0	0	2	0	0
9-1	10/08/05	2	0	0	1	0	2	0	0
9-1	10/08/05	3	0	0	0	0	1	0	0
9-1	10/08/05	4	0	0	0	0	7	0	0
9-2	10/08/05	1	0	0	0	0	0	0	0
9-2	10/08/05	2	0	2	0	0	0	0	0
9-2	10/08/05	3	0	0	0	0	0	0	0
10-1	10/01/05	1	0	0	0	0	0	0	0
10-1	10/01/05	2	0	1	0	0	0	0	0
10-1	10/01/05	3	0	0	1	0	0	0	0
10-1	10/01/05	4	0	1	0	0	0	0	0
10-2	10/02/05	1	0	0	0	0	0	0	0
10-2	10/02/05	2	0	0	0	0	0	0	0
10-2	10/02/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Longnose gar	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner
8-1	10/23/05	1	0	0	0	0	0	0	0
8-1	10/23/05	2	0	0	0	0	0	0	0
8-1	10/23/05	3	0	0	0	0	0	0	0
8-1	10/23/05	4	0	0	0	0	0	0	0
8-2	10/23/05	1	0	0	0	0	0	0	0
8-2	10/23/05	2	0	0	0	0	0	0	0
8-2	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	1	0	0	0	0	0	0	0
8-3	10/23/05	2	0	0	0	0	0	0	0
8-3	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	4	0	0	0	0	0	0	0
8-4	10/01/05	1	0	0	0	0	0	0	0
8-4	10/01/05	2	0	0	2	0	0	0	0
8-4	10/01/05	3	0	0	0	0	0	0	0
8-4	10/01/05	4	0	0	0	0	0	0	0
8-5	10/01/05	1	0	0	13	0	0	0	0
8-5	10/01/05	2	0	0	21	0	0	0	0
8-5	10/01/05	3	0	0	21	0	0	0	0
9-1	10/08/05	1	0	0	0	0	0	0	0
9-1	10/08/05	2	0	2	2	0	0	0	0
9-1	10/08/05	3	0	0	0	0	0	0	0
9-1	10/08/05	4	0	0	0	0	0	0	0
9-2	10/08/05	1	0	0	0	0	0	0	4
9-2	10/08/05	2	0	0	0	0	0	0	2
9-2	10/08/05	3	0	0	0	3	0	0	3
10-1	10/01/05	1	0	0	0	4	9	2	14
10-1	10/01/05	2	0	0	1	2	0	0	2
10-1	10/01/05	3	0	0	0	10	7	2	6
10-1	10/01/05	4	0	0	0	8	21	1	11
10-2	10/02/05	1	0	0	0	22	0	10	7
10-2	10/02/05	2	0	0	0	3	0	0	5
10-2	10/02/05	3	0	0	0	7	0	10	5

Site	Date	Sample number	Red shiner	River carpsucker	Sand shiner	Smallmouth buffalo	Speckled chub	Suckermouth minnow	Warmouth sunfish
8-1	10/23/05	1	0	0	0	0	1	0	0
8-1	10/23/05	2	0	0	0	0	1	0	0
8-1	10/23/05	3	0	0	1	0	2	0	0
8-1	10/23/05	4	1	0	0	0	5	0	0
8-2	10/23/05	1	2	0	0	0	0	0	0
8-2	10/23/05	2	0	0	0	0	0	0	0
8-2	10/23/05	3	0	0	0	0	0	0	0
8-3	10/23/05	1	2	0	0	0	0	0	0
8-3	10/23/05	2	0	0	0	0	2	0	0
8-3	10/23/05	3	1	0	0	0	0	0	0
8-3	10/23/05	4	3	0	0	0	2	0	0
8-4	10/01/05	1	2	0	0	0	0	0	0
8-4	10/01/05	2	2	0	0	0	0	0	0
8-4	10/01/05	3	0	0	0	0	0	0	0
8-4	10/01/05	4	1	0	0	0	0	1	0
8-5	10/01/05	1	0	0	0	0	0	0	0
8-5	10/01/05	2	0	0	0	0	0	0	0
8-5	10/01/05	3	2	0	0	0	0	0	0
9-1	10/08/05	1	1	0	0	0	0	0	0
9-1	10/08/05	2	2	0	0	0	0	0	0
9-1	10/08/05	3	0	0	0	0	0	0	0
9-1	10/08/05	4	0	0	0	0	0	0	0
9-2	10/08/05	1	1	0	0	0	7	0	0
9-2	10/08/05	2	0	0	0	0	2	0	0
9-2	10/08/05	3	0	0	0	0	2	0	0
10-1	10/01/05	1	2	0	0	0	7	0	0
10-1	10/01/05	2	0	0	0	0	3	0	0
10-1	10/01/05	3	0	0	0	0	7	0	0
10-1	10/01/05	4	6	0	0	0	6	0	0
10-2	10/02/05	1	1	0	0	0	4	0	0
10-2	10/02/05	2	0	0	0	0	1	0	0
10-2	10/02/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	White bass
8-1	10/23/05	1	0
8-1	10/23/05	2	0
8-1	10/23/05	3	0
8-1	10/23/05	4	0
8-2	10/23/05	1	0
8-2	10/23/05	2	0
8-2	10/23/05	3	0
8-3	10/23/05	1	0
8-3	10/23/05	2	0
8-3	10/23/05	3	0
8-3	10/23/05	4	0
8-4	10/01/05	1	0
8-4	10/01/05	2	0
8-4	10/01/05	3	0
8-4	10/01/05	4	0
8-5	10/01/05	1	0
8-5	10/01/05	2	0
8-5	10/01/05	3	0
9-1	10/08/05	1	0
9-1	10/08/05	2	0
9-1	10/08/05	3	0
9-1	10/08/05	4	0
9-2	10/08/05	1	0
9-2	10/08/05	2	0
9-2	10/08/05	3	0
10-1	10/01/05	1	0
10-1	10/01/05	2	0
10-1	10/01/05	3	0
10-1	10/01/05	4	0
10-2	10/02/05	1	0
10-2	10/02/05	2	0
10-2	10/02/05	3	0

Site	Date	Sample number	Conditions	Time (hrs)	Temperature (° C)	Conductivity (µS)	Dissolved oxygen (mg/l)
10-3	10/02/05	1	Partly Cloudy	1000-1100	24.4	14760	8.54
10-3	10/02/05	2	Partly Cloudy	1000-1100	24.4	14760	8.54
10-3	10/02/05	3	Partly Cloudy	1000-1100	24.4	14760	8.54
10-3	10/02/05	4	Partly Cloudy	1000-1100	24.4	14760	8.54
10-4	10/02/05	1	Partly Cloudy	1430-1610	26.9	13210	7.96
10-4	10/02/05	2	Partly Cloudy	1430-1610	26.9	13210	7.96
10-4	10/02/05	3	Partly Cloudy	1430-1610	26.9	13210	7.96
10-5	10/02/05	1	Partly Cloudy	1730-1815	26.8	28800	9.35
10-5	10/02/05	2	Partly Cloudy	1730-1815	26.8	28800	9.35
10-5	10/02/05	3	Partly Cloudy	1730-1815	26.8	28800	9.35
10-5	10/02/05	4	Partly Cloudy	1730-1815	26.8	28800	9.35
11-1	10/08/05	1	Clear	1515-1630	19.6	2413	7.65
11-1	10/08/05	2	Clear	1515-1630	19.6	2413	7.65
11-1	10/08/05	3	Clear	1515-1630	19.6	2413	7.65
11-1	10/08/05	4	Clear	1515-1630	19.6	2413	7.65
11-2	10/01/05	1	Clear	1735-1840	21.6	3574	4.79
11-2	10/01/05	2	Clear	1735-1840	21.6	3574	4.79
11-2	10/01/05	3	Clear	1735-1840	21.6	3574	4.79
11-3	10/17/05	1	Clear	1740-1830	18.0	2500	7.67
11-3	10/17/05	2	Clear	1740-1830	18.0	2500	7.67
11-3	10/17/05	3	Clear	1740-1830	18.0	2500	7.67
11-4	10/09/05	1	Clear	0800-0910	17.7	35910	5.12
11-4	10/09/05	2	Clear	0800-0910	17.7	35910	5.12
11-4	10/09/05	3	Clear	0800-0910	17.7	35910	5.12
11-5	10/09/05	1	Clear	0930-1030	19.0	40750	8.00
11-5	10/09/05	2	Clear	0930-1030	19.0	40750	8.00
11-5	10/09/05	3	Clear	0930-1030	19.0	40750	8.00

Site	Date	Sample number	Turbidity (NTU)	Habitat	Net time (sec)	Black bullhead	Blue catfish	Bluegill
10-3	10/02/05	1		Run	67	0	0	0
10-3	10/02/05	2		Riffle	59	0	0	0
10-3	10/02/05	3		Pool	80	0	0	6
10-3	10/02/05	4		Pool	78	0	0	2
10-4	10/02/05	1	53.20	Pool	55	0	0	0
10-4	10/02/05	2	53.20	Run	85	0	0	0
10-4	10/02/05	3	53.20	Run	78	0	0	0
10-5	10/02/05	1	7.77	Pool	83	0	0	0
10-5	10/02/05	2	7.77	Riffle	55	0	0	0
10-5	10/02/05	3	7.77	Pool	63	0	0	0
10-5	10/02/05	4	7.77	Pool	70	0	0	0
11-1	10/08/05	1	4120.00	Run	47	0	0	0
11-1	10/08/05	2	4120.00	Run	52	0	0	1
11-1	10/08/05	3	4120.00	Run	60	0	0	0
11-1	10/08/05	4	4120.00	Pool	61	0	0	1
11-2	10/01/05	1	3100.00	Run	75	0	0	0
11-2	10/01/05	2	3100.00	Run	70	0	0	0
11-2	10/01/05	3	3100.00	Run	72	0	0	0
11-3	10/17/05	1	972.00	Run	73	0	0	0
11-3	10/17/05	2	972.00	Riffle	63	0	0	0
11-3	10/17/05	3	972.00	Run	65	0	0	1
11-4	10/09/05	1	26.80	Run	46	0	0	0
11-4	10/09/05	2	26.80	Pool	68	0	0	0
11-4	10/09/05	3	26.80	Riffle	43	0	0	0
11-5	10/09/05	1	17.70	Riffle	45	0	0	0
11-5	10/09/05	2	17.70	Run	46	0	0	0
11-5	10/09/05	3	17.70	Pool	61	0	0	0

Site	Date	Sample number	Bluntnose minnow	Bullhead minnow	Channel catfish	Common carp	emerald shiner	Fathead minnow	Freshwater drum
10-3	10/02/05	1	0	0	0	0	0	0	0
10-3	10/02/05	2	0	0	0	0	0	0	0
10-3	10/02/05	3	0	0	0	0	0	0	0
10-3	10/02/05	4	0	0	0	0	0	0	0
10-4	10/02/05	1	0	0	0	0	0	0	0
10-4	10/02/05	2	0	0	0	0	0	0	0
10-4	10/02/05	3	0	0	0	0	0	0	0
10-5	10/02/05	1	0	0	0	0	0	0	0
10-5	10/02/05	2	0	0	0	0	0	0	0
10-5	10/02/05	3	0	0	0	0	0	0	0
10-5	10/02/05	4	0	0	0	0	0	0	0
11-1	10/08/05	1	0	0	0	2	0	0	0
11-1	10/08/05	2	0	0	0	7	0	0	0
11-1	10/08/05	3	0	0	0	1	0	0	0
11-1	10/08/05	4	0	0	0	4	0	0	0
11-2	10/01/05	1	0	0	0	0	0	0	0
11-2	10/01/05	2	0	0	0	0	0	0	0
11-2	10/01/05	3	0	0	0	0	0	0	0
11-3	10/17/05	1	1	0	0	0	0	0	0
11-3	10/17/05	2	0	0	0	0	0	0	0
11-3	10/17/05	3	0	0	0	0	0	0	0
11-4	10/09/05	1	0	0	0	0	0	0	0
11-4	10/09/05	2	0	0	0	0	0	0	0
11-4	10/09/05	3	0	0	0	0	0	0	0
11-5	10/09/05	1	0	0	0	0	0	0	0
11-5	10/09/05	2	0	0	0	0	0	0	0
11-5	10/09/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Ghost shiner	Gizzard shad	Green sunfish	Hybrid sunfish	Inland silverside	Largemouth bass	Longear sunfish
10-3	10/02/05	1	0	0	0	0	0	0	0
10-3	10/02/05	2	0	0	0	0	0	0	0
10-3	10/02/05	3	0	0	0	0	0	0	0
10-3	10/02/05	4	0	0	0	0	0	0	0
10-4	10/02/05	1	0	0	0	0	0	0	0
10-4	10/02/05	2	0	0	0	0	0	0	0
10-4	10/02/05	3	0	0	0	0	0	0	0
10-5	10/02/05	1	0	0	0	0	0	0	0
10-5	10/02/05	2	0	0	0	0	0	0	0
10-5	10/02/05	3	0	0	0	0	0	0	0
10-5	10/02/05	4	0	0	0	0	0	0	0
11-1	10/08/05	1	0	0	0	0	0	0	0
11-1	10/08/05	2	0	2	0	0	0	0	0
11-1	10/08/05	3	0	0	1	0	0	0	0
11-1	10/08/05	4	0	2	0	0	0	0	0
11-2	10/01/05	1	0	0	0	0	0	0	0
11-2	10/01/05	2	0	0	1	0	0	0	0
11-2	10/01/05	3	0	0	0	0	0	0	0
11-3	10/17/05	1	0	0	0	0	0	0	0
11-3	10/17/05	2	0	0	0	0	0	0	0
11-3	10/17/05	3	0	0	0	0	0	0	0
11-4	10/09/05	1	0	0	0	0	0	0	0
11-4	10/09/05	2	0	0	0	0	0	0	0
11-4	10/09/05	3	0	0	0	0	0	0	0
11-5	10/09/05	1	0	0	0	0	0	0	0
11-5	10/09/05	2	0	0	0	0	0	0	0
11-5	10/09/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	Longnose gar	Mosquitofish	Orangespot sunfish	Plains killifish	Plains minnow	Red River pupfish	Red River shiner
10-3	10/02/05	1	0	0	0	17	0	121	4
10-3	10/02/05	2	0	0	0	8	0	17	1
10-3	10/02/05	3	0	1	2	18	0	116	2
10-3	10/02/05	4	0	3	1	9	0	112	1
10-4	10/02/05	1	0	7	0	21	0	55	0
10-4	10/02/05	2	0	0	0	1	0	46	0
10-4	10/02/05	3	0	6	0	2	0	42	0
10-5	10/02/05	1	0	6	0	14	0	92	0
10-5	10/02/05	2	0	0	0	1	0	32	0
10-5	10/02/05	3	0	4	0	17	0	55	0
10-5	10/02/05	4	0	0	0	44	0	181	0
11-1	10/08/05	1	0	0	0	0	0	0	0
11-1	10/08/05	2	0	2	0	0	0	0	1
11-1	10/08/05	3	0	0	1	0	0	0	1
11-1	10/08/05	4	0	0	0	2	0	0	0
11-2	10/01/05	1	0	0	0	0	0	0	1
11-2	10/01/05	2	0	0	0	0	0	0	1
11-2	10/01/05	3	0	0	0	0	1	0	1
11-3	10/17/05	1	0	0	0	4	3	2	2
11-3	10/17/05	2	0	0	0	1	2	2	4
11-3	10/17/05	3	0	0	0	1	5	0	1
11-4	10/09/05	1	0	0	0	7	0	29	0
11-4	10/09/05	2	0	26	0	138	0	341	0
11-4	10/09/05	3	0	0	0	1	0	5	0
11-5	10/09/05	1	0	0	0	5	0	10	0
11-5	10/09/05	2	0	0	0	2	0	21	0
11-5	10/09/05	3	0	0	0	9	0	178	0

Site	Date	Sample number	Red shiner	River carpsucker	Sand shiner	Smallmouth buffalo	Speckled chub	Suckermouth minnow	Warmouth sunfish
10-3	10/02/05	1	4	0	0	0	0	0	0
10-3	10/02/05	2	0	0	0	0	0	0	0
10-3	10/02/05	3	1	0	0	0	0	0	0
10-3	10/02/05	4	1	0	0	0	0	0	0
10-4	10/02/05	1	98	0	0	0	0	0	0
10-4	10/02/05	2	38	0	0	0	0	0	0
10-4	10/02/05	3	20	0	0	0	0	0	0
10-5	10/02/05	1	0	0	0	0	0	0	0
10-5	10/02/05	2	0	0	0	0	0	0	0
10-5	10/02/05	3	0	0	0	0	0	0	0
10-5	10/02/05	4	0	0	0	0	0	0	0
11-1	10/08/05	1	3	0	0	0	4	0	1
11-1	10/08/05	2	2	0	0	0	1	0	0
11-1	10/08/05	3	5	0	0	0	3	0	0
11-1	10/08/05	4	2	0	0	0	0	0	0
11-2	10/01/05	1	1	0	0	0	0	0	0
11-2	10/01/05	2	0	0	0	0	0	0	0
11-2	10/01/05	3	0	0	0	0	0	0	0
11-3	10/17/05	1	0	0	0	0	0	0	0
11-3	10/17/05	2	2	0	0	0	0	0	0
11-3	10/17/05	3	5	0	0	0	0	0	0
11-4	10/09/05	1	0	0	0	0	0	0	0
11-4	10/09/05	2	0	0	0	0	0	0	0
11-4	10/09/05	3	0	0	0	0	0	0	0
11-5	10/09/05	1	0	0	0	0	0	0	0
11-5	10/09/05	2	0	0	0	0	0	0	0
11-5	10/09/05	3	0	0	0	0	0	0	0

Site	Date	Sample number	White bass
10-3	10/02/05	1	0
10-3	10/02/05	2	0
10-3	10/02/05	3	0
10-3	10/02/05	4	0
10-4	10/02/05	1	0
10-4	10/02/05	2	0
10-4	10/02/05	3	0
10-5	10/02/05	1	0
10-5	10/02/05	2	0
10-5	10/02/05	3	0
10-5	10/02/05	4	0
11-1	10/08/05	1	0
11-1	10/08/05	2	0
11-1	10/08/05	3	0
11-1	10/08/05	4	0
11-2	10/01/05	1	0
11-2	10/01/05	2	0
11-2	10/01/05	3	0
11-3	10/17/05	1	0
11-3	10/17/05	2	0
11-3	10/17/05	3	0
11-4	10/09/05	1	0
11-4	10/09/05	2	0
11-4	10/09/05	3	0
11-5	10/09/05	1	0
11-5	10/09/05	2	0
11-5	10/09/05	3	0

APPENDIX D

LOCATIONS AND RELATIVE SIZES OF POTENTIAL DRY-SEASON REFUGIA IN THE WICHITA RIVER, REACHES 9 (UPSTREAM FROM LAKE KEMP), 10 AND 11

Note: GPS coordinates in this Appendix are reported as WGS 84.

River	Refugium Size	Longitude	Latitude
North Wichita River	small	99 o 24.00' 14.82"	33 o 41.00' 36.30"
North Wichita River	large	99 o 24.00' 58.98"	33 o 40.00' 59.22"
North Wichita River	medium	99 o 25.00' 09.72"	33 o 40.00' 57.66"
North Wichita River	large	99 o 25.00' 45.06"	33 o 41.00' 12.90"
North Wichita River	medium	99 o 26.00' 00.84"	33 o 41.00' 14.52"
North Wichita River	medium	99 o 26.00' 15.42"	33 o 41.00' 00.78"
North Wichita River	large	99 o 26.00' 39.06"	33 o 41.00' 03.18"
North Wichita River	large	99 o 26.00' 52.56"	33 o 41.00' 28.86"
North Wichita River	large	99 o 27.00' 34.68"	33 o 42.00' 07.20"
North Wichita River	small	99 o 28.00' 34.50"	33 o 42.00' 10.98"
North Wichita River	small	99 o 29.00' 16.02"	33 o 42.00' 30.06"
North Wichita River	large	99 o 29.00' 34.02"	33 o 42.00' 44.94"
North Wichita River	medium	99 o 29.00' 03.78"	33 o 42.00' 42.18"
North Wichita River	large	99 o 29.00' 29.40"	33 o 43.00' 09.12"
North Wichita River	large	99 o 29.00' 18.18"	33 o 43.00' 33.18"
North Wichita River	medium	99 o 29.00' 27.36"	33 o 43.00' 22.62"
North Wichita River	large	99 o 29.00' 06.18"	33 o 43.00' 08.40"
North Wichita River	large	99 o 28.00' 55.08"	33 o 43.00' 12.48"
North Wichita River	large	99 o 28.00' 23.04"	33 o 43.00' 04.92"
North Wichita River	large	99 o 28.00' 09.42"	33 o 43.00' 09.06"
North Wichita River	small	99 o 28.00' 20.82"	33 o 43.00' 35.34"
North Wichita River	large	99 o 28.00' 26.40"	33 o 43.00' 52.32"
North Wichita River	medium	99 o 28.00' 32.10"	33 o 45.00' 04.98"
North Wichita River	medium	99 o 28.00' 35.64"	33 o 44.00' 54.42"
North Wichita River	large	99 o 28.00' 35.88"	33 o 45.00' 11.46"
North Wichita River	medium	99 o 28.00' 42.54"	33 o 45.00' 12.42"
North Wichita River	large	99 o 29.00' 53.58"	33 o 45.00' 52.50"
North Wichita River	small	99 o 29.00' 39.84"	33 o 46.00' 05.04"
North Wichita River	large	99 o 30.00' 07.74"	33 o 45.00' 51.36"
North Wichita River	medium	99 o 31.00' 16.02"	33 o 46.00' 09.54"
North Wichita River	small	99 o 31.00' 19.38"	33 o 46.00' 47.82"
North Wichita River	medium	99 o 31.00' 37.50"	33 o 47.00' 03.54"
North Wichita River	large	99 o 32.00' 42.84"	33 o 46.00' 49.74"
North Wichita River	large	99 o 32.00' 34.80"	33 o 47.00' 41.40"
North Wichita River	large	99 o 33.00' 03.30"	33 o 47.00' 43.14"
North Wichita River	medium	99 o 33.00' 13.80"	33 o 47.00' 48.12"
North Wichita River	small	99 o 32.00' 30.90"	33 o 47.00' 36.12"
North Wichita River	medium	99 o 33.00' 40.50"	33 o 47.00' 28.74"
North Wichita River	medium	99 o 34.00' 26.70"	33 o 47.00' 35.82"

River	Refugium Size	Longitude	Latitude
North Wichita River	small	99 o 33.00' 58.50"	33 o 47.00' 28.38"
North Wichita River	small	99 o 34.00' 25.26"	33 o 47.00' 41.52"
North Wichita River	large	99 o 34.00' 24.18"	33 o 47.00' 57.12"
North Wichita River	medium	99 o 34.00' 43.50"	33 o 48.00' 08.28"
North Wichita River	medium	99 o 34.00' 44.46"	33 o 47.00' 59.70"
North Wichita River	large	99 o 34.00' 52.56"	33 o 47.00' 09.66"
North Wichita River	medium	99 o 34.00' 09.84"	33 o 47.00' 53.28"
North Wichita River	large	99 o 34.00' 57.42"	33 o 47.00' 03.36"
North Wichita River	large	99 o 35.00' 39.48"	33 o 47.00' 13.20"
North Wichita River	small	99 o 35.00' 26.04"	33 o 47.00' 09.90"
North Wichita River	large	99 o 36.00' 00.66"	33 o 47.00' 26.04"
North Wichita River	small	99 o 36.00' 01.32"	33 o 47.00' 18.36"
North Wichita River	large	99 o 35.00' 54.48"	33 o 47.00' 39.30"
North Wichita River	large	99 o 35.00' 59.04"	33 o 47.00' 47.88"
North Wichita River	large	99 o 36.00' 48.78"	33 o 47.00' 56.04"
North Wichita River	large	99 o 36.00' 24.12"	33 o 47.00' 42.48"
North Wichita River	medium	99 o 37.00' 13.50"	33 o 48.00' 04.20"
North Wichita River	small	99 o 36.00' 40.50"	33 o 47.00' 50.82"
North Wichita River	small	99 o 37.00' 06.96"	33 o 47.00' 59.22"
North Wichita River	large	99 o 38.00' 04.20"	33 o 48.00' 09.72"
North Wichita River	large	99 o 37.00' 33.42"	33 o 48.00' 15.00"
North Wichita River	large	99 o 37.00' 59.10"	33 o 48.00' 50.10"
North Wichita River	small	99 o 37.00' 56.40"	33 o 48.00' 38.46"
North Wichita River	large	99 o 39.00' 04.14"	33 o 49.00' 06.00"
North Wichita River	large	99 o 39.00' 13.80"	33 o 49.00' 01.26"
North Wichita River	large	99 o 39.00' 58.20"	33 o 48.00' 38.94"
North Wichita River	medium	99 o 39.00' 51.84"	33 o 48.00' 29.88"
North Wichita River	large	99 o 40.00' 14.58"	33 o 49.00' 06.24"
North Wichita River	medium	99 o 41.00' 11.16"	33 o 49.00' 38.58"
North Wichita River	large	99 o 41.00' 48.78"	33 o 49.00' 34.38"
North Wichita River	large	99 o 41.00' 57.48"	33 o 48.00' 41.40"
North Wichita River	medium	99 o 41.00' 57.42"	33 o 48.00' 56.28"
North Wichita River	large	99 o 42.00' 00.72"	33 o 48.00' 00.72"
North Wichita River	large	99 o 42.00' 23.04"	33 o 47.00' 59.22"
North Wichita River	large	99 o 42.00' 43.02"	33 o 47.00' 55.14"
North Wichita River	large	99 o 42.00' 27.54"	33 o 48.00' 35.64"
North Wichita River	medium	99 o 42.00' 36.42"	33 o 48.00' 17.94"
North Wichita River	large	99 o 42.00' 58.50"	33 o 48.00' 46.56"
North Wichita River	large	99 o 43.00' 17.16"	33 o 48.00' 52.08"

River	Refugium Size	Longitude	Latitude
North Wichita River	medium	99 o 43.00' 15.42"	33 o 48.00' 03.12"
North Wichita River	large	99 o 43.00' 30.90"	33 o 47.00' 53.52"
North Wichita River	medium	99 o 43.00' 34.20"	33 o 48.00' 01.68"
North Wichita River	small	99 o 43.00' 59.04"	33 o 48.00' 18.42"
North Wichita River	small	99 o 44.00' 41.28"	33 o 48.00' 34.20"
North Wichita River	large	99 o 45.00' 24.72"	33 o 48.00' 11.28"
North Wichita River	large	99 o 45.00' 28.26"	33 o 48.00' 22.92"
North Wichita River	small	99 o 44.00' 58.92"	33 o 48.00' 10.74"
North Wichita River	large	99 o 45.00' 11.82"	33 o 48.00' 38.04"
North Wichita River	large	99 o 45.00' 44.40"	33 o 49.00' 24.48"
North Wichita River	medium	99 o 46.00' 15.30"	33 o 49.00' 02.88"
North Wichita River	medium	99 o 45.00' 20.70"	33 o 49.00' 21.66"
North Wichita River	medium	99 o 47.00' 47.04"	33 o 49.00' 25.68"
North Wichita River	small	99 o 47.00' 31.98"	33 o 49.00' 28.38"
North Wichita River	small	99 o 47.00' 50.46"	33 o 49.00' 20.10"
North Wichita River	large	99 o 47.00' 42.78"	33 o 49.00' 16.68"
North Wichita River	large	99 o 47.00' 23.10"	33 o 49.00' 09.54"
North Wichita River	large	99 o 47.00' 30.72"	33 o 49.00' 03.24"
North Wichita River	medium	99 o 47.00' 26.46"	33 o 49.00' 16.68"
North Wichita River	medium	99 o 47.00' 51.42"	33 o 49.00' 03.48"
North Wichita River	medium	99 o 47.00' 59.70"	33 o 49.00' 09.36"
North Wichita River	medium	99 o 48.00' 25.08"	33 o 49.00' 32.82"
North Wichita River	large	99 o 48.00' 54.72"	33 o 49.00' 25.50"
North Wichita River	medium	99 o 48.00' 47.40"	33 o 49.00' 35.82"
North Wichita River	medium	99 o 48.00' 05.82"	33 o 49.00' 17.76"
North Wichita River	large	99 o 49.00' 35.46"	33 o 49.00' 13.14"
North Wichita River	medium	99 o 49.00' 11.70"	33 o 49.00' 12.90"
North Wichita River	large	99 o 49.00' 59.34"	33 o 49.00' 30.90"
North Wichita River	medium	99 o 49.00' 54.48"	33 o 49.00' 23.16"
North Wichita River	large	99 o 50.00' 08.10"	33 o 49.00' 57.78"
North Wichita River	large	99 o 50.00' 12.96"	33 o 50.00' 28.68"
North Wichita River	medium	99 o 50.00' 46.56"	33 o 50.00' 33.00"
North Wichita River	medium	99 o 52.00' 06.36"	33 o 50.00' 49.02"
North Wichita River	large	99 o 52.00' 18.36"	33 o 51.00' 03.66"
North Wichita River	large	99 o 52.00' 21.36"	33 o 51.00' 19.44"
North Wichita River	large	99 o 52.00' 08.70"	33 o 51.00' 45.42"
North Wichita River	medium	99 o 52.00' 21.90"	33 o 51.00' 31.68"
North Wichita River	small	99 o 52.00' 20.22"	33 o 51.00' 08.94"
North Wichita River	medium	99 o 52.00' 06.84"	33 o 51.00' 59.16"

River	Refugium Size	Longitude	Latitude
North Wichita River	medium	99 o 52.00' 09.90"	33 o 52.00' 15.36"
North Wichita River	medium	99 o 52.00' 18.06"	33 o 52.00' 23.88"
North Wichita River	small	99 o 52.00' 06.42"	33 o 52.00' 04.38"
North Wichita River	large	99 o 52.00' 27.12"	33 o 52.00' 29.58"
North Wichita River	large	99 o 52.00' 34.32"	33 o 52.00' 33.42"
North Wichita River	medium	99 o 52.00' 52.32"	33 o 52.00' 40.26"
North Wichita River	medium	99 o 53.00' 02.88"	33 o 52.00' 17.22"
North Wichita River	medium	99 o 53.00' 13.92"	33 o 52.00' 00.54"
North Wichita River	large	99 o 53.00' 46.32"	33 o 51.00' 22.98"
North Wichita River	small	99 o 53.00' 25.68"	33 o 51.00' 33.84"
North Wichita River	large	99 o 53.00' 50.64"	33 o 51.00' 29.16"
North Wichita River	medium	99 o 53.00' 57.30"	33 o 51.00' 55.20"
North Wichita River	large	99 o 54.00' 13.56"	33 o 51.00' 56.58"
North Wichita River	medium	99 o 54.00' 31.08"	33 o 52.00' 15.36"
North Wichita River	medium	99 o 55.00' 11.46"	33 o 52.00' 11.88"
North Wichita River	medium	99 o 54.00' 56.04"	33 o 51.00' 53.16"
North Wichita River	medium	99 o 55.00' 02.10"	33 o 51.00' 29.82"
North Wichita River	small	99 o 55.00' 22.02"	33 o 51.00' 44.34"
North Wichita River	medium	99 o 56.00' 22.62"	33 o 51.00' 58.92"
North Wichita River	medium	99 o 56.00' 59.52"	33 o 52.00' 04.74"
North Wichita River	medium	99 o 57.00' 08.58"	33 o 52.00' 11.10"
North Wichita River	large	99 o 58.00' 09.30"	33 o 52.00' 58.26"
North Wichita River	large	99 o 58.00' 53.28"	33 o 53.00' 06.00"
North Wichita River	small	99 o 59.00' 54.78"	33 o 52.00' 37.56"
North Wichita River	small	99 o 59.00' 50.28"	33 o 52.00' 29.40"
North Wichita River	large	99 o 59.00' 43.92"	33 o 52.00' 58.38"
North Wichita River	medium	99 o 0.00' 01.98"	33 o 53.00' 35.22"
North Wichita River	medium	99 o 0.00' 36.90"	33 o 53.00' 22.56"
North Wichita River	large	99 o 0.00' 41.34"	33 o 53.00' 57.36"
North Wichita River	large	99 o 1.00' 07.50"	33 o 54.00' 10.56"
North Wichita River	large	99 o 1.00' 12.72"	33 o 54.00' 22.86"
North Wichita River	medium	99 o 1.00' 28.86"	33 o 54.00' 20.58"
North Wichita River	medium	99 o 1.00' 35.70"	33 o 54.00' 19.86"
North Wichita River	small	99 o 1.00' 39.06"	33 o 54.00' 25.74"
North Wichita River	large	99 o 1.00' 32.10"	33 o 54.00' 43.92"
North Wichita River	medium	100 o 1.00' 46.02"	33 o 54.00' 50.28"
North Wichita River	medium	100 o 1.00' 51.60"	33 o 55.00' 10.44"
North Wichita River	small	100 o 1.00' 58.08"	33 o 55.00' 14.22"
North Wichita River	small	100 o 1.00' 24.90"	33 o 55.00' 06.72"

River	Refugium Size	Longitude	Latitude
North Wichita River	medium	100 o 2.00' 18.42"	33 o 55.00' 21.54"
North Wichita River	medium	100 o 2.00' 29.58"	33 o 55.00' 29.22"
North Wichita River	medium	100 o 2.00' 34.56"	33 o 55.00' 33.66"
North Wichita River	medium	100 o 2.00' 49.62"	33 o 56.00' 18.78"
North Wichita River	small	100 o 2.00' 32.22"	33 o 55.00' 47.46"
North Wichita River	medium	100 o 3.00' 26.22"	33 o 56.00' 33.78"
North Wichita River	medium	100 o 3.00' 34.50"	33 o 56.00' 19.20"
North Wichita River	small	100 o 3.00' 50.04"	33 o 56.00' 41.88"
North Wichita River	large	100 o 4.00' 51.18"	33 o 57.00' 22.74"
North Wichita River	medium	100 o 5.00' 49.80"	33 o 57.00' 18.54"
North Wichita River	large	100 o 5.00' 48.24"	33 o 57.00' 55.14"
North Wichita River	large	100 o 6.00' 09.66"	33 o 57.00' 55.86"
North Wichita River	medium	100 o 5.00' 34.98"	33 o 57.00' 43.56"
North Wichita River	medium	100 o 5.00' 43.44"	33 o 57.00' 52.98"
North Wichita River	large	100 o 6.00' 39.12"	33 o 57.00' 58.02"
North Wichita River	large	100 o 7.00' 03.00"	33 o 58.00' 09.48"
North Wichita River	medium	100 o 6.00' 48.18"	33 o 58.00' 07.50"
North Wichita River	small	100 o 6.00' 25.50"	33 o 57.00' 50.22"
North Wichita River	small	100 o 6.00' 42.18"	33 o 58.00' 02.28"
North Wichita River	medium	100 o 8.00' 21.84"	33 o 57.00' 58.62"
Middle Fork Wichita River	medium	99 o 55.00' 45.84"	33 o 51.00' 40.68"
Middle Fork Wichita River	small	99 o 55.00' 40.32"	33 o 51.00' 41.88"
Middle Fork Wichita River	large	99 o 55.00' 55.44"	33 o 51.00' 39.30"
Middle Fork Wichita River	medium	99 o 55.00' 50.10"	33 o 51.00' 41.52"
Middle Fork Wichita River	medium	99 o 55.00' 52.98"	33 o 51.00' 41.52"
Middle Fork Wichita River	small	99 o 56.00' 06.30"	33 o 51.00' 29.76"
Middle Fork Wichita River	medium	99 o 56.00' 19.86"	33 o 51.00' 21.24"
Middle Fork Wichita River	medium	99 o 56.00' 24.00"	33 o 51.00' 19.26"
Middle Fork Wichita River	medium	99 o 56.00' 27.60"	33 o 51.00' 18.66"
Middle Fork Wichita River	small	99 o 56.00' 19.14"	33 o 51.00' 35.04"
Middle Fork Wichita River	small	99 o 56.00' 27.78"	33 o 51.00' 28.32"
Middle Fork Wichita River	small	99 o 56.00' 19.68"	33 o 51.00' 23.76"
Middle Fork Wichita River	small	99 o 56.00' 22.26"	33 o 51.00' 19.56"
Middle Fork Wichita River	large	99 o 56.00' 32.64"	33 o 51.00' 18.96"
Middle Fork Wichita River	medium	99 o 57.00' 11.52"	33 o 51.00' 24.48"
Middle Fork Wichita River	medium	99 o 57.00' 16.08"	33 o 51.00' 29.70"
Middle Fork Wichita River	medium	99 o 57.00' 44.64"	33 o 51.00' 15.96"
Middle Fork Wichita River	small	99 o 57.00' 28.08"	33 o 51.00' 27.90"
Middle Fork Wichita River	large	99 o 57.00' 43.14"	33 o 51.00' 08.58"

River	Refugium Size	Longitude	Latitude
Middle Fork Wichita River	medium	99 o 57.00' 35.82"	33 o 50.00' 26.52"
Middle Fork Wichita River	large	99 o 58.00' 03.72"	33 o 50.00' 18.24"
Middle Fork Wichita River	medium	99 o 57.00' 49.50"	33 o 50.00' 22.98"
Middle Fork Wichita River	large	99 o 58.00' 27.54"	33 o 50.00' 33.18"
Middle Fork Wichita River	medium	99 o 58.00' 32.94"	33 o 50.00' 27.48"
Middle Fork Wichita River	small	99 o 58.00' 14.94"	33 o 50.00' 31.20"
Middle Fork Wichita River	large	99 o 58.00' 50.28"	33 o 50.00' 31.80"
Middle Fork Wichita River	large	99 o 58.00' 38.04"	33 o 50.00' 07.50"
Middle Fork Wichita River	medium	99 o 58.00' 37.44"	33 o 50.00' 13.44"
Middle Fork Wichita River	medium	99 o 58.00' 50.16"	33 o 50.00' 08.70"
Middle Fork Wichita River	medium	99 o 59.00' 01.02"	33 o 49.00' 49.38"
Middle Fork Wichita River	small	99 o 58.00' 45.12"	33 o 49.00' 55.74"
Middle Fork Wichita River	small	99 o 58.00' 58.80"	33 o 49.00' 54.48"
Middle Fork Wichita River	large	99 o 59.00' 13.68"	33 o 49.00' 52.86"
Middle Fork Wichita River	large	99 o 59.00' 38.94"	33 o 50.00' 01.50"
Middle Fork Wichita River	medium	99 o 59.00' 06.06"	33 o 49.00' 50.10"
Middle Fork Wichita River	medium	99 o 59.00' 22.74"	33 o 49.00' 55.50"
Middle Fork Wichita River	medium	99 o 59.00' 55.56"	33 o 50.00' 01.32"
Middle Fork Wichita River	small	100 o 0.00' 09.72"	33 o 50.00' 07.80"
Middle Fork Wichita River	large	100 o 0.00' 12.96"	33 o 49.00' 58.02"
Middle Fork Wichita River	large	100 o 0.00' 13.08"	33 o 49.00' 49.44"
Middle Fork Wichita River	medium	100 o 0.00' 10.56"	33 o 50.00' 02.82"
Middle Fork Wichita River	large	100 o 0.00' 06.36"	33 o 49.00' 35.94"
Middle Fork Wichita River	large	100 o 0.00' 33.54"	33 o 49.00' 43.08"
Middle Fork Wichita River	large	100 o 0.00' 43.92"	33 o 49.00' 33.78"
Middle Fork Wichita River	large	100 o 0.00' 53.58"	33 o 49.00' 27.72"
Middle Fork Wichita River	medium	100 o 0.00' 22.68"	33 o 49.00' 41.40"
Middle Fork Wichita River	medium	100 o 1.00' 49.44"	33 o 49.00' 09.78"
Middle Fork Wichita River	medium	100 o 2.00' 26.34"	33 o 49.00' 27.90"
Middle Fork Wichita River	large	100 o 2.00' 34.26"	33 o 49.00' 20.70"
Middle Fork Wichita River	small	100 o 2.00' 26.34"	33 o 49.00' 10.68"
Middle Fork Wichita River	medium	100 o 2.00' 19.74"	33 o 48.00' 50.28"
Middle Fork Wichita River	medium	100 o 2.00' 25.68"	33 o 48.00' 39.12"
Middle Fork Wichita River	medium	100 o 2.00' 34.80"	33 o 48.00' 35.82"
Middle Fork Wichita River	medium	100 o 3.00' 18.48"	33 o 48.00' 41.70"
Middle Fork Wichita River	medium	100 o 3.00' 27.96"	33 o 48.00' 42.30"
Middle Fork Wichita River	small	100 o 2.00' 47.88"	33 o 48.00' 35.16"
Middle Fork Wichita River	small	100 o 2.00' 59.10"	33 o 48.00' 37.68"
Middle Fork Wichita River	medium	100 o 3.00' 34.44"	33 o 48.00' 32.76"

River	Refugium Size	Longitude	Latitude
Middle Fork Wichita River	medium	100 o 3.00' 28.68"	33 o 48.00' 12.06"
Middle Fork Wichita River	small	100 o 3.00' 17.04"	33 o 48.00' 15.48"
Middle Fork Wichita River	large	100 o 3.00' 29.34"	33 o 47.00' 54.48"
Middle Fork Wichita River	medium	100 o 3.00' 33.24"	33 o 48.00' 05.58"
Middle Fork Wichita River	medium	100 o 3.00' 34.86"	33 o 47.00' 44.10"
Middle Fork Wichita River	medium	100 o 3.00' 39.18"	33 o 47.00' 41.46"
Middle Fork Wichita River	medium	100 o 3.00' 53.82"	33 o 47.00' 43.08"
Middle Fork Wichita River	medium	100 o 4.00' 12.06"	33 o 47.00' 46.44"
Middle Fork Wichita River	small	100 o 3.00' 57.48"	33 o 47.00' 43.92"
Middle Fork Wichita River	small	100 o 4.00' 09.30"	33 o 47.00' 47.70"
Middle Fork Wichita River	medium	100 o 4.00' 27.36"	33 o 47.00' 46.02"
Middle Fork Wichita River	small	100 o 4.00' 12.78"	33 o 47.00' 43.08"
Middle Fork Wichita River	small	100 o 4.00' 14.40"	33 o 47.00' 40.26"
Middle Fork Wichita River	small	100 o 4.00' 22.02"	33 o 47.00' 37.68"
South Wichita River	large	100 o 10.00' 56.46"	33 o 38.00' 23.16"
South Wichita River	medium	100 o 10.00' 48.90"	33 o 38.00' 57.48"
South Wichita River	small	100 o 10.00' 49.44"	33 o 38.00' 03.24"
South Wichita River	large	100 o 10.00' 03.48"	33 o 38.00' 00.84"
South Wichita River	medium	100 o 10.00' 31.44"	33 o 37.00' 47.40"
South Wichita River	medium	100 o 10.00' 26.28"	33 o 37.00' 47.22"
South Wichita River	medium	100 o 10.00' 20.04"	33 o 37.00' 55.20"
South Wichita River	medium	100 o 10.00' 05.64"	33 o 37.00' 58.20"
South Wichita River	large	100 o 10.00' 09.30"	33 o 38.00' 13.08"
South Wichita River	large	100 o 10.00' 07.02"	33 o 38.00' 15.00"
South Wichita River	medium	100 o 10.00' 07.44"	33 o 38.00' 08.40"
South Wichita River	medium	100 o 9.00' 41.34"	33 o 38.00' 09.36"
South Wichita River	large	100 o 9.00' 23.16"	33 o 38.00' 14.88"
South Wichita River	large	100 o 9.00' 21.18"	33 o 38.00' 37.92"
South Wichita River	medium	100 o 9.00' 27.00"	33 o 38.00' 09.66"
South Wichita River	medium	100 o 9.00' 23.76"	33 o 38.00' 22.68"
South Wichita River	medium	100 o 9.00' 27.54"	33 o 38.00' 28.26"
South Wichita River	small	100 o 9.00' 31.74"	33 o 38.00' 08.28"
South Wichita River	small	100 o 9.00' 26.58"	33 o 38.00' 34.74"
South Wichita River	large	100 o 9.00' 07.92"	33 o 38.00' 18.18"
South Wichita River	medium	100 o 8.00' 55.14"	33 o 38.00' 08.28"
South Wichita River	large	100 o 8.00' 35.88"	33 o 38.00' 06.30"
South Wichita River	large	100 o 8.00' 32.52"	33 o 37.00' 52.68"
South Wichita River	large	100 o 8.00' 16.32"	33 o 37.00' 55.86"
South Wichita River	large	100 o 8.00' 10.26"	33 o 37.00' 43.98"

River	Refugium Size	Longitude	Latitude
South Wichita River	medium	100 ° 7.00' 57.12"	33 ° 37.00' 33.00"
South Wichita River	medium	100 ° 7.00' 51.78"	33 ° 37.00' 24.84"
South Wichita River	small	100 ° 7.00' 46.08"	33 ° 37.00' 18.00"
South Wichita River	small	100 ° 7.00' 19.32"	33 ° 37.00' 24.84"
South Wichita River	small	100 ° 7.00' 14.04"	33 ° 37.00' 24.60"
South Wichita River	medium	100 ° 6.00' 57.00"	33 ° 37.00' 31.56"
South Wichita River	small	100 ° 6.00' 34.26"	33 ° 37.00' 39.90"
South Wichita River	large	100 ° 6.00' 33.36"	33 ° 37.00' 53.10"
South Wichita River	large	100 ° 6.00' 23.04"	33 ° 37.00' 51.06"
South Wichita River	medium	100 ° 6.00' 20.46"	33 ° 38.00' 03.06"
South Wichita River	large	100 ° 6.00' 11.34"	33 ° 38.00' 11.64"
South Wichita River	large	100 ° 6.00' 01.32"	33 ° 38.00' 02.52"
South Wichita River	medium	100 ° 5.00' 54.06"	33 ° 38.00' 00.06"
South Wichita River	medium	100 ° 5.00' 44.40"	33 ° 38.00' 02.94"
South Wichita River	small	100 ° 5.00' 40.92"	33 ° 38.00' 06.54"
South Wichita River	small	100 ° 5.00' 29.10"	33 ° 38.00' 19.02"
South Wichita River	medium	100 ° 5.00' 27.66"	33 ° 38.00' 17.10"
South Wichita River	medium	100 ° 5.00' 29.82"	33 ° 38.00' 04.68"
South Wichita River	small	100 ° 5.00' 27.48"	33 ° 38.00' 16.56"
South Wichita River	medium	100 ° 5.00' 15.00"	33 ° 38.00' 19.32"
South Wichita River	small	100 ° 5.00' 20.40"	33 ° 38.00' 00.54"
South Wichita River	large	100 ° 5.00' 00.60"	33 ° 38.00' 12.90"
South Wichita River	medium	100 ° 5.00' 05.82"	33 ° 38.00' 17.82"
South Wichita River	large	100 ° 4.00' 44.28"	33 ° 37.00' 43.02"
South Wichita River	large	100 ° 5.00' 05.52"	33 ° 37.00' 31.62"
South Wichita River	small	100 ° 4.00' 59.28"	33 ° 37.00' 36.36"
South Wichita River	medium	100 ° 4.00' 35.16"	33 ° 37.00' 23.70"
South Wichita River	small	100 ° 4.00' 29.58"	33 ° 37.00' 24.24"
South Wichita River	medium	100 ° 4.00' 25.98"	33 ° 37.00' 26.28"
South Wichita River	small	100 ° 4.00' 31.62"	33 ° 38.00' 02.46"
South Wichita River	medium	100 ° 4.00' 17.04"	33 ° 38.00' 08.76"
South Wichita River	small	100 ° 4.00' 20.28"	33 ° 38.00' 08.34"
South Wichita River	small	100 ° 4.00' 04.02"	33 ° 37.00' 57.84"
South Wichita River	small	100 ° 3.00' 56.04"	33 ° 38.00' 09.06"
South Wichita River	medium	100 ° 4.00' 11.34"	33 ° 38.00' 20.70"
South Wichita River	small	100 ° 4.00' 00.06"	33 ° 38.00' 15.54"
South Wichita River	medium	100 ° 3.00' 30.12"	33 ° 38.00' 12.06"
South Wichita River	small	100 ° 3.00' 26.22"	33 ° 38.00' 10.32"
South Wichita River	small	100 ° 3.00' 22.20"	33 ° 38.00' 14.40"

River	Refugium Size	Longitude	Latitude
South Wichita River	small	100 o 3.00' 19.02"	33 o 38.00' 20.28"
South Wichita River	medium	100 o 2.00' 48.00"	33 o 37.00' 58.02"
South Wichita River	small	100 o 3.00' 02.46"	33 o 38.00' 12.18"
South Wichita River	small	100 o 3.00' 00.18"	33 o 38.00' 07.44"
South Wichita River	medium	100 o 2.00' 42.12"	33 o 38.00' 04.14"
South Wichita River	small	100 o 2.00' 43.68"	33 o 38.00' 12.06"
South Wichita River	small	100 o 2.00' 48.84"	33 o 38.00' 21.78"
South Wichita River	medium	100 o 3.00' 18.54"	33 o 38.00' 35.82"
South Wichita River	medium	100 o 3.00' 21.18"	33 o 38.00' 44.70"
South Wichita River	medium	100 o 3.00' 16.26"	33 o 39.00' 03.12"
South Wichita River	small	100 o 3.00' 14.40"	33 o 38.00' 33.06"
South Wichita River	medium	100 o 3.00' 32.52"	33 o 39.00' 04.44"
South Wichita River	medium	100 o 3.00' 37.62"	33 o 39.00' 03.60"
South Wichita River	medium	100 o 3.00' 41.94"	33 o 39.00' 14.10"
South Wichita River	medium	100 o 3.00' 37.38"	33 o 39.00' 13.32"
South Wichita River	medium	100 o 3.00' 29.34"	33 o 39.00' 10.20"
South Wichita River	medium	100 o 3.00' 22.32"	33 o 39.00' 11.52"
South Wichita River	large	100 o 2.00' 33.24"	33 o 38.00' 53.52"
South Wichita River	small	100 o 1.00' 44.94"	33 o 39.00' 03.90"
South Wichita River	large	100 o 1.00' 47.94"	33 o 38.00' 22.44"
South Wichita River	medium	100 o 1.00' 56.94"	33 o 38.00' 27.78"
South Wichita River	medium	100 o 1.00' 28.32"	33 o 38.00' 36.12"
South Wichita River	medium	100 o 1.00' 26.34"	33 o 38.00' 39.84"
South Wichita River	small	100 o 1.00' 43.08"	33 o 38.00' 22.50"
South Wichita River	small	100 o 1.00' 37.08"	33 o 38.00' 27.42"
South Wichita River	large	100 o 1.00' 14.28"	33 o 39.00' 18.78"
South Wichita River	small	100 o 1.00' 23.22"	33 o 39.00' 02.76"
South Wichita River	small	100 o 1.00' 22.14"	33 o 39.00' 09.18"
South Wichita River	large	100 o 1.00' 03.78"	33 o 39.00' 40.02"
South Wichita River	medium	100 o 1.00' 21.30"	33 o 39.00' 38.70"
South Wichita River	small	100 o 1.00' 19.80"	33 o 39.00' 46.32"
South Wichita River	large	100 o 0.00' 57.42"	33 o 39.00' 23.28"
South Wichita River	medium	100 o 0.00' 45.90"	33 o 39.00' 28.86"
South Wichita River	medium	100 o 0.00' 51.48"	33 o 39.00' 31.80"
South Wichita River	small	100 o 0.00' 44.46"	33 o 39.00' 18.90"
South Wichita River	small	100 o 0.00' 57.54"	33 o 39.00' 36.36"
South Wichita River	medium	100 o 0.00' 57.84"	33 o 39.00' 37.74"
South Wichita River	medium	100 o 0.00' 34.56"	33 o 39.00' 41.40"
South Wichita River	medium	100 o 0.00' 30.42"	33 o 39.00' 41.16"

River	Refugium Size	Longitude	Latitude
South Wichita River	large	100 o 0.00' 22.50"	33 o 39.00' 39.42"
South Wichita River	large	100 o 0.00' 20.64"	33 o 39.00' 34.32"
South Wichita River	large	100 o 0.00' 13.32"	33 o 39.00' 34.02"
South Wichita River	medium	100 o 0.00' 04.86"	33 o 39.00' 35.64"
South Wichita River	large	100 o 0.00' 05.46"	33 o 39.00' 18.36"
South Wichita River	medium	99 o 59.00' 49.02"	33 o 39.00' 11.10"
South Wichita River	small	99 o 59.00' 50.34"	33 o 39.00' 10.62"
South Wichita River	large	99 o 59.00' 43.38"	33 o 39.00' 26.76"
South Wichita River	large	99 o 59.00' 43.50"	33 o 39.00' 41.28"
South Wichita River	medium	99 o 59.00' 38.88"	33 o 39.00' 49.02"
South Wichita River	medium	99 o 59.00' 14.88"	33 o 39.00' 22.08"
South Wichita River	medium	99 o 59.00' 12.90"	33 o 39.00' 28.32"
South Wichita River	medium	99 o 59.00' 14.28"	33 o 39.00' 35.64"
South Wichita River	medium	99 o 59.00' 13.56"	33 o 39.00' 45.00"
South Wichita River	small	99 o 59.00' 13.44"	33 o 39.00' 32.70"
South Wichita River	medium	99 o 59.00' 02.04"	33 o 39.00' 26.34"
South Wichita River	medium	99 o 59.00' 04.44"	33 o 39.00' 16.26"
South Wichita River	small	99 o 58.00' 58.56"	33 o 39.00' 38.10"
South Wichita River	small	99 o 58.00' 56.76"	33 o 39.00' 34.50"
South Wichita River	small	99 o 58.00' 58.02"	33 o 39.00' 31.20"
South Wichita River	small	99 o 58.00' 59.58"	33 o 39.00' 29.22"
South Wichita River	small	99 o 59.00' 01.32"	33 o 39.00' 23.40"
South Wichita River	small	99 o 59.00' 05.70"	33 o 39.00' 17.70"
South Wichita River	small	99 o 58.00' 34.74"	33 o 39.00' 18.42"
South Wichita River	medium	99 o 58.00' 39.60"	33 o 39.00' 24.42"
South Wichita River	medium	99 o 58.00' 44.58"	33 o 39.00' 35.58"
South Wichita River	medium	99 o 58.00' 39.90"	33 o 39.00' 40.20"
South Wichita River	small	99 o 58.00' 46.98"	33 o 39.00' 31.68"
South Wichita River	large	99 o 58.00' 04.50"	33 o 39.00' 39.06"
South Wichita River	large	99 o 57.00' 59.58"	33 o 39.00' 33.48"
South Wichita River	medium	99 o 58.00' 28.38"	33 o 39.00' 44.16"
South Wichita River	medium	99 o 58.00' 09.78"	33 o 39.00' 40.86"
South Wichita River	small	99 o 58.00' 26.58"	33 o 39.00' 44.10"
South Wichita River	medium	99 o 57.00' 52.08"	33 o 39.00' 20.76"
South Wichita River	small	99 o 57.00' 45.00"	33 o 39.00' 34.38"
South Wichita River	small	99 o 58.00' 08.40"	33 o 40.00' 17.46"
South Wichita River	small	99 o 57.00' 21.42"	33 o 40.00' 43.56"
South Wichita River	small	99 o 56.00' 43.86"	33 o 40.00' 37.44"
South Wichita River	small	99 o 56.00' 22.86"	33 o 41.00' 04.02"

River	Refugium Size	Longitude	Latitude
South Wichita River	small	99 o 56.00' 16.38"	33 o 41.00' 10.20"
South Wichita River	small	99 o 56.00' 14.82"	33 o 41.00' 09.96"
South Wichita River	small	99 o 55.00' 49.44"	33 o 40.00' 51.48"
South Wichita River	small	99 o 54.00' 09.24"	33 o 40.00' 08.28"
South Wichita River	small	99 o 54.00' 04.02"	33 o 40.00' 07.32"
South Wichita River	medium	99 o 54.00' 40.86"	33 o 40.00' 20.58"
South Wichita River	small	99 o 53.00' 20.28"	33 o 40.00' 01.86"
South Wichita River	medium	99 o 53.00' 30.12"	33 o 39.00' 52.20"
South Wichita River	small	99 o 53.00' 37.44"	33 o 39.00' 46.02"
South Wichita River	small	99 o 53.00' 21.18"	33 o 39.00' 41.58"
South Wichita River	large	99 o 53.00' 08.52"	33 o 40.00' 02.28"
South Wichita River	medium	99 o 53.00' 09.78"	33 o 39.00' 57.06"
South Wichita River	medium	99 o 53.00' 03.84"	33 o 40.00' 02.52"
South Wichita River	medium	99 o 53.00' 00.78"	33 o 40.00' 03.96"
South Wichita River	small	99 o 53.00' 17.82"	33 o 39.00' 45.12"
South Wichita River	small	99 o 53.00' 09.84"	33 o 39.00' 46.92"
South Wichita River	small	99 o 53.00' 07.44"	33 o 39.00' 54.60"
South Wichita River	large	99 o 52.00' 43.98"	33 o 40.00' 18.18"
South Wichita River	medium	99 o 52.00' 32.76"	33 o 40.00' 15.72"
South Wichita River	medium	99 o 51.00' 52.50"	33 o 40.00' 14.16"
South Wichita River	small	99 o 52.00' 05.46"	33 o 40.00' 12.30"
South Wichita River	large	99 o 51.00' 26.40"	33 o 39.00' 25.26"
South Wichita River	medium	99 o 51.00' 32.52"	33 o 39.00' 33.12"
South Wichita River	medium	99 o 51.00' 37.32"	33 o 39.00' 19.20"
South Wichita River	medium	99 o 51.00' 37.20"	33 o 39.00' 15.00"
South Wichita River	medium	99 o 50.00' 38.34"	33 o 39.00' 13.86"
South Wichita River	medium	99 o 50.00' 13.20"	33 o 39.00' 14.70"
South Wichita River	small	99 o 50.00' 15.54"	33 o 39.00' 17.40"
South Wichita River	small	99 o 50.00' 09.42"	33 o 39.00' 02.52"
South Wichita River	small	99 o 50.00' 04.74"	33 o 39.00' 08.28"
South Wichita River	small	99 o 49.00' 41.94"	33 o 39.00' 04.86"
South Wichita River	medium	99 o 48.00' 56.34"	33 o 39.00' 16.98"
South Wichita River	small	99 o 49.00' 05.04"	33 o 39.00' 12.78"
South Wichita River	small	99 o 49.00' 03.96"	33 o 39.00' 13.68"
South Wichita River	small	99 o 48.00' 42.54"	33 o 39.00' 13.56"
South Wichita River	medium	99 o 48.00' 32.34"	33 o 39.00' 12.36"
South Wichita River	medium	99 o 48.00' 32.34"	33 o 39.00' 10.08"
South Wichita River	medium	99 o 48.00' 32.76"	33 o 39.00' 04.20"
South Wichita River	medium	99 o 48.00' 33.42"	33 o 38.00' 52.80"

River	Refugium Size	Longitude	Latitude
South Wichita River	medium	99 o 48.00' 34.44"	33 o 38.00' 45.30"
South Wichita River	medium	99 o 48.00' 27.30"	33 o 38.00' 43.56"
South Wichita River	large	99 o 48.00' 22.68"	33 o 38.00' 43.20"
South Wichita River	large	99 o 47.00' 25.02"	33 o 38.00' 39.36"
South Wichita River	medium	99 o 47.00' 31.74"	33 o 38.00' 31.86"
South Wichita River	small	99 o 46.00' 57.78"	33 o 38.00' 30.54"
South Wichita River	medium	99 o 46.00' 48.72"	33 o 38.00' 48.42"
South Wichita River	small	99 o 46.00' 32.82"	33 o 38.00' 46.14"
South Wichita River	medium	99 o 46.00' 28.44"	33 o 39.00' 07.08"
South Wichita River	medium	99 o 46.00' 04.02"	33 o 39.00' 00.72"
South Wichita River	large	99 o 45.00' 47.34"	33 o 38.00' 27.72"
South Wichita River	large	99 o 45.00' 34.74"	33 o 38.00' 25.74"
South Wichita River	large	99 o 45.00' 10.20"	33 o 38.00' 44.46"
South Wichita River	large	99 o 45.00' 06.78"	33 o 38.00' 58.86"
South Wichita River	small	99 o 45.00' 12.60"	33 o 38.00' 39.72"
South Wichita River	small	99 o 45.00' 00.72"	33 o 38.00' 55.50"
South Wichita River	small	99 o 44.00' 49.08"	33 o 38.00' 57.78"
South Wichita River	medium	99 o 43.00' 13.20"	33 o 38.00' 28.80"
South Wichita River	small	99 o 42.00' 56.34"	33 o 38.00' 29.88"
South Wichita River	medium	99 o 42.00' 47.22"	33 o 38.00' 06.24"
South Wichita River	small	99 o 42.00' 40.50"	33 o 38.00' 05.70"
South Wichita River	small	99 o 42.00' 35.82"	33 o 38.00' 14.94"
South Wichita River	small	99 o 42.00' 27.00"	33 o 38.00' 14.88"
South Wichita River	small	99 o 42.00' 07.98"	33 o 38.00' 31.26"
South Wichita River	small	99 o 42.00' 01.02"	33 o 38.00' 35.34"
South Wichita River	small	99 o 41.00' 53.34"	33 o 38.00' 08.94"
South Wichita River	medium	99 o 41.00' 18.96"	33 o 37.00' 58.56"
South Wichita River	small	99 o 40.00' 24.18"	33 o 38.00' 29.88"
South Wichita River	medium	99 o 40.00' 40.74"	33 o 38.00' 15.54"
South Wichita River	small	99 o 40.00' 35.70"	33 o 38.00' 26.94"
South Wichita River	medium	99 o 40.00' 16.02"	33 o 38.00' 46.32"
South Wichita River	large	99 o 39.00' 54.66"	33 o 38.00' 28.86"
South Wichita River	large	99 o 39.00' 36.00"	33 o 38.00' 25.86"
South Wichita River	large	99 o 39.00' 22.50"	33 o 38.00' 33.54"
South Wichita River	medium	99 o 39.00' 13.38"	33 o 38.00' 25.32"
South Wichita River	small	99 o 38.00' 56.34"	33 o 38.00' 25.56"
South Wichita River	small	99 o 38.00' 38.34"	33 o 38.00' 46.74"
South Wichita River	large	99 o 38.00' 24.90"	33 o 39.00' 27.54"
South Wichita River	medium	99 o 38.00' 21.90"	33 o 39.00' 34.98"

River	Refugium Size	Longitude	Latitude
South Wichita River	large	99 o 37.00' 59.88"	33 o 39.00' 44.10"
South Wichita River	small	99 o 38.00' 09.00"	33 o 39.00' 46.50"
South Wichita River	large	99 o 37.00' 07.32"	33 o 39.00' 28.56"
South Wichita River	small	99 o 36.00' 55.26"	33 o 40.00' 15.00"
South Wichita River	large	99 o 36.00' 07.80"	33 o 40.00' 50.04"
South Wichita River	medium	99 o 35.00' 52.08"	33 o 40.00' 46.14"
South Wichita River	small	99 o 35.00' 49.08"	33 o 40.00' 45.84"
South Wichita River	small	99 o 35.00' 39.78"	33 o 40.00' 50.28"
South Wichita River	small	99 o 35.00' 04.02"	33 o 41.00' 06.18"
South Wichita River	small	99 o 35.00' 11.22"	33 o 41.00' 43.08"
South Wichita River	medium	99 o 34.00' 49.14"	33 o 41.00' 51.24"
South Wichita River	large	99 o 33.00' 58.50"	33 o 41.00' 29.70"
South Wichita River	small	99 o 33.00' 02.64"	33 o 42.00' 17.58"
South Wichita River	small	99 o 32.00' 56.70"	33 o 42.00' 21.72"
South Wichita River	small	99 o 33.00' 05.34"	33 o 42.00' 33.96"
South Wichita River	medium	99 o 33.00' 05.94"	33 o 42.00' 38.10"
South Wichita River	medium	99 o 32.00' 28.32"	33 o 42.00' 56.64"
South Wichita River	medium	99 o 32.00' 20.22"	33 o 42.00' 55.86"
South Wichita River	medium	99 o 32.00' 16.32"	33 o 42.00' 50.58"
South Wichita River	large	99 o 32.00' 15.72"	33 o 42.00' 44.28"
South Wichita River	large	99 o 32.00' 20.76"	33 o 42.00' 22.92"
South Wichita River	large	99 o 31.00' 46.08"	33 o 42.00' 11.16"
South Wichita River	medium	99 o 32.00' 07.32"	33 o 42.00' 07.20"
South Wichita River	small	99 o 31.00' 59.10"	33 o 42.00' 10.98"
South Wichita River	small	99 o 31.00' 21.36"	33 o 42.00' 26.34"
South Wichita River	large	99 o 31.00' 09.54"	33 o 42.00' 39.42"
South Wichita River	medium	99 o 30.00' 59.46"	33 o 42.00' 24.60"
South Wichita River	medium	99 o 30.00' 54.42"	33 o 42.00' 24.36"
South Wichita River	large	99 o 30.00' 49.80"	33 o 43.00' 10.80"
South Wichita River	medium	100 o 12.00' 29.28"	33 o 37.00' 17.82"
South Wichita River	small	100 o 12.00' 09.84"	33 o 37.00' 24.48"
South Wichita River	small	100 o 12.00' 08.28"	33 o 37.00' 27.42"
South Wichita River	small	100 o 11.00' 59.34"	33 o 37.00' 33.66"
South Wichita River	small	100 o 11.00' 46.14"	33 o 37.00' 41.04"
South Wichita River	small	100 o 11.00' 59.70"	33 o 38.00' 10.68"
South Wichita River	large	100 o 11.00' 25.68"	33 o 38.00' 24.12"

APPENDIX E

STREAM HABITAT MEASUREMENTS IN THE WICHITA RIVER SYSTEM, SPRING, SUMMER, AND FALL 2005

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
07/21/05	8-1	1	Channel	24.6	32.7	0
07/21/05	8-1	2	Channel	22.3	32.7	0
07/21/05	8-1	3	Channel	24.3	30.5	0
07/21/05	8-1	4	Channel	26.8	31.8	0
07/21/05	8-1	5	Channel	24.4	29.9	0
07/21/05	8-1	6	Channel	23.2	27.5	0
07/21/05	8-1	7	Channel	24.1	32.1	0
07/21/05	8-1	8	Channel	23.4	28.9	0
07/21/05	8-1	9	Channel	22.9	31.6	0
07/21/05	8-1	10	Channel	22.9	31.1	0
07/21/05	8-1	11	Channel	21.1	28.5	0
07/21/05	8-2	1	Channel	23.9	26.3	0
07/21/05	8-2	2	Channel	24.3	27.3	0
07/21/05	8-2	3	Channel	24.0	26.1	0
07/21/05	8-2	4	Channel	23.1	26.0	0
07/21/05	8-2	5	Channel	21.7	23.5	0
07/21/05	8-2	6	Channel	20.8	25.9	0
07/21/05	8-2	7	Channel	20.9	29.3	0
07/21/05	8-2	8	Channel	17.9	27.3	0
07/21/05	8-2	9	Channel	26.9	30.4	0
07/21/05	8-2	10	Channel	26.5	30.3	0
07/21/05	8-2	11	Channel	27.6	31.8	0
07/21/05	8-3	1	Channel	16.0	25.3	0
07/21/05	8-3	2	Channel	19.2	26.6	0
07/21/05	8-3	3	Channel	18.9	26.7	0
07/21/05	8-3	4	Channel	19.2	27.6	0
07/21/05	8-3	5	Channel	21.0	26.9	0
07/21/05	8-3	6	Channel	21.9	29.9	0
07/21/05	8-3	7	Channel	19.6	26.3	0
07/21/05	8-3	8	Channel	15.8	24.8	0
07/21/05	8-3	9	Channel	17.4	22.6	0
07/21/05	8-3	10	Channel	17.4	22.6	0
07/21/05	8-3	11	Channel	17.8	25.1	0
07/20/05	8-4	1	Channel	13.9	24.0	0
07/20/05	8-4	2	Channel	18.0	24.2	0
07/20/05	8-4	3	Channel	16.7	23.6	0
07/20/05	8-4	4	Channel	12.4	24.7	0
07/20/05	8-4	5	Channel	12.6	25.2	0
07/20/05	8-4	6	Channel	14.2	24.3	0
07/20/05	8-4	7	Channel	16.7	21.4	0
07/20/05	8-4	8	Channel	16.2	19.5	0
07/20/05	8-4	9	Channel	16.2	20.4	0
07/20/05	8-4	10	Channel	16.2	22.7	0
07/20/05	8-4	11	Channel	15.8	21.8	0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
07/21/05	8-1	1	0	49.2	45.5	17	17	Grazing
07/21/05	8-1	2	0	44.7	61.2		16	Grazing
07/21/05	8-1	3	0	46.5	43.5	17	17	Grazing
07/21/05	8-1	4	0	51.5	50.2	17	17	Grazing
07/21/05	8-1	5	0	64.6	42.0	16	17	Grazing
07/21/05	8-1	6	0	52.5	60.2	16	17	Grazing
07/21/05	8-1	7	0	44.9	44.0	13	17	Grazing
07/21/05	8-1	8	0	60.0	52.7	17	17	Grazing
07/21/05	8-1	9	0	48.7	50.5	17	17	Grazing
07/21/05	8-1	10	0	53.7	52.7	17	17	Grazing
07/21/05	8-1	11	0	53.0	67.1	17	17	Grazing
07/21/05	8-2	1	0	36.9	42.5	16	17	Grazing
07/21/05	8-2	2	0	42.2	54.0	17	16	Grazing
07/21/05	8-2	3	0	48.0	50.2	17	17	Grazing
07/21/05	8-2	4	0	44.0	54.2	16	17	Grazing
07/21/05	8-2	5	0	41.7	54.5	8	17	Grazing
07/21/05	8-2	6	0	44.7	57.1	10	17	Grazing
07/21/05	8-2	7	0	43.5	51.5	14	17	Grazing
07/21/05	8-2	8	0	34.0	46.7	7	16	Grazing
07/21/05	8-2	9	0	41.0	44.4	17	17	Grazing
07/21/05	8-2	10	0	40.7	53.5	12	17	Grazing
07/21/05	8-2	11	0	49.9	52.9	17	17	Grazing
07/21/05	8-3	1	0	54.2	63.5	17	13	Grazing
07/21/05	8-3	2	0	67.2	44.7	14	16	Grazing
07/21/05	8-3	3	0	57.4	41.9	17	13	Grazing
07/21/05	8-3	4	0	40.7	59.7	11	14	Grazing
07/21/05	8-3	5	0	44.0	59.5	13	17	Grazing
07/21/05	8-3	6	0	47.2	54.0	17	16	Grazing
07/21/05	8-3	7	0	54.0	35.0	17	7	Grazing
07/21/05	8-3	8	0	72.6	41.4	16	1	Grazing
07/21/05	8-3	9	0	62.2	43.7	16	5	Grazing
07/21/05	8-3	10	0	25.7	58.2	11	15	Grazing
07/21/05	8-3	11	0	72.3	43.5	12	14	Grazing
07/20/05	8-4	1	0	50.5	49.2	10	1	Grazing
07/20/05	8-4	2	0	87.0	42.2	17	0	Grazing
07/20/05	8-4	3	0	55.9	50.4	16	5	Grazing
07/20/05	8-4	4	0	34.4	85.1	0	14	Grazing
07/20/05	8-4	5	0	40.2	68.9	0	12	Grazing
07/20/05	8-4	6	0	116.6	57.7	12	17	Grazing
07/20/05	8-4	7	0	72.0	60.4	14	15	Grazing
07/20/05	8-4	8	0	45.0	92.3	14	16	Grazing
07/20/05	8-4	9	0	44.5	68.5	16	17	Grazing
07/20/05	8-4	10	0	57.5	64.5	6	13	Grazing
07/20/05	8-4	11	0	61.4	39.7	17	16	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
07/21/05	8-1	1	30.3	35.9	2.6	3.1	80	70
07/21/05	8-1	2	30.1	25.2	3.0	2.7	40	20
07/21/05	8-1	3	41.5	28.8	2.6	3.0	80	70
07/21/05	8-1	4	33.2	39.2	3.2	2.5	60	10
07/21/05	8-1	5	28.8	73.5	2.6	3.3	40	20
07/21/05	8-1	6	27.0	76.8	2.6	3.2	80	5
07/21/05	8-1	7	39.0	57.5	3.5	3.2	90	70
07/21/05	8-1	8	33.2	54.9	2.7	2.9	50	10
07/21/05	8-1	9	34.2	41.4	3.1	2.9	70	5
07/21/05	8-1	10	35.0	51.4	3.2	4.0	50	50
07/21/05	8-1	11	34.0	55.9	3.1	3.3	60	40
07/21/05	8-2	1	41.0	57.4	2.0	1.7	60	50
07/21/05	8-2	2	64.5	57.5	1.8	2.2	70	60
07/21/05	8-2	3	87.0	47.2	2.0	2.1	70	60
07/21/05	8-2	4	82.8	45.9	1.7	2.3	50	70
07/21/05	8-2	5	52.5	45.7	2.2	2.4	90	80
07/21/05	8-2	6	53.0	47.2	2.2	2.3	95	20
07/21/05	8-2	7	72.8	27.5	2.8	2.6	80	60
07/21/05	8-2	8	42.7	38.7	2.7	2.9	100	80
07/21/05	8-2	9	57.7	89.0	2.2	3.9	100	50
07/21/05	8-2	10	38.9	79.4	2.1	2.5	95	90
07/21/05	8-2	11	52.4	53.0	2.5	2.4	95	75
07/21/05	8-3	1	42.5	25.2	2.4	2.5	40	10
07/21/05	8-3	2	45.2	33.2	2.6	3.2	70	40
07/21/05	8-3	3	25.1	66.1	2.5	2.5	60	90
07/21/05	8-3	4	35.7	82.7	2.9	2.7	90	80
07/21/05	8-3	5	33.2	61.7	2.1	2.2	30	5
07/21/05	8-3	6	37.7	37.2	2.9	2.8	5	95
07/21/05	8-3	7	87.0	36.2	2.2	2.2	5	95
07/21/05	8-3	8	57.2	19.2	4.0	2.0	75	95
07/21/05	8-3	9	64.5	34.0	2.1	2.4	75	100
07/21/05	8-3	10	53.5	46.2	2.4	2.5	90	95
07/21/05	8-3	11	48.0	44.2	2.6	2.9	50	90
07/20/05	8-4	1	43.4	25.1	2.7	1.9	5	95
07/20/05	8-4	2	48.7	29.7	2.4	3.3	80	90
07/20/05	8-4	3	21.7	46.7	2.6	3.0	90	95
07/20/05	8-4	4	14.1	48.5	2.5	2.7	100	85
07/20/05	8-4	5	22.2	72.3	2.2	2.8	100	60
07/20/05	8-4	6	26.0	25.8	2.1	2.1	80	90
07/20/05	8-4	7	48.5	31.3	2.6	2.3	60	75
07/20/05	8-4	8	75.0	51.5	2.1	2.2	40	90
07/20/05	8-4	9	71.4	38.2	2.3	2.8	70	95
07/20/05	8-4	10	47.9	34.2	2.6	2.2	90	90
07/20/05	8-4	11	47.2	25.6	2.3	2.1	80	95

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
07/21/05	8-1	1			sand, silt	sand, silt
07/21/05	8-1	2			sand, silt	sand, silt
07/21/05	8-1	3			sand, silt	sand, silt
07/21/05	8-1	4			sand, silt	sand, silt
07/21/05	8-1	5		yes	sand, silt	sand, silt
07/21/05	8-1	6		yes	sand, silt	sand, silt
07/21/05	8-1	7			sand, silt	sand, silt
07/21/05	8-1	8		yes	sand, silt	sand, silt
07/21/05	8-1	9			sand, silt	sand, silt
07/21/05	8-1	10			sand, silt	sand, silt
07/21/05	8-1	11			sand, silt	sand, silt
07/21/05	8-2	1	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	2		yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	3	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	4	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-2	5	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-2	6	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	7	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	8		yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	9		yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	10	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-2	11	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-3	1	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-3	2	yes	yes	sand, silt, clay	sand, silt, clay
07/21/05	8-3	3		yes	sand, silt, clay	sand, silt, clay
07/21/05	8-3	4		yes	sand, silt, clay	sand, silt, clay
07/21/05	8-3	5		yes	sand, silt, clay	sand, silt, clay
07/21/05	8-3	6	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-3	7	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-3	8	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-3	9	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-3	10	yes		sand, silt, clay	sand, silt, clay
07/21/05	8-3	11	yes	yes	sand, silt, clay	sand, silt, clay
07/20/05	8-4	1	yes		sand, silt	sand, silt
07/20/05	8-4	2			sand, silt	sand, silt
07/20/05	8-4	3			sand, silt	sand, silt
07/20/05	8-4	4		yes	sand, silt	sand, silt
07/20/05	8-4	5			sand, silt	sand, silt
07/20/05	8-4	6			sand, silt	sand, silt
07/20/05	8-4	7	yes	yes	sand, silt	sand, silt
07/20/05	8-4	8	yes		sand, silt	sand, silt
07/20/05	8-4	9	yes		sand, silt	sand, silt
07/20/05	8-4	10	yes		sand, silt	sand, silt
07/20/05	8-4	11	yes		sand, silt	sand, silt

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
07/21/05	8-1	1			
07/21/05	8-1	2			
07/21/05	8-1	3			
07/21/05	8-1	4			
07/21/05	8-1	5			
07/21/05	8-1	6			
07/21/05	8-1	7			
07/21/05	8-1	8			
07/21/05	8-1	9			
07/21/05	8-1	10			
07/21/05	8-1	11			
07/21/05	8-2	1			
07/21/05	8-2	2			
07/21/05	8-2	3			
07/21/05	8-2	4			
07/21/05	8-2	5			
07/21/05	8-2	6			
07/21/05	8-2	7			
07/21/05	8-2	8			
07/21/05	8-2	9			
07/21/05	8-2	10			
07/21/05	8-2	11			
07/21/05	8-3	1			
07/21/05	8-3	2			
07/21/05	8-3	3			
07/21/05	8-3	4			
07/21/05	8-3	5			
07/21/05	8-3	6			
07/21/05	8-3	7			
07/21/05	8-3	8			
07/21/05	8-3	9			
07/21/05	8-3	10			
07/21/05	8-3	11			
07/20/05	8-4	1			
07/20/05	8-4	2			
07/20/05	8-4	3			
07/20/05	8-4	4			
07/20/05	8-4	5			
07/20/05	8-4	6			vegetation
07/20/05	8-4	7			
07/20/05	8-4	8			vegetation
07/20/05	8-4	9			
07/20/05	8-4	10			
07/20/05	8-4	11			vegetation

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
07/21/05	8-1	1	36	36	19	0.33	0.35	0.31
07/21/05	8-1	2	33	27	25	0.43	0.38	0.30
07/21/05	8-1	3	28	27	32	0.41	0.38	0.28
07/21/05	8-1	4	18	26	32	0.33	0.35	0.31
07/21/05	8-1	5	22	22	50	0.32	0.32	0.38
07/21/05	8-1	6	31	38	59	0.22	0.23	0.31
07/21/05	8-1	7	51	52	52	0.19	0.37	0.09
07/21/05	8-1	8	45	63	61	0.21	0.31	0.15
07/21/05	8-1	9	38	57	71	0.22	0.24	0.21
07/21/05	8-1	10	62	72	56	0.18	0.22	0.03
07/21/05	8-1	11	72	73	76	0.14	0.19	0.09
07/21/05	8-2	1	85	94	102	0.07	0.06	0.07
07/21/05	8-2	2	81	90	95	0.10	0.10	0.09
07/21/05	8-2	3	96	101	91	0.15	0.08	0.08
07/21/05	8-2	4	107	115	129	0.11	0.06	0.06
07/21/05	8-2	5	126	121	118	0.08	0.07	0.11
07/21/05	8-2	6	110	132	148	0.10	0.07	0.07
07/21/05	8-2	7	96	129	142	0.05	0.11	0.06
07/21/05	8-2	8	95	120	148	0.05	0.10	0.06
07/21/05	8-2	9	41	51	74	0.15	0.13	0.08
07/21/05	8-2	10	49	87	57	0.04	0.06	0.02
07/21/05	8-2	11	50	70	37	0.13	0.07	0.03
07/21/05	8-3	1	49	76	98	0.00	0.27	0.14
07/21/05	8-3	2	62	57	45	0.27	0.22	0.12
07/21/05	8-3	3	24	33	82	0.26	0.19	0.20
07/21/05	8-3	4	27	50	75	0.00	0.29	0.29
07/21/05	8-3	5	26	51	34	0.19	0.21	0.29
07/21/05	8-3	6	39	41	27	0.31	0.38	0.22
07/21/05	8-3	7	92	73	37	0.20	0.13	0.15
07/21/05	8-3	8	100	59	17	0.21	0.17	0.15
07/21/05	8-3	9	88	56	27	0.22	0.27	0.19
07/21/05	8-3	10	106	68	49	0.17	0.19	0.07
07/21/05	8-3	11	81	76	53	0.13	0.19	0.10
07/20/05	8-4	1	30	17	16	0.12	0.17	0.12
07/20/05	8-4	2	22	21	10	0.23	0.21	0.21
07/20/05	8-4	3	19	8	19	0.16	0.05	0.27
07/20/05	8-4	4	16	23	19	0.22	0.26	0.14
07/20/05	8-4	5	20	20	15	0.19	0.16	0.23
07/20/05	8-4	6	7	16	19	0.12	0.23	0.25
07/20/05	8-4	7	37	15	28	0.12	0.26	0.14
07/20/05	8-4	8	43	40	11	0.16	0.05	0.01
07/20/05	8-4	9	30	22	17	0.15	0.10	0.05
07/20/05	8-4	10	20	6	18	0.23	0.00	0.35
07/20/05	8-4	11	24	19	12	0.24	0.27	0.00

Date	Site	Transect	Bed substrate		
			Left	Middle	Right
07/21/05	8-1	1	sand, silt	sand, silt	sand, silt
07/21/05	8-1	2	sand, silt	sand, silt	sand, silt
07/21/05	8-1	3	sand, silt	sand, silt	sand, silt
07/21/05	8-1	4	sand, silt	sand, silt	sand, silt
07/21/05	8-1	5	sand, silt	sand, silt	sand, silt
07/21/05	8-1	6	sand, silt	sand, silt	sand, silt
07/21/05	8-1	7	sand, silt	sand, silt	sand, silt, clay
07/21/05	8-1	8	sand, silt	sand, silt	sand, silt
07/21/05	8-1	9	sand, silt	sand, silt	sand, silt
07/21/05	8-1	10	sand, silt	sand, silt	sand, silt
07/21/05	8-1	11	sand, silt	sand, silt	sand, silt
07/21/05	8-2	1	sand, silt, clay	sand, silt	sand, silt
07/21/05	8-2	2	sand, silt, clay	sand, silt	sand, silt, clay
07/21/05	8-2	3	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/21/05	8-2	4	sand, silt, clay	sand, silt	sand, silt, clay
07/21/05	8-2	5	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/21/05	8-2	6	sand, silt, clay	sand, silt	sand, silt, clay
07/21/05	8-2	7	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/21/05	8-2	8	sand, silt, clay	sand, silt	sand, silt, clay
07/21/05	8-2	9	sand, silt, gravel, boulder	sand, silt, gravel, boulder	sand, silt, gravel, boulder
07/21/05	8-2	10	sand, silt	sand, silt, gravel, cobble	sand, silt, gravel, cobble
07/21/05	8-2	11	sand, silt, gravel	sand, silt, gravel, cobble	sand, silt, gravel, boulder
07/21/05	8-3	1	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/21/05	8-3	2	sand, silt	sand, silt	sand, silt
07/21/05	8-3	3	sand, silt	sand, silt	sand, silt
07/21/05	8-3	4	sand, silt	sand, silt	sand, silt
07/21/05	8-3	5	sand, silt	sand, silt	sand, silt
07/21/05	8-3	6	sand, silt	sand, silt	sand, silt
07/21/05	8-3	7	sand, silt	sand, silt	sand, silt
07/21/05	8-3	8	sand, silt	sand, silt	sand, silt
07/21/05	8-3	9	sand, silt	sand, silt	sand, silt
07/21/05	8-3	10	sand, silt	sand, silt	sand, silt
07/21/05	8-3	11	sand, silt	sand, silt	sand, silt
07/20/05	8-4	1	sand, silt	sand, silt	sand, silt
07/20/05	8-4	2	sand, silt	sand, silt	sand, silt
07/20/05	8-4	3	sand, silt	sand, silt	sand, silt
07/20/05	8-4	4	sand, silt	sand, silt	sand, silt
07/20/05	8-4	5	sand, silt	sand, silt, gravel	sand, silt, gravel
07/20/05	8-4	6	sand, silt	sand, silt	sand, silt, gravel
07/20/05	8-4	7	sand, silt	sand, silt	sand, silt
07/20/05	8-4	8	sand, silt	sand, silt	sand, silt
07/20/05	8-4	9	sand, silt	sand, silt	sand, silt
07/20/05	8-4	10	sand, silt	sand, silt	sand, silt
07/20/05	8-4	11	sand, silt	sand, silt	sand, silt

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
07/21/05	8-1	1			
07/21/05	8-1	2			
07/21/05	8-1	3			
07/21/05	8-1	4			
07/21/05	8-1	5			
07/21/05	8-1	6			
07/21/05	8-1	7			
07/21/05	8-1	8			
07/21/05	8-1	9			
07/21/05	8-1	10			
07/21/05	8-1	11			
07/21/05	8-2	1			
07/21/05	8-2	2			
07/21/05	8-2	3			
07/21/05	8-2	4			
07/21/05	8-2	5			
07/21/05	8-2	6			
07/21/05	8-2	7			
07/21/05	8-2	8			
07/21/05	8-2	9	50	50	50
07/21/05	8-2	10		25	20
07/21/05	8-2	11		10	20
07/21/05	8-3	1			
07/21/05	8-3	2			
07/21/05	8-3	3			
07/21/05	8-3	4			
07/21/05	8-3	5			
07/21/05	8-3	6			
07/21/05	8-3	7			
07/21/05	8-3	8			
07/21/05	8-3	9			
07/21/05	8-3	10			
07/21/05	8-3	11			
07/20/05	8-4	1			
07/20/05	8-4	2			
07/20/05	8-4	3			
07/20/05	8-4	4			
07/20/05	8-4	5			50
07/20/05	8-4	6			
07/20/05	8-4	7			
07/20/05	8-4	8			
07/20/05	8-4	9			
07/20/05	8-4	10			
07/20/05	8-4	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
07/20/05	8-5	1	Channel	8.7	10.3	0
07/20/05	8-5	2	Channel	7.2	10.8	0
07/20/05	8-5	3	Channel	8.1	9.6	0
07/20/05	8-5	4	Channel	7.6	9.9	0
07/20/05	8-5	5	Channel	8.4	11.4	0
07/20/05	8-5	6	Channel	9.9	14.4	0
07/20/05	8-5	7	Channel	8.7	12.6	0
07/20/05	8-5	8	Channel	8.7	13.9	0
07/20/05	8-5	9	Channel	8.1	11.1	0
07/20/05	8-5	10	Channel	7.4	10.2	0
07/20/05	8-5	11	Channel	11.5	16.2	0
07/20/05	9-1	1	Channel	22.8	23.5	0
07/20/05	9-1	2	Channel	20.1	20.5	0
07/20/05	9-1	3	Channel	20.8	23.5	0
07/20/05	9-1	4	Channel	22.8	32.1	0
07/20/05	9-1	5	Channel	23.9	27.6	0
07/20/05	9-1	6	Channel	22.5	25.3	0
07/20/05	9-1	7	Channel	22.8	33.7	0
07/20/05	9-1	8	Channel	20.9	30.0	0
07/20/05	9-1	9	Channel	23.9	27.8	0
07/20/05	9-1	10	Channel	25.8	62.6	0
07/20/05	9-1	11	Channel	26.8	42.5	0
07/20/05	9-2	1	Channel	13.9	41.9	0
07/20/05	9-2	2	Channel	13.0	41.4	0
07/20/05	9-2	3	Channel	13.5	44.9	0
07/20/05	9-2	4	Channel	8.7	33.2	0
07/20/05	9-2	5	Backwater/Channel	20.4	36.5	5.2
07/20/05	9-2	6	Channel	8.4	26.8	0
07/20/05	9-2	7	Channel	13.7	47.0	0
07/20/05	9-2	8	Channel	6.8	43.1	0
07/20/05	9-2	9	Island	9.8	41.5	3.9
07/20/05	9-2	10	Channel	12.4	39.2	0
07/20/05	9-2	11	Channel	18.3	39.4	0
07/19/05	10-1	1	Run	14.0	30.3	0
07/19/05	10-1	2	Riffle	10.6	32.9	0
07/19/05	10-1	3	Riffle	6.6	37.4	0
07/19/05	10-1	4	Channel	8.0	36.2	0
07/19/05	10-1	5	Channel	8.7	37.9	0
07/19/05	10-1	6	Channel	10.8	42.8	0
07/19/05	10-1	7	Channel	12.1	43.4	0
07/19/05	10-1	8	Channel	14.2	44.7	0
07/19/05	10-1	9	Backwater	16.4	44.8	0
07/19/05	10-1	10	Backwater/Run	8.6	47.8	8.9
07/19/05	10-1	11	Run	4.4	48.0	0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
07/20/05	8-5	1	0	10.0	54.7	15	15	Grazing
07/20/05	8-5	2	0	14.8	57.9	17	17	Grazing
07/20/05	8-5	3	0	12.0	80.6	17	17	Grazing
07/20/05	8-5	4	0	10.6	54.4	2	0	Grazing
07/20/05	8-5	5	0	11.1	73.6	17	17	Grazing
07/20/05	8-5	6	0	16.5	45.2	17	5	Grazing
07/20/05	8-5	7	0	12.8	39.2	17	7	Grazing
07/20/05	8-5	8	0	13.3	40.5	8	7	Grazing
07/20/05	8-5	9	0	20.1	43.4	17	17	Grazing
07/20/05	8-5	10	0	34.0	57.7	17	12	Grazing
07/20/05	8-5	11	0	11.0	47.2	5	17	Grazing
07/20/05	9-1	1	0	31.7	17.2	17	16	Grazing
07/20/05	9-1	2	0	29.2	27.6	15	17	Grazing
07/20/05	9-1	3	0	33.7	14.6	16	17	Grazing
07/20/05	9-1	4	0	26.7	22.2	14	17	Grazing
07/20/05	9-1	5	0	21.1	24.0	14	17	Grazing
07/20/05	9-1	6	0	20.7	16.7	8	17	Grazing
07/20/05	9-1	7	0	15.0	23.7	7	6	Grazing
07/20/05	9-1	8	355	18.7	28.3	3	17	Grazing
07/20/05	9-1	9	0	17.2	12.5	7	9	Grazing
07/20/05	9-1	10	0	30.1	9.5	4	17	Grazing
07/20/05	9-1	11	0	24.7	22.0	5	17	Grazing
07/20/05	9-2	1	5	11.3	24.8	0	6	Grazing
07/20/05	9-2	2	0	7.9	18.1	0	12	Grazing
07/20/05	9-2	3	0	10.1	17.3	0	11	Grazing
07/20/05	9-2	4	350	9.3	30.2	0	6	Grazing
07/20/05	9-2	5	340	10.8	21.7	0	4	Grazing
07/20/05	9-2	6	330	14.1	12.6	0	0	Grazing
07/20/05	9-2	7	5	13.8	16.0	0	0	Grazing
07/20/05	9-2	8	325	22.2	10.6	0	0	Grazing
07/20/05	9-2	9	5	26.6	9.3	8	0	Grazing
07/20/05	9-2	10	350	30.1	13.6	15	0	Grazing
07/20/05	9-2	11	35	26.2	14.5	11	0	Grazing
07/19/05	10-1	1	16	17.2	29.6	0	9	Grazing
07/19/05	10-1	2	18	13.5	35.5	0	17	Grazing
07/19/05	10-1	3	9	12.8	49.2	0	2	Grazing
07/19/05	10-1	4	0	12.3	31.6	0	12	Grazing
07/19/05	10-1	5	5	13.1	27.7	0	5	Grazing
07/19/05	10-1	6	0	15.0	22.0	0	1	Grazing
07/19/05	10-1	7	0	14.1	40.7	0	11	Grazing
07/19/05	10-1	8	8	15.1	28.0	0	0	Grazing
07/19/05	10-1	9	60	13.3	28.8	0	12	Grazing
07/19/05	10-1	10	355	12.3	24.7	0	16	Grazing
07/19/05	10-1	11	352	13.1	66.4	0	7	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
07/20/05	8-5	1	18.7	45.2	0.4	0.4	100	80
07/20/05	8-5	2	24.2	36.5	0.6	0.9	100	95
07/20/05	8-5	3	9.7	24.3	0.7	1.0	100	50
07/20/05	8-5	4	5.8	22.2	0.8	1.4	100	100
07/20/05	8-5	5	6.0	25.7	0.7	1.5	100	100
07/20/05	8-5	6	20.7	17.6	0.6	1.4	100	100
07/20/05	8-5	7	25.7	11.5	0.7	0.9	100	100
07/20/05	8-5	8	17.2	11.0	0.6	0.8	90	100
07/20/05	8-5	9	15.1	17.8	0.5	1.0	100	80
07/20/05	8-5	10	7.5	13.6	0.5	1.4	100	90
07/20/05	8-5	11	17.5	19.3	0.4	1.3	100	100
07/20/05	9-1	1	46.4	49.7	0.9	0.6	90	20
07/20/05	9-1	2	82.6	48.5	0.7	0.9	40	90
07/20/05	9-1	3	38.7	26.1	1.5	0.6	20	90
07/20/05	9-1	4	60.5	7.6	1.4	0.7	15	100
07/20/05	9-1	5	39.5	71.0	1.0	1.5	90	70
07/20/05	9-1	6	45.5	42.2	0.9	1.5	90	80
07/20/05	9-1	7	9.3	53.7	1.0	1.5	100	50
07/20/05	9-1	8	44.7	54.9	1.1	1.9	90	90
07/20/05	9-1	9	43.5	50.7	1.2	1.2	80	95
07/20/05	9-1	10	49.2	6.1	1.3	0.9	90	100
07/20/05	9-1	11	30.3	9.0	0.8	0.6	50	90
07/20/05	9-2	1	6.1	54.7	1.4	1.4	5	80
07/20/05	9-2	2	6.0	38.0	1.4	1.8	20	90
07/20/05	9-2	3	6.8	47.5	2.0	2.1	5	80
07/20/05	9-2	4	5.5	43.5	1.4	1.9	5	60
07/20/05	9-2	5	11.1	38.2	1.1	1.2	0	60
07/20/05	9-2	6	7.4	9.0	1.5	1.6	5	0
07/20/05	9-2	7	9.6	7.9	1.9	1.4	5	5
07/20/05	9-2	8	15.3	6.5	2.0	1.9	2	2
07/20/05	9-2	9	47.5	6.4	1.7	1.7	5	5
07/20/05	9-2	10	39.7	8.1	1.6	1.3	50	5
07/20/05	9-2	11	38.7	9.8	1.6	1.3	60	5
07/19/05	10-1	1	9.1	46.7	1.7	1.7	5	20
07/19/05	10-1	2	9.3	56.0	2.1	2.0	5	40
07/19/05	10-1	3	9.3	33.0	1.3	2.3	2	20
07/19/05	10-1	4	9.1	47.7	1.1	1.9	2	10
07/19/05	10-1	5	10.1	40.4	1.2	1.7	2	40
07/19/05	10-1	6	10.0	45.2	1.4	1.9	2	70
07/19/05	10-1	7	18.3	53.9	1.6	1.8	2	60
07/19/05	10-1	8	10.6	46.0	1.8	2.1	5	50
07/19/05	10-1	9	10.6	68.0	1.2	1.5	10	50
07/19/05	10-1	10	12.3	60.5	2.6	1.6	40	80
07/19/05	10-1	11	8.8	64.6	2.2	1.7	40	50

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
07/20/05	8-5	1		yes	sand, silt, clay	sand, silt, clay
07/20/05	8-5	2		yes	sand, silt, clay	sand, silt, clay
07/20/05	8-5	3		yes	sand, silt, clay	sand, silt, clay
07/20/05	8-5	4			sand, silt, clay	sand, silt, clay
07/20/05	8-5	5			sand, silt, clay	sand, silt, clay
07/20/05	8-5	6			sand, silt, clay	sand, silt, clay
07/20/05	8-5	7	yes		sand, silt, clay	sand, silt, clay
07/20/05	8-5	8			sand, silt, clay	sand, silt, clay
07/20/05	8-5	9			sand, silt, clay	sand, silt, clay
07/20/05	8-5	10			sand, silt, clay	sand, silt, clay
07/20/05	8-5	11			sand, silt, clay	sand, silt, clay
07/20/05	9-1	1	yes	yes	sand, silt, clay gravel	sand, silt, clay gravel
07/20/05	9-1	2	yes	yes	sand, silt	sand, silt
07/20/05	9-1	3	yes	yes	sand, silt	sand, silt
07/20/05	9-1	4	yes		sand, silt	sand, silt
07/20/05	9-1	5	yes	yes	sand, silt, gravel	sand, silt, gravel
07/20/05	9-1	6	yes	yes	sand, silt, gravel	sand, silt, gravel
07/20/05	9-1	7		yes	sand, silt	sand, silt
07/20/05	9-1	8	yes	yes	sand, silt	sand, silt
07/20/05	9-1	9	yes	yes	sand, silt	sand, silt
07/20/05	9-1	10	yes	yes	sand, silt	sand, silt
07/20/05	9-1	11	yes	yes	sand, silt, gravel	sand, silt
07/20/05	9-2	1		yes	sand, silt	sand, silt
07/20/05	9-2	2		yes	sand, silt	sand, silt
07/20/05	9-2	3		yes	sand, silt, gravel	sand, silt
07/20/05	9-2	4		yes	sand, silt, gravel	sand, silt
07/20/05	9-2	5		yes	sand, silt	sand, silt
07/20/05	9-2	6		yes	sand, silt, gravel	sand, silt, gravel
07/20/05	9-2	7			sand, silt	sand, silt, gravel
07/20/05	9-2	8	yes		sand, silt	sand, silt, gravel
07/20/05	9-2	9	yes		sand, silt	sand, silt, gravel
07/20/05	9-2	10	yes		sand, silt	sand, silt, gravel
07/20/05	9-2	11	yes		sand, silt	sand, silt
07/19/05	10-1	1		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	2		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	3			sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	4		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	5		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	6		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	7		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	8		yes	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	9		yes	sand, silt, gravel, clay	sand, silt, gravel, clay
07/19/05	10-1	10		yes	sand, silt, gravel, clay	sand, silt, gravel, clay
07/19/05	10-1	11		yes	sand, silt, gravel, clay	sand, silt, gravel, clay

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
07/20/05	8-5	1	vegetation		
07/20/05	8-5	2			vegetation
07/20/05	8-5	3			
07/20/05	8-5	4			
07/20/05	8-5	5			
07/20/05	8-5	6	vegetation		vegetation
07/20/05	8-5	7	vegetation		vegetation
07/20/05	8-5	8	vegetation		
07/20/05	8-5	9	vegetation		
07/20/05	8-5	10			
07/20/05	8-5	11	vegetation		vegetation
07/20/05	9-1	1			
07/20/05	9-1	2	pondweed		
07/20/05	9-1	3			pondweed
07/20/05	9-1	4			
07/20/05	9-1	5			
07/20/05	9-1	6			
07/20/05	9-1	7			
07/20/05	9-1	8			
07/20/05	9-1	9			
07/20/05	9-1	10			
07/20/05	9-1	11	pondweed	pondweed	pondweed
07/20/05	9-2	1			
07/20/05	9-2	2			
07/20/05	9-2	3			
07/20/05	9-2	4			
07/20/05	9-2	5			
07/20/05	9-2	6			
07/20/05	9-2	7			
07/20/05	9-2	8			
07/20/05	9-2	9			
07/20/05	9-2	10			
07/20/05	9-2	11			
07/19/05	10-1	1	pondweed		
07/19/05	10-1	2			
07/19/05	10-1	3			
07/19/05	10-1	4			
07/19/05	10-1	5			
07/19/05	10-1	6			
07/19/05	10-1	7			
07/19/05	10-1	8			
07/19/05	10-1	9			
07/19/05	10-1	10			
07/19/05	10-1	11			

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
07/20/05	8-5	1	60	67	58	0.00	0.07	0.02
07/20/05	8-5	2	62	68	62	0.04	0.09	0.00
07/20/05	8-5	3	61	65	62	0.05	0.06	0.03
07/20/05	8-5	4	63	68	64	0.11	0.06	0.05
07/20/05	8-5	5	63	67	60	0.04	0.04	0.00
07/20/05	8-5	6	64	70	64	0.02	0.04	0.01
07/20/05	8-5	7	55	74	68	0.01	0.04	0.03
07/20/05	8-5	8	74	75	66	0.04	0.06	0.01
07/20/05	8-5	9	74	74	67	0.06	0.01	0.00
07/20/05	8-5	10	72	74	69	0.02	0.02	0.00
07/20/05	8-5	11	71	91	82	0.00	0.03	0.02
07/20/05	9-1	1	85	111	112	0.37	0.43	0.23
07/20/05	9-1	2	74	103	107	0.15	0.31	0.27
07/20/05	9-1	3	135	97	49	0.20	0.29	0.25
07/20/05	9-1	4	169	132	68	0.29	0.19	0.04
07/20/05	9-1	5	72	81	52	0.34	0.29	0.15
07/20/05	9-1	6	62	79	88	0.18	0.17	0.23
07/20/05	9-1	7	40	76	101	0.21	0.22	0.19
07/20/05	9-1	8	90	76	86	0.24	0.26	0.29
07/20/05	9-1	9	92	109	75	0.17	0.34	0.13
07/20/05	9-1	10	128	107	65	0.23	0.25	0.10
07/20/05	9-1	11	112	83	53	0.15	0.14	0.12
07/20/05	9-2	1	8	20	22	0.02	0.03	0.04
07/20/05	9-2	2	8	10	19	0.04	0.06	0.07
07/20/05	9-2	3	6	6	7	0.09	0.12	0.07
07/20/05	9-2	4	8	12	12	0.06	0.13	0.19
07/20/05	9-2	5	5	2	4	0.00	0.03	0.08
07/20/05	9-2	6	6	8	8	0.05	0.28	0.24
07/20/05	9-2	7	5	8	12	0.15	0.15	0.08
07/20/05	9-2	8	8	10	3	0.14	0.27	0.02
07/20/05	9-2	9	5	8	11	0.02	0.22	0.30
07/20/05	9-2	10	5	2	5	0.32	0.07	0.18
07/20/05	9-2	11	6	8	14	0.07	0.20	0.00
07/19/05	10-1	1	6	7	12	0.04	0.16	0.10
07/19/05	10-1	2	5	7	7	0.16	0.25	0.26
07/19/05	10-1	3	3	6	17	0.16	0.08	0.32
07/19/05	10-1	4	13	20	24	0.06	0.10	0.13
07/19/05	10-1	5	36	53	54	0.06	0.00	0.00
07/19/05	10-1	6	18	28	44	0.07	0.06	0.00
07/19/05	10-1	7	31	30	47	0.00	0.04	0.01
07/19/05	10-1	8	26	57	53	0.02	0.00	0.00
07/19/05	10-1	9	19	16	7	0.02	0.00	0.05
07/19/05	10-1	10	4	5	16	0.00	0.00	0.53
07/19/05	10-1	11	9	13	17	0.16	0.28	0.28

Date	Site	Transect	Bed substrate		
			Left	Middle	Right
07/20/05	8-5	1	silt, clay	silt, clay	silt, clay
07/20/05	8-5	2	silt, clay	silt, clay	silt, clay
07/20/05	8-5	3	silt, clay	silt, clay	silt, clay
07/20/05	8-5	4	silt, clay	silt, clay	silt, clay
07/20/05	8-5	5	silt, clay	silt, clay	silt, clay
07/20/05	8-5	6	silt, clay	silt, clay	silt, clay
07/20/05	8-5	7	silt, clay	silt, clay	silt, clay
07/20/05	8-5	8	silt, clay	silt, clay	silt, clay
07/20/05	8-5	9	silt, clay	silt, clay	silt, clay
07/20/05	8-5	10	silt, clay	silt, clay	silt, clay
07/20/05	8-5	11	silt, clay	silt, clay	silt, clay
07/20/05	9-1	1	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/20/05	9-1	2	sand, silt, gravel	sand, silt, gravel, cobble	sand, silt, gravel, cobble
07/20/05	9-1	3	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/20/05	9-1	4	sand, silt	sand, silt	sand, silt
07/20/05	9-1	5	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/20/05	9-1	6	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel, cobble
07/20/05	9-1	7	sand, silt, gravel,cobble	sand, silt, gravel,cobble	sand, silt, gravel,cobble
07/20/05	9-1	8	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/20/05	9-1	9	sand, silt	sand, silt	sand, silt
07/20/05	9-1	10	sand, silt, gravel	sand, silt	sand, silt, gravel
07/20/05	9-1	11	sand, silt, gravel	sand, silt	sand, silt
07/20/05	9-2	1	sand, silt	sand, silt	sand, silt
07/20/05	9-2	2	sand, silt	sand, silt	sand, silt
07/20/05	9-2	3	sand, silt	sand, silt	sand, silt
07/20/05	9-2	4	sand, silt	sand, silt, gravel	sand, silt, gravel
07/20/05	9-2	5	sand, silt	sand, silt	sand, silt, gravel
07/20/05	9-2	6	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/20/05	9-2	7	sand, silt	sand, silt, gravel	sand, silt
07/20/05	9-2	8	sand, silt	sand, silt, gravel	sand, silt, gravel
07/20/05	9-2	9	sand, silt	sand, silt	sand, silt
07/20/05	9-2	10	sand, silt	sand, silt	sand, silt, gravel
07/20/05	9-2	11	sand, silt	sand	sand, silt
07/19/05	10-1	1	sand, silt, gravel	sand, silt	sand, silt
07/19/05	10-1	2	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	3	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/19/05	10-1	4	sand, silt	sand, silt	sand, silt
07/19/05	10-1	5	sand, silt	sand, silt	sand, silt
07/19/05	10-1	6	sand, silt	sand, silt	sand, silt
07/19/05	10-1	7	sand	sand	sand
07/19/05	10-1	8	sand, silt	sand, silt, gravel, clay	sand, silt, gravel, clay
07/19/05	10-1	9	sand, silt, gravel, clay	sand, silt, gravel, clay	sand, silt, gravel, clay
07/19/05	10-1	10	sand, silt, gravel, clay	sand, silt, gravel, clay	sand, silt, gravel, clay
07/19/05	10-1	11	sand, silt, gravel, clay	sand, silt, gravel, clay	sand, silt, gravel, clay

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
07/20/05	8-5	1			
07/20/05	8-5	2			
07/20/05	8-5	3			
07/20/05	8-5	4			
07/20/05	8-5	5			
07/20/05	8-5	6			
07/20/05	8-5	7			
07/20/05	8-5	8			
07/20/05	8-5	9			
07/20/05	8-5	10			
07/20/05	8-5	11			
07/20/05	9-1	1			
07/20/05	9-1	2			
07/20/05	9-1	3			10
07/20/05	9-1	4			
07/20/05	9-1	5			
07/20/05	9-1	6		20	15
07/20/05	9-1	7	10	10	5
07/20/05	9-1	8			
07/20/05	9-1	9			
07/20/05	9-1	10			
07/20/05	9-1	11			
07/20/05	9-2	1			
07/20/05	9-2	2			
07/20/05	9-2	3			
07/20/05	9-2	4			
07/20/05	9-2	5			
07/20/05	9-2	6			
07/20/05	9-2	7			
07/20/05	9-2	8			
07/20/05	9-2	9			
07/20/05	9-2	10			
07/20/05	9-2	11			
07/19/05	10-1	1			
07/19/05	10-1	2			
07/19/05	10-1	3			
07/19/05	10-1	4			
07/19/05	10-1	5			
07/19/05	10-1	6			
07/19/05	10-1	7			
07/19/05	10-1	8			
07/19/05	10-1	9			
07/19/05	10-1	10			
07/19/05	10-1	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
07/13/05	10-2	1	Channel	10.5	13.5	0
07/13/05	10-2	2	Channel	9.2	10.9	0
07/13/05	10-2	3	Channel	8.1	9.8	0
07/13/05	10-2	4	Channel	9.6	12.1	0
07/13/05	10-2	5	Channel	8.5	10.1	0
07/13/05	10-2	6	Channel	10.1	12.3	0
07/13/05	10-2	7	Channel	8.1	8.7	0
07/13/05	10-2	8	Channel	9.9	11.7	0
07/13/05	10-2	9	Channel	11.2	12.4	0
07/13/05	10-2	10	Channel	10.6	12.7	0
07/13/05	10-2	11	Channel	12.8	12.8	0
07/13/05	10-3	1	Channel	21.7	25.0	0
07/13/05	10-3	2	Channel	23.5	27.4	0
07/13/05	10-3	3	Channel	22.3	31.0	0
07/13/05	10-3	4	Channel	22.1	26.6	0
07/13/05	10-3	5	Channel	22.6	27.7	0
07/13/05	10-3	6	Channel	21.7	29.6	0
07/13/05	10-3	7	Channel	18.5	21.7	0
07/13/05	10-3	8	Channel	20.5	21.9	0
07/13/05	10-3	9	Channel	17.4	24.1	0
07/13/05	10-3	10	Braided	9.3	38.8	14.7
07/13/05	10-3	11	Braided	16.0	34.9	14.3
07/19/05	10-4	1	Channel	12.6	16.2	0
07/19/05	10-4	2	Channel	13.5	19.2	0
07/19/05	10-4	3	Channel	7.3	22.1	0
07/19/05	10-4	4	Channel	9.4	14.6	0
07/19/05	10-4	5	Channel	7.5	15.1	0
07/19/05	10-4	6	Channel	6.4	20.5	0
07/19/05	10-4	7	Channel	7.6	17.8	0
07/19/05	10-4	8	Run	8.7	20.5	0
07/19/05	10-4	9	Run	6.9	19.5	0
07/19/05	10-4	10	Pool	12.1	15.3	0
07/19/05	10-4	11	Pool	11.9	12.6	0
07/13/05	10-5	1	Channel	22.6	34.1	0
07/13/05	10-5	2	Channel	20.3	27.1	0
07/13/05	10-5	3	Channel	22.3	30.3	0
07/13/05	10-5	4	Channel	24.8	29.1	0
07/13/05	10-5	5	Channel	25.5	31.6	0
07/13/05	10-5	6	Channel	19.4	23.9	0
07/13/05	10-5	7	Channel	16.9	22.6	0
07/13/05	10-5	8	Riffle	6.1	16.7	0
07/13/05	10-5	9	Channel	15.5	17.4	0
07/13/05	10-5	10	Channel	14.6	16.4	0
07/13/05	10-5	11	Channel	15.5	19.8	0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
07/13/05	10-2	1	0	41.2	27.2	4	8	Grazing
07/13/05	10-2	2	0	42.9	31.6	13	15	Grazing
07/13/05	10-2	3	0	35.9	34.0	15	7	Grazing
07/13/05	10-2	4	0	37.2	34.2	13	1	Grazing
07/13/05	10-2	5	0	37.7	33.2	17	14	Grazing
07/13/05	10-2	6	0	34.7	41.9	1	16	Grazing
07/13/05	10-2	7	0	34.2	33.0	12	17	Grazing
07/13/05	10-2	8	0	40.0	42.4	10	11	Grazing
07/13/05	10-2	9	0	36.2	29.2	11	17	Grazing
07/13/05	10-2	10	0	37.2	60.5	8	17	Grazing
07/13/05	10-2	11	0	39.7	40.0	14	14	Grazing
07/13/05	10-3	1	0	20.0	17.2	12	1	Grazing
07/13/05	10-3	2	0	19.7	22.2	4	3	Grazing
07/13/05	10-3	3	0	20.2	21.7	1	0	Grazing
07/13/05	10-3	4	0	16.0	19.8	11	0	Grazing
07/13/05	10-3	5	0	20.2	19.7	1	3	Grazing
07/13/05	10-3	6	0	21.5	22.1	0	0	Grazing
07/13/05	10-3	7	0	28.8	19.7	4	0	Grazing
07/13/05	10-3	8	0	20.7	23.6	7	7	Grazing
07/13/05	10-3	9	0	13.3	19.2	0	3	Grazing
07/13/05	10-3	10		15.6	18.2	2	0	Grazing
07/13/05	10-3	11		21.2	11.6	1	0	Grazing
07/19/05	10-4	1	0	34.7	27.2	5	3	Grazing
07/19/05	10-4	2	0	28.2	51.7	4	11	Grazing
07/19/05	10-4	3	0	22.2	48.5	0	5	Grazing
07/19/05	10-4	4	0	56.5	27.5	14	14	Grazing
07/19/05	10-4	5	0	49.2	16.7	0	0	Grazing
07/19/05	10-4	6	0	59.7	36.9	3	0	Grazing
07/19/05	10-4	7	0	41.2	24.8	0	0	Grazing
07/19/05	10-4	8	0	27.2	24.2	13	0	Grazing
07/19/05	10-4	9	0	42.2	23.6	0	0	Grazing
07/19/05	10-4	10	0	27.2	49.7	0	16	Grazing
07/19/05	10-4	11	0	28.5	50.0	16	15	Grazing
07/13/05	10-5	1	0	17.2	13.1	12	0	Grazing
07/13/05	10-5	2	0	16.1	13.1	16	0	Grazing
07/13/05	10-5	3	0	17.2	13.3	15	0	Grazing
07/13/05	10-5	4	0	18.1	18.2	10	0	Grazing
07/13/05	10-5	5	0	18.2	17.2	1	10	Grazing
07/13/05	10-5	6	0	19.7	18.0	1	3	Grazing
07/13/05	10-5	7	0	13.3	13.1	11	1	Grazing
07/13/05	10-5	8	10	8.6	38.0	0	2	Grazing
07/13/05	10-5	9	0	10.3	25.2	1	9	Grazing
07/13/05	10-5	10	0	22.2	26.2	11	13	Grazing
07/13/05	10-5	11	0	26.2	29.1	0	15	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
07/13/05	10-2	1	26.0	53.7	1.3	1.5	90	95
07/13/05	10-2	2	56.3	51.5	1.4	1.2	100	100
07/13/05	10-2	3	90.0	50.4	1.2	1.2	90	90
07/13/05	10-2	4	70.4	49.2	1.2	1.4	70	80
07/13/05	10-2	5	68.9	61.4	1.4	1.2	80	90
07/13/05	10-2	6	70.4	90.0	1.6	1.8	85	100
07/13/05	10-2	7	59.2	90.0	1.3	1.2	95	100
07/13/05	10-2	8	53.0	40.5	1.3	1.5	95	40
07/13/05	10-2	9	52.4	85.0	1.3	1.2	90	100
07/13/05	10-2	10	71.8	50.2	1.3	1.2	95	40
07/13/05	10-2	11	33.2	68.5	1.2	1.0	30	80
07/13/05	10-3	1	38.5	31.8	1.3	1.1	100	95
07/13/05	10-3	2	41.4	42.4	1.5	1.6	100	90
07/13/05	10-3	3	22.5	17.7	1.6	1.7	90	100
07/13/05	10-3	4	24.3	32.9	1.5	1.3	90	100
07/13/05	10-3	5	25.9	28.4	1.5	1.6	90	100
07/13/05	10-3	6	14.4	13.8	1.5	2.1	90	80
07/13/05	10-3	7	90.0	15.4	1.3	1.6	90	90
07/13/05	10-3	8	63.4	35.5	1.4	1.5	90	90
07/13/05	10-3	9	16.2	52.4	1.0	2.3	85	90
07/13/05	10-3	10	90.0	24.3	1.6	1.3	0	5
07/13/05	10-3	11	80.0	56.3	3.7	2.1	5	80
07/19/05	10-4	1	61.7	24.0	2.8	1.7	60	90
07/19/05	10-4	2	27.8	28.7	2.7	3.5	40	100
07/19/05	10-4	3	13.6	27.2	2.1	1.2	20	85
07/19/05	10-4	4	105.0	14.3	2.0	1.3	0	90
07/19/05	10-4	5	45.2	24.3	1.5	1.5	5	10
07/19/05	10-4	6	24.3	21.3	1.2	1.5	60	50
07/19/05	10-4	7	25.0	19.0	1.5	2.0	60	40
07/19/05	10-4	8	29.7	17.0	1.3	2.1	20	80
07/19/05	10-4	9	21.2	15.8	1.8	1.3	45	55
07/19/05	10-4	10	28.7	107.0	1.9	2.5	80	10
07/19/05	10-4	11	32.4	128.0	1.1	2.6	85	5
07/13/05	10-5	1	11.5	14.1	1.8	1.6	90	97
07/13/05	10-5	2	34.9	12.6	1.1	1.8	90	97
07/13/05	10-5	3	23.7	8.3	1.0	1.3	100	50
07/13/05	10-5	4	25.2	16.3	1.5	1.9	100	80
07/13/05	10-5	5	13.1	16.8	1.2	1.8	70	70
07/13/05	10-5	6	44.4	33.2	1.2	1.9	90	70
07/13/05	10-5	7	41.1	16.5	1.5	0.7	95	60
07/13/05	10-5	8	9.0	37.0	0.6	1.7	95	70
07/13/05	10-5	9	32.7	53.2	1.1	1.2	70	70
07/13/05	10-5	10	47.5	45.0	1.7	1.0	70	60
07/13/05	10-5	11	30.3	41.5	2.2	1.1	50	40

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
07/13/05	10-2	1		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	2		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	3		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	4		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	5			sand, silt, clay	sand, silt, clay
07/13/05	10-2	6	yes	yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	7		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	8		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	9	yes	yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	10		yes	sand, silt, clay	sand, silt, clay
07/13/05	10-2	11	yes	yes	sand, silt, clay	sand, silt, clay
07/13/05	10-3	1	yes		sand, silt	sand, silt
07/13/05	10-3	2			sand, silt	sand, silt
07/13/05	10-3	3			sand, silt	sand, silt
07/13/05	10-3	4			sand, silt	sand, silt
07/13/05	10-3	5			sand, silt	sand, silt
07/13/05	10-3	6			sand, silt	sand, silt
07/13/05	10-3	7	yes	yes	sand, silt	sand, silt
07/13/05	10-3	8	yes		sand, silt	sand, silt
07/13/05	10-3	9			sand, silt	sand, silt
07/13/05	10-3	10	yes	yes	sand, gravel	sand, gravel
07/13/05	10-3	11	yes			
07/19/05	10-4	1	yes		sand, rock	sand, silt
07/19/05	10-4	2	yes		sand, rock	sand, silt
07/19/05	10-4	3	yes		sand, rock	sand, silt
07/19/05	10-4	4	yes		sand, boulder	sand, silt
07/19/05	10-4	5	yes		sand, rock	sand, silt
07/19/05	10-4	6	yes		sand, rock	sand, silt
07/19/05	10-4	7		yes	sand, silt	sand, silt
07/19/05	10-4	8		yes	sand, silt	sand, silt
07/19/05	10-4	9			sand, silt	sand, silt
07/19/05	10-4	10		yes	sand, silt	sand, bouler
07/19/05	10-4	11		yes	sand, silt	sand, bouler
07/13/05	10-5	1			sand, silt	sand, silt
07/13/05	10-5	2	yes		sand, silt	sand, silt
07/13/05	10-5	3			sand, silt	sand, silt
07/13/05	10-5	4			sand, silt	sand, silt
07/13/05	10-5	5			sand, silt	sand, silt
07/13/05	10-5	6			sand, silt	sand, silt
07/13/05	10-5	7			sand, gravel	sand, silt
07/13/05	10-5	8		yes	sand, silt	sand, gravel
07/13/05	10-5	9			sand, silt, gravel	sand, silt, gravel
07/13/05	10-5	10		yes	sand, silt, gravel	sand, silt, gravel
07/13/05	10-5	11		yes	sand, silt, gravel	sand, silt, gravel

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
07/13/05	10-2	1			
07/13/05	10-2	2			
07/13/05	10-2	3			
07/13/05	10-2	4			
07/13/05	10-2	5			
07/13/05	10-2	6			
07/13/05	10-2	7			
07/13/05	10-2	8			
07/13/05	10-2	9			
07/13/05	10-2	10			
07/13/05	10-2	11			
07/13/05	10-3	1	pondweed	pondweed	
07/13/05	10-3	2	pondweed	pondweed	pondweed
07/13/05	10-3	3	pondweed	pondweed	pondweed
07/13/05	10-3	4		pondweed	pondweed
07/13/05	10-3	5	pondweed	pondweed	pondweed
07/13/05	10-3	6	pondweed	pondweed	pondweed
07/13/05	10-3	7	pondweed	pondweed	pondweed
07/13/05	10-3	8	pondweed	pondweed	pondweed
07/13/05	10-3	9	pondweed	pondweed	pondweed
07/13/05	10-3	10			pondweed
07/13/05	10-3	11			
07/19/05	10-4	1			
07/19/05	10-4	2			
07/19/05	10-4	3			
07/19/05	10-4	4			
07/19/05	10-4	5	widgeon grass	widgeon grass	widgeon grass
07/19/05	10-4	6	widgeon grass	widgeon grass	widgeon grass
07/19/05	10-4	7	widgeon grass	widgeon grass	widgeon grass
07/19/05	10-4	8	widgeon grass	widgeon grass	widgeon grass
07/19/05	10-4	9	pondweed	widgeon grass	widgeon grass
07/19/05	10-4	10			
07/19/05	10-4	11			
07/13/05	10-5	1			
07/13/05	10-5	2			
07/13/05	10-5	3	widgeon grass		
07/13/05	10-5	4	widgeon grass		
07/13/05	10-5	5	widgeon grass	widgeon grass	widgeon grass
07/13/05	10-5	6			
07/13/05	10-5	7			
07/13/05	10-5	8	*Chara*	*Chara*	*Chara* , widgeon grass
07/13/05	10-5	9			
07/13/05	10-5	10			
07/13/05	10-5	11			

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
07/13/05	10-2	1	10	5	13	0.35	0.18	0.20
07/13/05	10-2	2	5	19	8	0.17	0.26	0.17
07/13/05	10-2	3	21	10	12	0.04	0.29	0.17
07/13/05	10-2	4	7	14	32	0.16	0.23	0.10
07/13/05	10-2	5	30	16	16	0.09	0.23	0.17
07/13/05	10-2	6	22	13	28	0.11	0.13	0.08
07/13/05	10-2	7	73	78	33	0.00	0.09	0.00
07/13/05	10-2	8	46	47	41	0.05	0.04	0.01
07/13/05	10-2	9	20	19	22	0.04	0.10	0.08
07/13/05	10-2	10	28	27	21	0.11	0.10	0.09
07/13/05	10-2	11	18	19	31	0.07	0.08	0.12
07/13/05	10-3	1	39	46	102	0.00	0.00	0.00
07/13/05	10-3	2	27	24	54	0.00	0.00	0.00
07/13/05	10-3	3	24	18	12	0.15	0.02	0.01
07/13/05	10-3	4	51	30	21	0.04	0.00	0.00
07/13/05	10-3	5	52	30	20	0.03	0.01	0.00
07/13/05	10-3	6	46	46	21	0.03	0.01	0.00
07/13/05	10-3	7	60	58	41	0.00	0.01	0.00
07/13/05	10-3	8	53	40	28	0.00	0.00	0.00
07/13/05	10-3	9	51	48	57	0.00	0.00	0.00
07/13/05	10-3	10	38		8	0.09		0.03
07/13/05	10-3	11	21		55	0.10		0.01
07/19/05	10-4	1	96	97	64	0.00	0.02	0.01
07/19/05	10-4	2	52	86	74	0.00	0.04	0.00
07/19/05	10-4	3	51	65	61	0.00	0.00	0.03
07/19/05	10-4	4	36	46	60	0.00	0.01	0.06
07/19/05	10-4	5	32	39	33	0.00	0.00	0.00
07/19/05	10-4	6	21	31	29	0.04	0.03	0.03
07/19/05	10-4	7	20	30	24	0.06	0.08	0.02
07/19/05	10-4	8	16	26	34	0.23	0.24	0.18
07/19/05	10-4	9	19	16	17	0.13	0.21	0.14
07/19/05	10-4	10	30	41	53	0.00	0.00	0.05
07/19/05	10-4	11	32	41	50	0.02	0.02	0.02
07/13/05	10-5	1	48	26	27	0.00	0.00	0.00
07/13/05	10-5	2	38	31	33	0.00	0.00	0.02
07/13/05	10-5	3	45	32	24	0.00	0.06	0.00
07/13/05	10-5	4	23	35	25	0.00	0.04	0.01
07/13/05	10-5	5	18	21	21	0.01	0.07	0.17
07/13/05	10-5	6	56	48	41	0.00	0.00	0.11
07/13/05	10-5	7	65	26	27	0.02	0.06	0.00
07/13/05	10-5	8	13	14	8	0.38	0.23	0.36
07/13/05	10-5	9	41	54	54	0.00	0.01	0.00
07/13/05	10-5	10	74	80	80	0.02	0.02	0.01
07/13/05	10-5	11	31	28	70	0.01	0.01	0.00

Date	Site	Transect	Bed substrate		
			Left	Middle	Right
07/13/05	10-2	1	sand, silt, gravel, clay	sand, silt, gravel, clay	sand, silt, gravel, clay
07/13/05	10-2	2	sand, silt	sand, silt	sand, silt
07/13/05	10-2	3	sand, silt	sand, silt	sand, silt, gravel
07/13/05	10-2	4	sand, silt	sand, silt	sand, silt
07/13/05	10-2	5	sand, silt	sand, silt	sand, silt
07/13/05	10-2	6	sand, silt	sand, silt	sand, silt
07/13/05	10-2	7	sand, silt	sand, silt	sand, silt
07/13/05	10-2	8	sand, silt	sand, silt	sand, silt
07/13/05	10-2	9	sand, silt	sand, silt	sand, silt
07/13/05	10-2	10	sand, silt	sand, silt	sand, silt
07/13/05	10-2	11	sand, silt	sand, silt	sand, silt
07/13/05	10-3	1	sand, silt	sand, silt	silt, bedrock
07/13/05	10-3	2	sand, silt	sand, silt	sand, silt
07/13/05	10-3	3	bedrock	bedrock	bedrock
07/13/05	10-3	4	bedrock	sand, bedrock	sand, bedrock
07/13/05	10-3	5	bedrock	silt, bedrock	sand, silt
07/13/05	10-3	6	sand, bedrock	sand, bedrock	sand, silt
07/13/05	10-3	7	sand, bedrock	bedrock	sand, bedrock
07/13/05	10-3	8	bedrock	sand, silt	sand, silt
07/13/05	10-3	9	bedrock	sand, bedrock	bedrock
07/13/05	10-3	10	bedrock	gravel	sand, silt, bedrock
07/13/05	10-3	11	bedrock	gravel	bedrock
07/19/05	10-4	1	silt, clay	silt, clay	silt, clay
07/19/05	10-4	2	silt, clay	silt, clay	silt, clay
07/19/05	10-4	3	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	4	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	5	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	6	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	7	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	8	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	9	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	10	sand, silt, clay	sand, silt, clay	sand, silt, clay
07/19/05	10-4	11	sand, silt, clay	silt, clay	bedrock
07/13/05	10-5	1	sand, silt, gravel	sand, silt	sand, silt, gravel
07/13/05	10-5	2	sand, silt	sand, silt	sand, silt
07/13/05	10-5	3	sand, silt	sand, silt	sand, silt
07/13/05	10-5	4	sand, silt	sand, silt	sand, silt
07/13/05	10-5	5	sand, silt	sand, silt	sand, silt
07/13/05	10-5	6	bedrock	silt, bedrock	bedrock
07/13/05	10-5	7	bedrock	silt, gravel	silt, gravel
07/13/05	10-5	8	silt, gravel	silt, gravel	silt, gravel
07/13/05	10-5	9	bedrock	bedrock	bedrock
07/13/05	10-5	10	bedrock	bedrock	bedrock
07/13/05	10-5	11	bedrock, gravel	bedrock, gravel	silt, gravel

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
07/13/05	10-2	1			
07/13/05	10-2	2			
07/13/05	10-2	3			
07/13/05	10-2	4			
07/13/05	10-2	5			
07/13/05	10-2	6			
07/13/05	10-2	7			
07/13/05	10-2	8			
07/13/05	10-2	9			
07/13/05	10-2	10			
07/13/05	10-2	11			
07/13/05	10-3	1			100
07/13/05	10-3	2			
07/13/05	10-3	3	100	100	100
07/13/05	10-3	4	100	100	100
07/13/05	10-3	5	100	100	
07/13/05	10-3	6	100	100	
07/13/05	10-3	7	100	100	100
07/13/05	10-3	8	100		
07/13/05	10-3	9	100	100	100
07/13/05	10-3	10	100		25
07/13/05	10-3	11	100		100
07/19/05	10-4	1			
07/19/05	10-4	2			
07/19/05	10-4	3			
07/19/05	10-4	4			
07/19/05	10-4	5			
07/19/05	10-4	6			
07/19/05	10-4	7			
07/19/05	10-4	8			
07/19/05	10-4	9			
07/19/05	10-4	10			
07/19/05	10-4	11			100
07/13/05	10-5	1			
07/13/05	10-5	2			
07/13/05	10-5	3			
07/13/05	10-5	4			
07/13/05	10-5	5			
07/13/05	10-5	6	100	100	100
07/13/05	10-5	7	100	25	25
07/13/05	10-5	8	25	25	25
07/13/05	10-5	9	100	100	100
07/13/05	10-5	10	100	100	100
07/13/05	10-5	11	100	100	100

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
07/19/05	11-1	1	Channel	6.2	27.3	0
07/19/05	11-1	2	Braid	3.2	17.3	3.9
07/19/05	11-1	3	Channel	2.6	26.7	0
07/19/05	11-1	4	Channel	9.0	17.8	0
07/19/05	11-1	5	Channel	6.9	20.5	0
07/19/05	11-1	6	Channel	9.0	18.0	0
07/19/05	11-1	7	Channel	8.5	16.0	0
07/19/05	11-1	8	Backwater	11.8	16.1	4.9
07/19/05	11-1	9	Channel	7.3	16.0	0
07/19/05	11-1	10	Channel	9.2	20.5	0
07/19/05	11-1	11	Braid	6.2	17.2	5.3
07/19/05	11-2	1	Channel	6.9	7.6	0
07/19/05	11-2	2	Channel	6.9	9.8	0
07/19/05	11-2	3	Channel	6.4	8.1	0
07/19/05	11-2	4	Channel	6.5	9.5	0
07/19/05	11-2	5	Channel	6.7	9.4	0
07/19/05	11-2	6	Channel	6.8	11.0	0
07/19/05	11-2	7	Channel	6.7	8.3	0
07/19/05	11-2	8	Channel	6.7	8.1	0
07/19/05	11-2	9	Channel	6.7	10.5	0
07/19/05	11-2	10	Channel	7.1	10.5	0
07/19/05	11-2	11	Channel	7.3	9.1	0
07/14/05	11-3	1	Channel	20.8	23.2	5.6
07/14/05	11-3	2	Channel	13.0	24.6	10.7
07/14/05	11-3	3	Channel	20.1	22.7	3.5
07/14/05	11-3	4	Channel	16.6	24.3	7
07/14/05	11-3	5	Channel	17.4	26.3	3.2
07/14/05	11-3	6	Channel	11.9	26.2	8
07/14/05	11-3	7	Channel	14.9	20.5	0
07/14/05	11-3	8	Channel	18.3	22.6	0
07/14/05	11-3	9	Channel	19.4	25.0	0
07/14/05	11-3	10	Channel	18.7	22.0	0
07/14/05	11-3	11	Channel	18.3	21.1	0
07/11/05	11-4	1	Channel	2.6	16.6	0
07/11/05	11-4	2	Channel	2.0	14.0	0
07/11/05	11-4	3	Riffle	2.0	14.4	0
07/11/05	11-4	4	Side Channel	6.0	15.5	2.5
07/11/05	11-4	5	Channel	2.6	9.6	0
07/11/05	11-4	6	Channel	2.9	11.6	0
07/11/05	11-4	7	Channel	3.4	10.0	0
07/11/05	11-4	8	Channel	3.4	11.1	0
07/11/05	11-4	9	Channel	3.6	13.2	0
07/11/05	11-4	10	Channel	5.6	13.8	0
07/11/05	11-4	11	Channel	3.8	13.9	0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
07/19/05	11-1	1	0	14.3	28.5	0	0	Grazing
07/19/05	11-1	2	310	21.2	14.1	0	0	Grazing
07/19/05	11-1	3	20	52.0	15.5	1	0	Grazing
07/19/05	11-1	4	0	36.0	24.8	5	0	Grazing
07/19/05	11-1	5	0	16.2	21.7	0	3	Grazing
07/19/05	11-1	6	0	15.3	24.7	0	5	Grazing
07/19/05	11-1	7	0	16.7	26.2	0	9	Grazing
07/19/05	11-1	8	340	16.8	19.2	17	5	Grazing
07/19/05	11-1	9	10	17.5	24.8	17	0	Grazing
07/19/05	11-1	10	0	24.3	31.1	0	0	Grazing
07/19/05	11-1	11	0	20.2	26.7	0	8	Grazing
07/19/05	11-2	1	0	38.9	49.7	10	13	Grazing
07/19/05	11-2	2	0	36.2	26.2	1	0	Grazing
07/19/05	11-2	3	0	21.6	39.0	16	17	Grazing
07/19/05	11-2	4	0	39.2	38.5	0	14	Grazing
07/19/05	11-2	5	0	42.5	25.2	3	0	Grazing
07/19/05	11-2	6	0	23.7	33.7	14	0	Grazing
07/19/05	11-2	7	0	32.9	18.2	12	6	Grazing
07/19/05	11-2	8	0	32.5	18.0	14	9	Grazing
07/19/05	11-2	9	0	41.4	16.8	15	8	Grazing
07/19/05	11-2	10	0	35.5	27.0	11	0	Grazing
07/19/05	11-2	11	0	17.2	16.1	15	16	Grazing
07/14/05	11-3	1	0	16.3	19.2	0	11	Grazing
07/14/05	11-3	2	0	23.7	17.6	0	2	Grazing
07/14/05	11-3	3	0	17.1	9.6	4	11	Grazing
07/14/05	11-3	4	0	21.8	9.3	3	13	Grazing
07/14/05	11-3	5	0	25.2	8.6	0	0	Grazing
07/14/05	11-3	6	0	24.2	11.8	0	0	Grazing
07/14/05	11-3	7	0	20.0	11.6	0	0	Grazing
07/14/05	11-3	8	0	24.3	27.3	0	16	Grazing
07/14/05	11-3	9	0	13.6	20.2	14	15	Grazing
07/14/05	11-3	10	0	24.6	12.1	12	16	Grazing
07/14/05	11-3	11	0	22.1	13.2	13	4	Grazing
07/11/05	11-4	1	0	28.2	40.5	0	1	Grazing
07/11/05	11-4	2	0	22.6	27.5	0	0	Grazing
07/11/05	11-4	3	340	81.5	24.5	13	0	Grazing
07/11/05	11-4	4	30	46.2	24.7	5	0	Grazing
07/11/05	11-4	5	0	27.3	36.7	2	0	Grazing
07/11/05	11-4	6	0	13.1	38.0	0	0	Grazing
07/11/05	11-4	7	0	24.6	38.2	4	0	Grazing
07/11/05	11-4	8	0	14.8	43.0	0	0	Grazing
07/11/05	11-4	9	0	15.3	34.2	0	1	Grazing
07/11/05	11-4	10	0	27.6	45.0	0	9	Grazing
07/11/05	11-4	11	0	14.5	29.5	0	0	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
07/19/05	11-1	1	11.3	20.1	1.9	1.2	5	0
07/19/05	11-1	2	15.6	16.5	1.6	1.5	0	0
07/19/05	11-1	3	44.2	10.3	1.3	1.8	2	2
07/19/05	11-1	4	39.4	18.6	1.3	1.5	50	2
07/19/05	11-1	5	12.8	54.7	2.2	2.0	10	95
07/19/05	11-1	6	17.8	62.7	1.3	1.5	5	40
07/19/05	11-1	7	17.5	45.7	1.9	1.9	20	90
07/19/05	11-1	8	52.5	44.0	1.6	1.9	100	95
07/19/05	11-1	9	51.9	15.3	1.3	1.6	90	5
07/19/05	11-1	10	34.7	22.7	1.9	1.5	70	75
07/19/05	11-1	11	15.6	43.0	1.6	2.1	100	90
07/19/05	11-2	1	58.0	52.0	1.0	1.3	90	100
07/19/05	11-2	2	42.2	36.2	1.4	0.8	40	40
07/19/05	11-2	3	38.2	37.2	1.1	1.2	80	50
07/19/05	11-2	4	37.7	52.0	1.7	0.9	40	40
07/19/05	11-2	5	46.9	39.0	1.0	1.0	100	75
07/19/05	11-2	6	46.9	26.0	1.2	1.3	10	90
07/19/05	11-2	7	46.5	44.2	1.1	1.1	85	80
07/19/05	11-2	8	45.0	42.7	1.0	0.9	80	70
07/19/05	11-2	9	41.4	35.0	0.8	0.8	100	20
07/19/05	11-2	10	45.2	41.0	0.9	0.9	90	10
07/19/05	11-2	11	49.9	31.6	1.1	1.0	90	90
07/14/05	11-3	1	32.0	53.0	1.6	1.1	90	100
07/14/05	11-3	2	28.7	41.0	2.6	1.1	75	100
07/14/05	11-3	3	43.4	54.0	2.1	2.7	90	100
07/14/05	11-3	4	39.9	63.2	2.2	2.5	95	90
07/14/05	11-3	5	32.0	32.2	2.0	2.5	90	80
07/14/05	11-3	6	11.8	31.6	1.9	2.0	100	90
07/14/05	11-3	7	15.7	45.2	2.1	1.9	100	100
07/14/05	11-3	8	18.3	53.7	2.2	2.0	95	100
07/14/05	11-3	9	43.5	49.0	2.5	2.4	100	100
07/14/05	11-3	10	54.3	58.7	2.4	2.3	100	100
07/14/05	11-3	11	51.7	48.5	3.1	2.8	90	100
07/11/05	11-4	1	17.3	20.2	0.62	0.67	90	95
07/11/05	11-4	2	14.9	16.0	0.56	0.43	50	30
07/11/05	11-4	3	49.2	11.8	0.65	0.62	100	85
07/11/05	11-4	4	38.4	15.1	0.71	0.68	80	80
07/11/05	11-4	5	20.0	16.4	0.48	0.44	90	70
07/11/05	11-4	6	39.2	13.2	0.54	0.61	100	90
07/11/05	11-4	7	23.8	27.4	0.41	0.42	95	80
07/11/05	11-4	8	30.4	23.7	0.45	0.62	90	60
07/11/05	11-4	9	25.0	26.7	0.66	0.68	80	40
07/11/05	11-4	10	25.6	21.8	0.17	0.34	95	95
07/11/05	11-4	11	14.9	25.0	0.60	0.64	70	60

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
07/19/05	11-1	1			sand, gravel	sand, gravel
07/19/05	11-1	2	yes		sand, gravel	sand, gravel
07/19/05	11-1	3	yes		sand, gravel	sand, gravel
07/19/05	11-1	4	yes		sand, gravel	sand, gravel
07/19/05	11-1	5		yes	sand, gravel	sand, gravel
07/19/05	11-1	6	yes	yes	sand, gravel	sand, gravel
07/19/05	11-1	7			sand, gravel	sand, gravel
07/19/05	11-1	8			sand, silt	sand, silt
07/19/05	11-1	9	yes	yes	sand, silt	sand, silt
07/19/05	11-1	10	yes		sand, gravel	sand, gravel
07/19/05	11-1	11	yes		sand, silt	sand, silt
07/19/05	11-2	1	yes	yes	sand, silt	sand, silt
07/19/05	11-2	2			sand, silt	sand, silt
07/19/05	11-2	3		yes	sand, silt	sand, silt
07/19/05	11-2	4		yes	sand, silt	sand, silt
07/19/05	11-2	5			sand, silt	sand, silt
07/19/05	11-2	6	yes		sand, silt	sand, silt
07/19/05	11-2	7	yes	yes	sand, silt	sand, silt
07/19/05	11-2	8	yes	yes	sand, silt	sand, silt
07/19/05	11-2	9			sand, silt	sand, silt
07/19/05	11-2	10	yes		sand, silt	sand, silt
07/19/05	11-2	11	yes		sand, silt	sand, silt
07/14/05	11-3	1			sand, silt, clay	sand, silt, clay
07/14/05	11-3	2	yes	yes	sand, silt, clay	sand, silt, clay
07/14/05	11-3	3		yes	sand, silt, clay	sand, silt, clay
07/14/05	11-3	4		yes	sand, silt, clay	sand, silt, clay
07/14/05	11-3	5		yes	sand, silt, clay	sand, silt, clay
07/14/05	11-3	6		yes	sand, silt, clay	sand, silt, clay
07/14/05	11-3	7			sand, silt, clay	sand, silt, clay
07/14/05	11-3	8			sand, silt, clay	sand, silt, clay
07/14/05	11-3	9			sand, silt, clay	sand, silt, clay
07/14/05	11-3	10			sand, silt, clay	sand, silt, clay
07/14/05	11-3	11			sand, silt, clay	sand, silt, clay
07/11/05	11-4	1			sand, silt	sand, silt
07/11/05	11-4	2			sand, silt	sand, silt
07/11/05	11-4	3	yes		sand, silt	sand, silt
07/11/05	11-4	4	yes		sand, silt	sand, silt
07/11/05	11-4	5			sand, silt	sand, silt
07/11/05	11-4	6			sand, silt	sand, silt
07/11/05	11-4	7			sand, silt	sand, silt
07/11/05	11-4	8			sand, silt	sand, silt
07/11/05	11-4	9			sand, silt	sand, silt
07/11/05	11-4	10			sand, silt	sand, silt
07/11/05	11-4	11			sand, silt	sand, silt

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
07/19/05	11-1	1			
07/19/05	11-1	2			
07/19/05	11-1	3			
07/19/05	11-1	4			
07/19/05	11-1	5			
07/19/05	11-1	6			
07/19/05	11-1	7			
07/19/05	11-1	8			
07/19/05	11-1	9			
07/19/05	11-1	10			
07/19/05	11-1	11			
07/19/05	11-2	1			
07/19/05	11-2	2			
07/19/05	11-2	3			
07/19/05	11-2	4			
07/19/05	11-2	5			
07/19/05	11-2	6			
07/19/05	11-2	7			
07/19/05	11-2	8			
07/19/05	11-2	9			
07/19/05	11-2	10			
07/19/05	11-2	11			
07/14/05	11-3	1			
07/14/05	11-3	2			
07/14/05	11-3	3			
07/14/05	11-3	4			
07/14/05	11-3	5			
07/14/05	11-3	6			
07/14/05	11-3	7			
07/14/05	11-3	8			
07/14/05	11-3	9			
07/14/05	11-3	10			
07/14/05	11-3	11			
07/11/05	11-4	1	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	2	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	3	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	4	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	5	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	6	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	7	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	8	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	9	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	10	widgeon grass	widgeon grass	widgeon grass
07/11/05	11-4	11	widgeon grass	widgeon grass	widgeon grass

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
07/19/05	11-1	1	6	1	1	0.08	0.00	0.03
07/19/05	11-1	2	3		10	0.12		0.16
07/19/05	11-1	3	13	14	11	0.00	0.01	0.13
07/19/05	11-1	4	28	49	40	0.00	0.00	0.00
07/19/05	11-1	5	10	19	30	0.00	0.00	0.00
07/19/05	11-1	6	16	24	51	0.02	0.02	0.00
07/19/05	11-1	7	15	28	31	0.00	0.02	0.00
07/19/05	11-1	8	1	3	13	0.00	0.01	0.00
07/19/05	11-1	9	18	21	11	0.00	0.02	0.02
07/19/05	11-1	10	2	7	4	0.00	0.01	0.01
07/19/05	11-1	11	2	3	6	0.03	0.06	0.27
07/19/05	11-2	1	37	52	48	0.00	0.00	0.00
07/19/05	11-2	2	38	52	35	0.00	0.00	0.00
07/19/05	11-2	3	40	46	41	0.00	0.00	0.00
07/19/05	11-2	4	42	51	40	0.00	0.00	0.00
07/19/05	11-2	5	36	49	41	0.00	0.00	0.00
07/19/05	11-2	6	34	41	35	0.00	0.00	0.00
07/19/05	11-2	7	38	40	39	0.00	0.00	0.00
07/19/05	11-2	8	40	45	38	0.00	0.00	0.00
07/19/05	11-2	9	39	41	35	0.00	0.00	0.00
07/19/05	11-2	10	34	42	34	0.00	0.00	0.00
07/19/05	11-2	11	31	44	32	0.00	0.00	0.00
07/14/05	11-3	1	5	11	21	0.13	0.29	0.50
07/14/05	11-3	2	17	19	7	0.21	0.48	0.11
07/14/05	11-3	3	5	20	16	0.00	0.35	0.28
07/14/05	11-3	4	6	12	21	0.05	0.41	0.43
07/14/05	11-3	5	6	11	18	0.05	0.36	0.25
07/14/05	11-3	6	16	19	27	0.18	0.29	0.30
07/14/05	11-3	7	19	13	12	0.25	0.31	0.20
07/14/05	11-3	8	18	13	6	0.42	0.31	0.16
07/14/05	11-3	9	11	13	10	0.42	0.18	0.29
07/14/05	11-3	10	5	14	9	0.15	0.43	0.23
07/14/05	11-3	11	15	2	5	0.27	0.04	0.17
07/11/05	11-4	1	21	21	25	0.00	0.00	0.00
07/11/05	11-4	2	1	1	1	0.00	0.00	0.00
07/11/05	11-4	3	1	1	1	0.01	0.00	0.00
07/11/05	11-4	4	19	14	3	0.00	0.00	0.02
07/11/05	11-4	5	6	9	5	0.00	0.00	0.00
07/11/05	11-4	6	10	8	9	0.00	0.00	0.00
07/11/05	11-4	7	15	13	18	0.00	0.00	0.00
07/11/05	11-4	8	18	15	18	0.00	0.00	0.00
07/11/05	11-4	9	23	28	31	0.00	0.00	0.00
07/11/05	11-4	10	78	81	68	0.00	0.00	0.00
07/11/05	11-4	11	21	22	10	0.00	0.00	0.00

Date	Site	Transect	Bed substrate		
			Left	Middle	Right
07/19/05	11-1	1	sand, clay, gravel	sand, clay, gravel	sand, clay, gravel
07/19/05	11-1	2	sand, silt, clay	sand, silt, clay	sand, silt
07/19/05	11-1	3	sand, clay	sand, gravel	sand, gravel
07/19/05	11-1	4	sand	sand	sand, silt
07/19/05	11-1	5	sand, silt, gravel	sand	sand, silt
07/19/05	11-1	6	sand, silt	sand	sand, silt
07/19/05	11-1	7	sand, silt	sand, silt, clay	sand, silt, clay
07/19/05	11-1	8	sand, silt, gravel	sand, silt	sand, silt
07/19/05	11-1	9	sand, silt	sand, silt	sand, silt
07/19/05	11-1	10	sand, silt	sand, silt	sand, silt
07/19/05	11-1	11	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
07/19/05	11-2	1	silt, clay	silt, clay	silt, clay
07/19/05	11-2	2	silt, clay	silt, clay	silt, clay
07/19/05	11-2	3	silt, clay	silt, clay	silt, clay
07/19/05	11-2	4	silt, clay	silt, clay	silt, clay
07/19/05	11-2	5	silt, clay	silt, clay	silt, clay
07/19/05	11-2	6	silt, clay	silt, clay	silt, clay
07/19/05	11-2	7	silt, clay	silt, clay	silt, clay
07/19/05	11-2	8	silt, clay	silt, clay	silt, clay
07/19/05	11-2	9	silt, clay	silt, clay	silt, clay
07/19/05	11-2	10	silt, clay	silt, clay	silt, clay
07/19/05	11-2	11	silt, clay	silt, clay	silt, clay
07/14/05	11-3	1	sand, silt	sand, silt	sand, silt
07/14/05	11-3	2	sand, silt	sand, silt	sand, silt
07/14/05	11-3	3	sand, silt	sand, silt	sand, silt
07/14/05	11-3	4	sand, silt	sand, silt	sand, silt
07/14/05	11-3	5	sand, silt	sand, silt	sand, silt
07/14/05	11-3	6	sand, silt	sand, silt	sand, silt
07/14/05	11-3	7	sand, silt	sand, silt	sand, silt
07/14/05	11-3	8	sand, silt	sand, silt	sand, silt
07/14/05	11-3	9	sand, silt	sand, silt	sand, silt
07/14/05	11-3	10	sand, silt	sand, silt	sand, silt
07/14/05	11-3	11	sand, silt	sand, silt	sand, silt
07/11/05	11-4	1	silt	silt	silt
07/11/05	11-4	2	silt, rock	silt, rock	silt, rock
07/11/05	11-4	3	sand, rock	sand, rock	silt, rock
07/11/05	11-4	4	sand, silt	sand, silt	sand, silt
07/11/05	11-4	5	sand, silt	sand, silt	sand, silt
07/11/05	11-4	6	sand, silt	sand, silt	sand, silt
07/11/05	11-4	7	sand, silt	sand, silt	sand, silt
07/11/05	11-4	8	sand, silt	sand, silt	sand, silt
07/11/05	11-4	9	sand, silt	sand, silt	sand, silt
07/11/05	11-4	10	sand, silt	sand, gravel	sand, silt
07/11/05	11-4	11	sand, silt	sand, silt	sand, silt

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
07/19/05	11-1	1			
07/19/05	11-1	2			
07/19/05	11-1	3			
07/19/05	11-1	4			
07/19/05	11-1	5			
07/19/05	11-1	6			
07/19/05	11-1	7			
07/19/05	11-1	8			
07/19/05	11-1	9			
07/19/05	11-1	10			
07/19/05	11-1	11			
07/19/05	11-2	1			
07/19/05	11-2	2			
07/19/05	11-2	3			
07/19/05	11-2	4			
07/19/05	11-2	5			
07/19/05	11-2	6			
07/19/05	11-2	7			
07/19/05	11-2	8			
07/19/05	11-2	9			
07/19/05	11-2	10			
07/19/05	11-2	11			
07/14/05	11-3	1			
07/14/05	11-3	2			
07/14/05	11-3	3			
07/14/05	11-3	4			
07/14/05	11-3	5			
07/14/05	11-3	6			
07/14/05	11-3	7			
07/14/05	11-3	8			
07/14/05	11-3	9			
07/14/05	11-3	10			
07/14/05	11-3	11			
07/11/05	11-4	1			
07/11/05	11-4	2	25	25	25
07/11/05	11-4	3	30	30	30
07/11/05	11-4	4			
07/11/05	11-4	5			
07/11/05	11-4	6			
07/11/05	11-4	7			
07/11/05	11-4	8			
07/11/05	11-4	9			
07/11/05	11-4	10			
07/11/05	11-4	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
07/13/05	11-5	1	Channel	5.0	14.0	0
07/13/05	11-5	2	Channel	4.2	10.6	0
07/13/05	11-5	3	Channel	4.6	9.2	0
07/13/05	11-5	4	Channel	5.2	12.6	0
07/13/05	11-5	5	Channel	6.1	10.3	0
07/13/05	11-5	6	Channel	5.9	11.2	0
07/13/05	11-5	7	Channel	5.2	13.7	0
07/13/05	11-5	8	Channel	7.1	11.5	0
07/13/05	11-5	9	Channel	6.6	20.5	0
07/13/05	11-5	10	Channel	3.9	23.4	0
07/13/05	11-5	11	Channel	6.6	17.6	0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
07/13/05	11-5	1	0	25.5	58.2	0	13	Grazing
07/13/05	11-5	2	0	28.2	44.5	1	0	Grazing
07/13/05	11-5	3	0	25.7	85.1	0	13	Grazing
07/13/05	11-5	4	0	34.5	63.5	0	1	Grazing
07/13/05	11-5	5	0	26.7	67.5	0	2	Grazing
07/13/05	11-5	6	0	37.0	60.7	3	7	Grazing
07/13/05	11-5	7	0	29.7	53.7	0	4	Grazing
07/13/05	11-5	8	0	26.2	50.7	0	1	Grazing
07/13/05	11-5	9	0	31.8	46.5	0	0	Grazing
07/13/05	11-5	10	0	28.7	27.1	0	0	Grazing
07/13/05	11-5	11	0	36.2	21.1	1	0	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
07/13/05	11-5	1	21.0	35.2	1.4	1.5	90	95
07/13/05	11-5	2	23.5	21.6	1.0	1.7	90	80
07/13/05	11-5	3	23.2	41.8	1.3	1.6	80	90
07/13/05	11-5	4	16.0	30.3	0.8	1.2	90	20
07/13/05	11-5	5	14.8	18.5	1.1	1.1	70	0
07/13/05	11-5	6	30.1	11.9	1.1	1.2	90	0
07/13/05	11-5	7	14.3	14.8	0.8	1.3	60	20
07/13/05	11-5	8	10.1	20.8	1.1	0.8	40	20
07/13/05	11-5	9	16.1	7.3	1.4	1.7	20	35
07/13/05	11-5	10	13.8	10.5	1.7	1.8	10	20
07/13/05	11-5	11	17.4	11.7	1.0	1.3	70	90

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
07/13/05	11-5	1	yes		sand, silt, gravel	sand, silt, gravel
07/13/05	11-5	2			sand, silt, gravel	sand, silt, gravel
07/13/05	11-5	3		yes	sand, silt	sand, silt, gravel
07/13/05	11-5	4		yes	sand, silt	sand, silt
07/13/05	11-5	5		yes	sand, silt	sand, silt, rock
07/13/05	11-5	6		yes	sand, silt	sand, silt, rock
07/13/05	11-5	7			sand, silt	sand, silt, rock
07/13/05	11-5	8			sand, silt	sand, silt, rock
07/13/05	11-5	9			sand, silt	sand, silt, gravel
07/13/05	11-5	10			sand, silt	sand, silt
07/13/05	11-5	11			sand, silt	sand, silt

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
07/13/05	11-5	1	widgeon grass	widgeon grass	widgeon grass
07/13/05	11-5	2	salt grass		widgeon grass
07/13/05	11-5	3			widgeon grass
07/13/05	11-5	4	widgeon grass	widgeon grass	widgeon grass
07/13/05	11-5	5			
07/13/05	11-5	6			widgeon grass
07/13/05	11-5	7	widgeon grass		widgeon grass
07/13/05	11-5	8			
07/13/05	11-5	9		widgeon grass	
07/13/05	11-5	10	widgeon grass		widgeon grass
07/13/05	11-5	11	widgeon grass		

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
07/13/05	11-5	1	10	12	8	0.04	0.00	0.00
07/13/05	11-5	2	36	63	41	0.00	0.00	0.00
07/13/05	11-5	3	42	54	22	0.00	0.00	0.00
07/13/05	11-5	4	33	38	11	0.01	0.00	0.00
07/13/05	11-5	5	16	16	11	0.00	0.03	0.00
07/13/05	11-5	6	2	12	6	0.01	0.02	0.00
07/13/05	11-5	7	5	12	13	0.01	0.01	0.00
07/13/05	11-5	8	6	6	13	0.00	0.00	0.00
07/13/05	11-5	9	5	8	9	0.00	0.00	0.01
07/13/05	11-5	10	10	13	5	0.00	0.02	0.00
07/13/05	11-5	11	13	16	10	0.00	0.00	0.00

Date	Site	Transect	Bed substrate		
			Left	Middle	Right
07/13/05	11-5	1	sand, silt	sand, silt	sand, silt
07/13/05	11-5	2	sand, silt	sand, silt	sand, silt
07/13/05	11-5	3	sand, silt, gravel	sand, silt, gravel	sand, silt
07/13/05	11-5	4	sand, silt	sand, silt, rock	sand, silt
07/13/05	11-5	5	sand, silt	sand, silt	sand, silt
07/13/05	11-5	6	sand, silt	sand, silt	sand, silt
07/13/05	11-5	7	sand, silt, rock	sand, silt	sand, silt, gravel
07/13/05	11-5	8	sand, silt, gravel	sand, silt, gravel	bedrock
07/13/05	11-5	9	sand, silt	sand, silt	sand, silt
07/13/05	11-5	10	sand, silt	sand, silt	sand, silt
07/13/05	11-5	11	sand, silt	sand, silt	sand, silt, fine rock

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
07/13/05	11-5	1			
07/13/05	11-5	2			
07/13/05	11-5	3	50	50	
07/13/05	11-5	4		50	
07/13/05	11-5	5			
07/13/05	11-5	6			
07/13/05	11-5	7	50		
07/13/05	11-5	8			100
07/13/05	11-5	9			
07/13/05	11-5	10			
07/13/05	11-5	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
08/09/05	8-1	1	Channel	25.0	32.5	0.0
08/09/05	8-1	2	Channel	24.5	32.2	0.0
08/09/05	8-1	3	Channel	24.8	31.0	0.0
08/09/05	8-1	4	Channel	25.8	30.7	0.0
08/09/05	8-1	5	Channel	23.3	29.4	0.0
08/09/05	8-1	6	Channel	22.9	28.0	0.0
08/09/05	8-1	7	Channel	23.4	28.9	0.0
08/09/05	8-1	8	Channel	21.7	29.1	0.0
08/09/05	8-1	9	Channel	22.2	26.8	0.0
08/09/05	8-1	10	Channel	21.8	27.5	0.0
08/09/05	8-1	11	Channel	21.8	27.9	0.0
08/09/05	8-2	1	Channel	25.1	27.2	0.0
08/09/05	8-2	2	Channel	24.5	27.8	0.0
08/09/05	8-2	3	Channel	24.7	26.6	0.0
08/09/05	8-2	4	Channel	22.4	26.3	0.0
08/09/05	8-2	5	Channel	25.4	29.9	0.0
08/09/05	8-2	6	Channel	21.3	23.4	0.0
08/09/05	8-2	7	Channel	20.6	30.0	0.0
08/09/05	8-2	8	Channel	21.0	25.5	0.0
08/09/05	8-2	9	Riffle	29.2	33.4	0.0
08/09/05	8-2	10	Run	26.5	27.0	0.0
08/09/05	8-2	11	Run	26.5	30.3	0.0
08/09/05	8-3	1	Channel	20.8	28.1	0.0
08/09/05	8-3	2	Channel	18.4	26.5	0.0
08/09/05	8-3	3	Channel	21.1	24.3	0.0
08/09/05	8-3	4	Channel	21.1	29.1	0.0
08/09/05	8-3	5	Channel	20.6	26.8	0.0
08/09/05	8-3	6	Channel	24.1	29.9	0.0
08/09/05	8-3	7	Channel	20.2	25.7	0.0
08/09/05	8-3	8	Channel	17.2	25.2	0.0
08/09/05	8-3	9	Channel	17.9	28.1	0.0
08/09/05	8-3	10	Channel	18.8	25.7	0.0
08/09/05	8-3	11	Channel	16.2	22.1	0.0
08/08/05	8-4	1	Channel	15.1	22.5	0.0
08/08/05	8-4	2	Channel	19.1	24.1	0.0
08/08/05	8-4	3	Channel	17.9	25.0	0.0
08/08/05	8-4	4	Channel	12.8	28.5	0.0
08/08/05	8-4	5	Channel	13.1	24.1	0.0
08/08/05	8-4	6	Channel	13.6	23.5	0.0
08/08/05	8-4	7	Channel	17.5	24.5	0.0
08/08/05	8-4	8	Channel	16.5	20.2	0.0
08/08/05	8-4	9	Channel	17.4	21.2	0.0
08/08/05	8-4	10	Channel	16.5	24.5	0.0
08/08/05	8-4	11	Channel	16.0	22.5	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
08/09/05	8-1	1	0	43.0	45.0	16	17	Grazing
08/09/05	8-1	2	0	39.5	58.5	16	17	Grazing
08/09/05	8-1	3	0	41.4	42.5	13	16	Grazing
08/09/05	8-1	4	0	46.2	43.0	17	15	Grazing
08/09/05	8-1	5	0	41.2	44.4	14	16	Grazing
08/09/05	8-1	6	0	33.2	52.9	14	17	Grazing
08/09/05	8-1	7	0	38.2	35.7	14	15	Grazing
08/09/05	8-1	8	0	55.7	44.9	17	17	Grazing
08/09/05	8-1	9	0	39.5	60.9	14	17	Grazing
08/09/05	8-1	10	0	55.4	40.7	15	17	Grazing
08/09/05	8-1	11	0	49.7	60.0	17	16	Grazing
08/09/05	8-2	1	0	45.5	49.5	17	17	Grazing
08/09/05	8-2	2	0	49.5	28.7	17	17	Grazing
08/09/05	8-2	3	0	47.5	52.2	17	17	Grazing
08/09/05	8-2	4	0	50.7	43.4	17	17	Grazing
08/09/05	8-2	5	0	25.8	66.4	12	17	Grazing
08/09/05	8-2	6	0	56.5	68.1	17	17	Grazing
08/09/05	8-2	7	0	42.0	50.4	17	17	Grazing
08/09/05	8-2	8	0	43.4	43.7	17	17	Grazing
08/09/05	8-2	9	0	48.2	36.5	17	17	Grazing
08/09/05	8-2	10	0	40.4	54.2	17	17	Grazing
08/09/05	8-2	11	0	46.2	35.7	17	17	Grazing
08/09/05	8-3	1	0	48.4	46.0	17	17	Grazing
08/09/05	8-3	2	0	57.5	67.3	17	17	Grazing
08/09/05	8-3	3	0	45.5	42.5	17	17	Grazing
08/09/05	8-3	4	0	45.4	48.4	17	17	Grazing
08/09/05	8-3	5	0	41.7	67.0	17	17	Grazing
08/09/05	8-3	6	0	26.7	49.4	17	17	Grazing
08/09/05	8-3	7	0	56.2	42.7	17	16	Grazing
08/09/05	8-3	8	0	55.0	42.2	17	13	Grazing
08/09/05	8-3	9	0	46.2	47.2	17	14	Grazing
08/09/05	8-3	10	0	37.5	59.0	16	17	Grazing
08/09/05	8-3	11	0	30.8	35.0	16	17	Grazing
08/08/05	8-4	1	0	49.0	50.4	16	13	Grazing
08/08/05	8-4	2	0	78.0	50.4	17	17	Grazing
08/08/05	8-4	3	0	60.7	34.7	17	16	Grazing
08/08/05	8-4	4	0	33.2	66.5	15	17	Grazing
08/08/05	8-4	5	0	43.7	88.6	8	17	Grazing
08/08/05	8-4	6	0	38.0	58.5	6	16	Grazing
08/08/05	8-4	7	0	59.5	46.5	17	12	Grazing
08/08/05	8-4	8	0	38.7	82.6	16	17	Grazing
08/08/05	8-4	9	0	39.2	68.0	16	17	Grazing
08/08/05	8-4	10	0	57.9	45.9	17	15	Grazing
08/08/05	8-4	11	0	55.5	36.4	17	7	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
08/09/05	8-1	1	28.0	31.3	2.1	2.8	70	60
08/09/05	8-1	2	27.5	24.7	2.6	2.2	75	75
08/09/05	8-1	3	34.0	25.2	2.1	2.0	80	75
08/09/05	8-1	4	34.4	38.7	2.2	1.9	80	70
08/09/05	8-1	5	25.8	61.5	2.3	2.2	80	70
08/09/05	8-1	6	23.7	77.5	2.1	2.3	70	0
08/09/05	8-1	7	36.2	44.5	1.8	2.2	90	80
08/09/05	8-1	8	31.8	40.2	2.0	2.7	90	80
08/09/05	8-1	9	33.5	55.2	2.0	2.2	60	50
08/09/05	8-1	10	35.0	81.1	2.6	1.8	90	60
08/09/05	8-1	11	29.7	35.7	2.3	2.6	80	70
08/09/05	8-2	1	52.9	77.8	1.7	1.4	80	20
08/09/05	8-2	2	76.1	52.2	2.2	2.5	70	60
08/09/05	8-2	3	90.5	55.4	1.9	1.7	90	50
08/09/05	8-2	4	65.2	37.7	1.7	1.9	90	20
08/09/05	8-2	5	37.7	49.9	2.1	1.9	100	80
08/09/05	8-2	6	85.2	54.4	2.1	2.1	70	40
08/09/05	8-2	7	38.0	34.0	1.6	2.4	85	60
08/09/05	8-2	8	39.7	55.0	1.6	1.7	100	95
08/09/05	8-2	9	44.9	84.1	2.0	2.4	100	50
08/09/05	8-2	10	54.0	85.1	1.8	2.0	90	70
08/09/05	8-2	11	67.8	47.7	1.7	2.0	100	80
08/09/05	8-3	1	26.1	68.2	3.0	3.0	80	95
08/09/05	8-3	2	51.5	20.2	3.1	2.5	50	80
08/09/05	8-3	3	35.5	75.3	2.5	2.0	60	40
08/09/05	8-3	4	32.5	86.0	2.0	2.0	80	80
08/09/05	8-3	5	29.2	64.5	1.8	2.3	60	40
08/09/05	8-3	6	34.7	25.1	1.6	2.3	20	80
08/09/05	8-3	7	90.0	67.0	2.6	2.2	100	100
08/09/05	8-3	8	62.0	25.7	2.3	2.0	20	100
08/09/05	8-3	9	65.1	22.6	2.3	2.5	10	100
08/09/05	8-3	10	60.4	32.2	2.0	2.0	90	95
08/09/05	8-3	11	60.7	51.4	1.8	2.3	95	100
08/08/05	8-4	1	36.4	28.2	2.5	1.7	70	100
08/08/05	8-4	2	40.2	43.0	2.3	2.5	90	90
08/08/05	8-4	3	17.0	42.5	2.1	2.5	90	95
08/08/05	8-4	4	22.2	59.7	2.4	2.7	95	90
08/08/05	8-4	5	24.0	31.1	1.9	2.6	100	100
08/08/05	8-4	6	22.6	10.3	1.8	2.8	100	95
08/08/05	8-4	7	32.7	44.0	2.6	2.5	95	90
08/08/05	8-4	8	65.5	50.2	2.6	2.2	90	95
08/08/05	8-4	9	61.5	52.7	2.0	2.2	80	90
08/08/05	8-4	10	50.0	10.6	2.7	2.8	90	95
08/08/05	8-4	11	35.7	19.4	2.7	1.8	80	95

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
08/09/05	8-1	1			sand, silt, clay	sand, silt, clay
08/09/05	8-1	2			sand, silt, clay	sand, silt, clay
08/09/05	8-1	3			sand, silt, clay	sand, silt, clay
08/09/05	8-1	4			sand, silt, clay	sand, silt, clay
08/09/05	8-1	5		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-1	6		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-1	7		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-1	8			sand, silt, clay	sand, silt, clay
08/09/05	8-1	9			sand, silt, clay	sand, silt, clay
08/09/05	8-1	10		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-1	11			sand, silt, clay	sand, silt, clay
08/09/05	8-2	1		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	2		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	3	yes		sand, silt, clay	sand, silt, clay
08/09/05	8-2	4	yes		sand, silt, clay	sand, silt, clay
08/09/05	8-2	5			sand, silt, clay	sand, silt, clay
08/09/05	8-2	6	yes	yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	7		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	8		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	9		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	10		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-2	11		yes	sand, silt, clay	sand, silt, clay
08/09/05	8-3	1		yes	sand, silt	sand, silt
08/09/05	8-3	2	yes		sand, silt	sand, silt
08/09/05	8-3	3		yes	sand, silt	sand, silt
08/09/05	8-3	4		yes	sand, silt	sand, silt
08/09/05	8-3	5		yes	sand, silt	sand, silt
08/09/05	8-3	6			sand, silt	sand, silt
08/09/05	8-3	7	yes		sand, silt	sand, silt
08/09/05	8-3	8	yes		sand, silt	sand, silt
08/09/05	8-3	9	yes		sand, silt	sand, silt
08/09/05	8-3	10	yes		sand, silt	sand, silt
08/09/05	8-3	11	yes		sand, silt	sand, silt
08/08/05	8-4	1	yes		sand, silt	sand, silt
08/08/05	8-4	2			sand, silt	sand, silt
08/08/05	8-4	3			sand, silt	sand, silt
08/08/05	8-4	4			sand, silt	sand, silt
08/08/05	8-4	5			sand, silt	sand, silt
08/08/05	8-4	6			sand, silt	sand, silt
08/08/05	8-4	7			sand, silt	sand, silt
08/08/05	8-4	8	yes		sand, silt	sand, silt
08/08/05	8-4	9	yes		sand, silt	sand, silt
08/08/05	8-4	10	yes		sand, silt	sand, silt
08/08/05	8-4	11	yes		sand, silt	sand, silt

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
08/09/05	8-1	1			
08/09/05	8-1	2			
08/09/05	8-1	3			
08/09/05	8-1	4			
08/09/05	8-1	5			
08/09/05	8-1	6			
08/09/05	8-1	7			
08/09/05	8-1	8			
08/09/05	8-1	9			
08/09/05	8-1	10			
08/09/05	8-1	11			
08/09/05	8-2	1			
08/09/05	8-2	2			
08/09/05	8-2	3			
08/09/05	8-2	4			
08/09/05	8-2	5			
08/09/05	8-2	6			
08/09/05	8-2	7			
08/09/05	8-2	8			
08/09/05	8-2	9			
08/09/05	8-2	10			
08/09/05	8-2	11			
08/09/05	8-3	1			
08/09/05	8-3	2			
08/09/05	8-3	3			
08/09/05	8-3	4			
08/09/05	8-3	5			
08/09/05	8-3	6			
08/09/05	8-3	7			
08/09/05	8-3	8			
08/09/05	8-3	9			
08/09/05	8-3	10			
08/09/05	8-3	11			
08/08/05	8-4	1			
08/08/05	8-4	2			
08/08/05	8-4	3			
08/08/05	8-4	4			
08/08/05	8-4	5			
08/08/05	8-4	6			
08/08/05	8-4	7			
08/08/05	8-4	8			
08/08/05	8-4	9			
08/08/05	8-4	10			
08/08/05	8-4	11			

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
08/09/05	8-1	1	42	38	35	0.35	0.33	0.21
08/09/05	8-1	2	41	36	33	0.30	0.39	0.35
08/09/05	8-1	3	34	33	40	0.40	0.45	0.30
08/09/05	8-1	4	25	32	48	0.25	0.42	0.39
08/09/05	8-1	5	28	32	55	0.22	0.33	0.43
08/09/05	8-1	6	29	34	57	0.20	0.38	0.38
08/09/05	8-1	7	46	61	44	0.24	0.41	0.35
08/09/05	8-1	8	50	60	76	0.23	0.33	0.14
08/09/05	8-1	9	39	46	70	0.24	0.24	0.34
08/09/05	8-1	10	44	53	59	0.21	0.25	0.30
08/09/05	8-1	11	78	78	58	0.14	0.21	0.03
08/09/05	8-2	1	71	97	99	0.09	0.14	0.15
08/09/05	8-2	2	73	90	97	0.13	0.18	0.14
08/09/05	8-2	3	89	100	92	0.17	0.17	0.13
08/09/05	8-2	4	96	126	127	0.12	0.14	0.13
08/09/05	8-2	5	113	121	118	0.14	0.15	0.09
08/09/05	8-2	6	110	126	135	0.10	0.12	0.15
08/09/05	8-2	7	79	115	145	0.13	0.11	0.11
08/09/05	8-2	8	88	128	151	0.14	0.11	0.12
08/09/05	8-2	9	27	36	24	0.40	0.54	0.55
08/09/05	8-2	10	59	76	42	0.13	0.30	0.18
08/09/05	8-2	11	42	76	22	0.20	0.23	0.10
08/09/05	8-3	1	24	76	85	0.19	0.33	0.18
08/09/05	8-3	2	79	65	78	0.34	0.30	0.11
08/09/05	8-3	3	52	47	62	0.34	0.29	0.26
08/09/05	8-3	4	14	46	101	0.23	0.33	0.35
08/09/05	8-3	5	24	55	74	0.17	0.32	0.45
08/09/05	8-3	6	47	50	27	0.29	0.48	0.28
08/09/05	8-3	7	62	44	33	0.38	0.36	0.20
08/09/05	8-3	8	134	91	43	0.18	0.24	0.16
08/09/05	8-3	9	137	71	19	0.29	0.28	0.19
08/09/05	8-3	10	123	44	28	0.26	0.28	0.20
08/09/05	8-3	11	87	87	67	0.23	0.28	0.18
08/08/05	8-4	1	31	26	32	0.47	0.37	0.31
08/08/05	8-4	2	35	25	14	0.25	0.40	0.28
08/08/05	8-4	3	14	30	34	0.15	0.25	0.31
08/08/05	8-4	4	31	44	44	0.36	0.46	0.13
08/08/05	8-4	5	27	32	36	0.22	0.36	0.38
08/08/05	8-4	6	26	32	41	0.33	0.47	0.52
08/08/05	8-4	7	34	32	25	0.37	0.31	0.23
08/08/05	8-4	8	50	37	21	0.34	0.10	0.19
08/08/05	8-4	9	40	31	23	0.40	0.21	0.24
08/08/05	8-4	10	34	20	32	0.45	0.28	0.34
08/08/05	8-4	11	34	34	25	0.43	0.34	0.04

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
08/09/05	8-1	1	sand, silt	sand, silt	sand, silt
08/09/05	8-1	2	sand, silt	sand, silt	sand, silt
08/09/05	8-1	3	sand, silt	sand, silt	sand, silt
08/09/05	8-1	4	sand, silt	sand, silt	sand, silt
08/09/05	8-1	5	sand, silt	sand, silt	sand, silt
08/09/05	8-1	6	sand, silt	sand, silt	sand, silt
08/09/05	8-1	7	sand, silt	sand, silt	sand, silt
08/09/05	8-1	8	sand, silt	sand, silt	sand, silt
08/09/05	8-1	9	sand, silt	sand, silt	sand, silt
08/09/05	8-1	10	sand, silt	sand, silt	sand, silt
08/09/05	8-1	11	sand, silt	sand, silt	sand, silt
08/09/05	8-2	1	sand, silt	sand, silt	sand, silt
08/09/05	8-2	2	sand, silt	sand, silt	sand, silt
08/09/05	8-2	3	sand, silt	sand, silt	sand, silt
08/09/05	8-2	4	sand, silt	sand, silt	sand, silt
08/09/05	8-2	5	sand, silt	sand, silt	sand, silt
08/09/05	8-2	6	sand, silt	sand, silt	sand, silt
08/09/05	8-2	7	sand, silt	sand, silt	sand, silt
08/09/05	8-2	8	sand, silt	sand, silt	sand, silt
08/09/05	8-2	9	gravel, boulder, bedrock	sand, gravel, boulder	boulder, bedrock
08/09/05	8-2	10	sand, gravel	sand, gravel	boulder
08/09/05	8-2	11	sand, silt, gravel	sand, gravel, boulder	boulder
08/09/05	8-3	1	sand, silt	sand, silt	sand, silt
08/09/05	8-3	2	sand, silt	sand, silt	sand, silt
08/09/05	8-3	3	sand, silt	sand, silt	sand, silt
08/09/05	8-3	4	sand, silt	sand, silt	sand, silt
08/09/05	8-3	5	sand, silt	sand, silt	sand, silt
08/09/05	8-3	6	sand, silt	sand, silt	sand, silt
08/09/05	8-3	7	sand, silt	sand, silt	sand, silt
08/09/05	8-3	8	sand, silt	sand, silt	sand, silt
08/09/05	8-3	9	sand, silt	sand, silt	sand, silt
08/09/05	8-3	10	sand, silt	sand, silt	sand, silt
08/09/05	8-3	11	sand, silt	sand, silt	sand, silt
08/08/05	8-4	1	sand, silt	sand, silt	sand, silt
08/08/05	8-4	2	sand, silt	sand, silt	sand, silt
08/08/05	8-4	3	sand, silt	sand, silt	sand, silt
08/08/05	8-4	4	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
08/08/05	8-4	5	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
08/08/05	8-4	6	sand, silt	sand, silt	sand, silt
08/08/05	8-4	7	sand, silt	sand, silt	sand, silt
08/08/05	8-4	8	sand, silt	sand, silt	sand, silt
08/08/05	8-4	9	sand, silt	sand, silt	sand, silt
08/08/05	8-4	10	sand, silt	sand, silt	sand, silt
08/08/05	8-4	11	sand, silt	sand, silt	sand, silt

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
08/09/05	8-1	1			
08/09/05	8-1	2			
08/09/05	8-1	3			
08/09/05	8-1	4			
08/09/05	8-1	5			
08/09/05	8-1	6			
08/09/05	8-1	7			
08/09/05	8-1	8			
08/09/05	8-1	9			
08/09/05	8-1	10			
08/09/05	8-1	11			
08/09/05	8-2	1			
08/09/05	8-2	2			
08/09/05	8-2	3			
08/09/05	8-2	4			
08/09/05	8-2	5			
08/09/05	8-2	6			
08/09/05	8-2	7			
08/09/05	8-2	8			
08/09/05	8-2	9	100	5	100
08/09/05	8-2	10			
08/09/05	8-2	11		15	
08/09/05	8-3	1			
08/09/05	8-3	2			
08/09/05	8-3	3			
08/09/05	8-3	4			
08/09/05	8-3	5			
08/09/05	8-3	6			
08/09/05	8-3	7			
08/09/05	8-3	8			
08/09/05	8-3	9			
08/09/05	8-3	10			
08/09/05	8-3	11			
08/08/05	8-4	1			
08/08/05	8-4	2			
08/08/05	8-4	3			
08/08/05	8-4	4			
08/08/05	8-4	5			
08/08/05	8-4	6			
08/08/05	8-4	7			
08/08/05	8-4	8			
08/08/05	8-4	9			
08/08/05	8-4	10			
08/08/05	8-4	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
08/08/05	8-5	1	Channel	9.4	14.8	0.0
08/08/05	8-5	2	Channel	8.4	14.7	0.0
08/08/05	8-5	3	Channel	9.5	19.3	0.0
08/08/05	8-5	4	Channel	8.2	18.9	0.0
08/08/05	8-5	5	Channel	8.7	16.2	0.0
08/08/05	8-5	6	Channel	10.2	19.3	0.0
08/08/05	8-5	7	Channel	9.1	14.8	0.0
08/08/05	8-5	8	Channel	8.9	19.0	0.0
08/08/05	8-5	9	Channel	9.3	15.8	0.0
08/08/05	8-5	10	Channel	8.7	14.9	0.0
08/08/05	8-5	11	Channel	8.9	12.1	0.0
08/08/05	9-1	1	Channel	19.9	24.2	0.0
08/08/05	9-1	2	Channel	21.4	25.3	0.0
08/08/05	9-1	3	Channel	21.1	25.6	0.0
08/08/05	9-1	4	Channel	21.8	29.3	0.0
08/08/05	9-1	5	Channel	24.1	30.5	0.0
08/08/05	9-1	6	Channel	23.3	25.3	0.0
08/08/05	9-1	7	Channel	21.1	32.4	0.0
08/08/05	9-1	8	Channel/BW	22.1	29.4	0.0
08/08/05	9-1	9	Channel	22.2	23.2	0.0
08/08/05	9-1	10	Channel	28.2	49.8	0.0
08/08/05	9-1	11	Channel	25.6	43.6	0.0
08/10/05	9-2	1	Channel	16.9	41.9	0.0
08/10/05	9-2	2	Channel	14.2	43.3	0.0
08/10/05	9-2	3	Channel	18.9	45.6	0.0
08/10/05	9-2	4	BW/SC/MC	26.8	36.9	4.8
08/10/05	9-2	5	SC/MC	20.8	43.4	8.0
08/10/05	9-2	6	Channel	18.5	28.7	0.0
08/10/05	9-2	7	Channel	15.1	47.3	0.0
08/10/05	9-2	8	Channel	19.2	47.1	0.0
08/10/05	9-2	9	Channel	22.1	45.4	0.0
08/10/05	9-2	10	Channel	17.1	45.2	0.0
08/10/05	9-2	11	Channel	16.2	41.4	0.0
08/10/05	10-1	1	Channel	13.7	31.5	0.0
08/10/05	10-1	2	Channel	13.7	33.7	0.0
08/10/05	10-1	3	Channel	12.1	34.3	0.0
08/10/05	10-1	4	Channel	8.0	37.8	0.0
08/10/05	10-1	5	Channel	8.2	37.1	0.0
08/10/05	10-1	6	Channel	8.9	38.4	0.0
08/10/05	10-1	7	Channel	10.5	43.2	0.0
08/10/05	10-1	8	Channel	11.9	44.7	0.0
08/10/05	10-1	9	Channel	11.9	43.8	0.0
08/10/05	10-1	10	Channel	14.6	45.7	0.0
08/10/05	10-1	11	MC/Riffle	18.0	46.0	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
08/08/05	8-5	1	0	10.1	49.5	16	17	Grazing
08/08/05	8-5	2	0	16.0	56.2	17	17	Grazing
08/08/05	8-5	3	0	14.6	76.1	17	17	Grazing
08/08/05	8-5	4	0	10.3	49.4	15	16	Grazing
08/08/05	8-5	5	0	13.1	66.6	17	17	Grazing
08/08/05	8-5	6	0	18.1	41.5	17	16	Grazing
08/08/05	8-5	7	0	12.5	47.5	15	13	Grazing
08/08/05	8-5	8	0	14.3	40.2	15	5	Grazing
08/08/05	8-5	9	0	16.1	46.2	13	10	Grazing
08/08/05	8-5	10	0	18.5	47.2	17	12	Grazing
08/08/05	8-5	11	0	16.7	57.0	17	17	Grazing
08/08/05	9-1	1	0	33.7	29.7	17	15	Grazing
08/08/05	9-1	2	0	29.6	22.2	17	17	Grazing
08/08/05	9-1	3	0	32.2	20.5	17	17	Grazing
08/08/05	9-1	4	0	20.0	25.7	17	17	Grazing
08/08/05	9-1	5	0	14.6	24.7	14	15	Grazing
08/08/05	9-1	6	0	17.8	27.6	16	17	Grazing
08/08/05	9-1	7	0	13.6	31.3	14	17	Grazing
08/08/05	9-1	8	0	18.7	37.9	7	17	Grazing
08/08/05	9-1	9	0	16.7	10.6	13	15	Grazing
08/08/05	9-1	10	0	24.1	10.6	17	17	Grazing
08/08/05	9-1	11	0	21.2	11.1	9	13	Grazing
08/10/05	9-2	1	0	10.1	16.2	0	13	Grazing
08/10/05	9-2	2	0	10.1	19.7	0	17	Grazing
08/10/05	9-2	3	0	11.6	18.8	0	17	Grazing
08/10/05	9-2	4	355	10.6	21.8	0	17	Grazing
08/10/05	9-2	5	345	12.8	20.2	0	17	Grazing
08/10/05	9-2	6	330	17.5	13.8	0	0	Grazing
08/10/05	9-2	7	335	17.5	17.2	0	0	Grazing
08/10/05	9-2	8	330	16.6	16.7	0	0	Grazing
08/10/05	9-2	9	340	24.7	13.6	12	0	Grazing
08/10/05	9-2	10	350	22.8	17.2	11	0	Grazing
08/10/05	9-2	11	0	38.2	16.7	17	0	Grazing
08/10/05	10-1	1	10	17.2	25.2	0	14	Grazing
08/10/05	10-1	2	10	13.3	19.7	0	17	Grazing
08/10/05	10-1	3	15	16.0	22.6	0	11	Grazing
08/10/05	10-1	4	0	11.8	39.0	0	12	Grazing
08/10/05	10-1	5	0	11.0	34.2	0	16	Grazing
08/10/05	10-1	6	0	11.6	22.2	0	10	Grazing
08/10/05	10-1	7	0	13.1	30.2	0	11	Grazing
08/10/05	10-1	8	0	13.3	42.7	0	17	Grazing
08/10/05	10-1	9	0	14.1	22.3	0	10	Grazing
08/10/05	10-1	10	0	12.1	20.7	0	16	Grazing
08/10/05	10-1	11	15	10.8	28.6	0	17	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
08/08/05	8-5	1	39.4	40.9	0.6	0.8	100	100
08/08/05	8-5	2	35.2	40.7	0.6	1.5	100	95
08/08/05	8-5	3	14.3	37.2	0.8	2.4	100	90
08/08/05	8-5	4	37.5	21.2	1.1	2.1	100	100
08/08/05	8-5	5	30.3	26.5	1.3	2.1	100	100
08/08/05	8-5	6	15.3	18.2	0.9	1.5	100	100
08/08/05	8-5	7	30.0	34.7	0.7	1.7	100	100
08/08/05	8-5	8	34.2	12.3	0.6	1.4	80	90
08/08/05	8-5	9	18.1	17.8	0.7	1.4	100	95
08/08/05	8-5	10	12.1	21.1	1.0	1.8	100	80
08/08/05	8-5	11	11.5	27.1	0.7	2.0	100	95
08/08/05	9-1	1	26.1	42.5	1.4	0.8	100	80
08/08/05	9-1	2	66.6	21.0	1.0	0.7	80	70
08/08/05	9-1	3	46.5	22.3	1.4	1.0	40	100
08/08/05	9-1	4	89.5	9.3	1.2	0.6	50	100
08/08/05	9-1	5	21.7	54.0	1.1	1.3	60	95
08/08/05	9-1	6	21.5	62.2	0.7	1.7	100	90
08/08/05	9-1	7	17.6	59.5	0.6	1.6	80	70
08/08/05	9-1	8	81.8	60.0	0.6	1.2	90	95
08/08/05	9-1	9	27.2	43.2	1.0	0.9	80	100
08/08/05	9-1	10	49.9	35.5	1.0	0.7	50	100
08/08/05	9-1	11	24.5	21.6	1.0	0.9	90	100
08/10/05	9-2	1	6.0	34.2	1.9	1.9	5	90
08/10/05	9-2	2	6.5	33.5	1.6	1.8	5	95
08/10/05	9-2	3	6.9	41.7	1.9	2.2	2	85
08/10/05	9-2	4	16.2	40.7	1.1	2.3	20	90
08/10/05	9-2	5	10.5	80.6	1.7	1.7	5	75
08/10/05	9-2	6	9.1	14.6	1.7	2.0	2	20
08/10/05	9-2	7	9.1	10.3	2.0	2.1	2	2
08/10/05	9-2	8	12.6	9.6	2.0	2.4	2	5
08/10/05	9-2	9	51.5	9.1	2.6	2.4	2	5
08/10/05	9-2	10	38.2	9.8	1.5	2.4	50	10
08/10/05	9-2	11	41.2	10.1	1.4	2.2	60	5
08/10/05	10-1	1	7.5	30.5	1.7	1.5	2	50
08/10/05	10-1	2	8.0	33.5	1.6	1.0	5	60
08/10/05	10-1	3	8.0	35.7	1.3	1.8	2	60
08/10/05	10-1	4	7.8	35.5	1.4	1.6	2	80
08/10/05	10-1	5	7.6	86.5	1.6	2.0	2	60
08/10/05	10-1	6	8.1	38.5	1.4	1.8	2	60
08/10/05	10-1	7	8.1	25.3	1.4	1.6	2	90
08/10/05	10-1	8	9.3	40.9	1.4	1.2	5	95
08/10/05	10-1	9	9.1	43.9	1.3	2.5	2	100
08/10/05	10-1	10	10.1	53.4	1.6	1.5	2	90
08/10/05	10-1	11	10.1	52.5	2.1	2.3	10	90

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
08/08/05	8-5	1		yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	2		yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	3		yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	4		yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	5	yes	yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	6	yes	yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	7	yes	yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	8	yes	yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	9		yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	10		yes	sand, silt, clay	sand, silt, clay
08/08/05	8-5	11		yes	sand, silt, clay	sand, silt, clay
08/08/05	9-1	1	yes	yes	sand, silt	sand, silt
08/08/05	9-1	2	yes	yes	sand, silt	sand, silt
08/08/05	9-1	3	yes	yes	sand, silt	sand, silt
08/08/05	9-1	4	yes		sand, silt	sand, silt
08/08/05	9-1	5	yes	yes	sand, silt	sand, silt
08/08/05	9-1	6		yes	sand, silt	sand, silt
08/08/05	9-1	7			sand, silt	sand, silt
08/08/05	9-1	8	yes		sand, silt	sand, silt
08/08/05	9-1	9			sand, silt	sand, silt
08/08/05	9-1	10	yes		sand, silt	sand, silt
08/08/05	9-1	11	yes		sand, silt	sand, silt
08/10/05	9-2	1		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	9-2	2		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	9-2	3		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	9-2	4	yes	yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	9-2	5		yes	sand, silt	sand, silt
08/10/05	9-2	6		yes	sand, silt, gravel	sand, silt
08/10/05	9-2	7		yes	sand, silt, gravel	sand, silt, gravel
08/10/05	9-2	8		yes	sand, silt	sand, silt, gravel
08/10/05	9-2	9	yes		sand, silt	sand, silt, gravel
08/10/05	9-2	10	yes		sand, silt	sand, silt, gravel
08/10/05	9-2	11	yes		sand, silt	sand, silt, gravel
08/10/05	10-1	1			sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	2		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	3		yes	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	10-1	4		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	5		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	6		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	7			sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	8		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	9			sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	10		yes	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	11		yes	sand, silt, clay, gravel	sand, silt, clay

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
08/08/05	8-5	1		vegetation	
08/08/05	8-5	2			
08/08/05	8-5	3			
08/08/05	8-5	4	vegetation		
08/08/05	8-5	5	vegetation		
08/08/05	8-5	6			vegetation
08/08/05	8-5	7	vegetation		
08/08/05	8-5	8	vegetation		vegetation
08/08/05	8-5	9			vegetation
08/08/05	8-5	10			vegetation
08/08/05	8-5	11			vegetation
08/08/05	9-1	1			
08/08/05	9-1	2	pondweed		
08/08/05	9-1	3			
08/08/05	9-1	4		pondweed	
08/08/05	9-1	5			
08/08/05	9-1	6			
08/08/05	9-1	7			
08/08/05	9-1	8	pondweed		
08/08/05	9-1	9		pondweed	pondweed
08/08/05	9-1	10	pondweed		
08/08/05	9-1	11	pondweed	pondweed	
08/10/05	9-2	1			
08/10/05	9-2	2			
08/10/05	9-2	3			
08/10/05	9-2	4			
08/10/05	9-2	5			
08/10/05	9-2	6			
08/10/05	9-2	7			
08/10/05	9-2	8			
08/10/05	9-2	9			
08/10/05	9-2	10			
08/10/05	9-2	11			
08/10/05	10-1	1			
08/10/05	10-1	2			
08/10/05	10-1	3			
08/10/05	10-1	4			
08/10/05	10-1	5			
08/10/05	10-1	6			
08/10/05	10-1	7			
08/10/05	10-1	8			
08/10/05	10-1	9			
08/10/05	10-1	10			
08/10/05	10-1	11			

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
08/08/05	8-5	1	50	56	53	0.00	0.01	0.00
08/08/05	8-5	2	49	60	57	0.00	0.08	0.02
08/08/05	8-5	3	54	58	52	0.00	0.00	0.00
08/08/05	8-5	4	50	59	57	0.00	0.00	0.00
08/08/05	8-5	5	53	58	50	0.02	0.02	0.00
08/08/05	8-5	6	53	58	52	0.00	0.06	0.00
08/08/05	8-5	7	52	62	60	0.02	0.00	0.00
08/08/05	8-5	8	55	64	57	0.01	0.04	0.00
08/08/05	8-5	9	51	67	59	0.00	0.00	0.00
08/08/05	8-5	10	60	68	58	0.00	0.01	0.00
08/08/05	8-5	11	58	67	60	0.03	0.01	0.00
08/08/05	9-1	1	95	120	87	0.06	0.18	0.05
08/08/05	9-1	2	81	89	98	0.12	0.24	0.32
08/08/05	9-1	3	149	100	38	0.22	0.26	0.30
08/08/05	9-1	4	151	119	63	0.23	0.18	0.03
08/08/05	9-1	5	66	67	56	0.31	0.27	0.23
08/08/05	9-1	6	41	59	100	0.27	0.24	0.36
08/08/05	9-1	7	78	80	89	0.21	0.37	0.37
08/08/05	9-1	8	30	99	53	0.00	0.30	0.23
08/08/05	9-1	9	82	129	86	0.23	0.22	0.05
08/08/05	9-1	10	120	84	48	0.23	0.22	0.12
08/08/05	9-1	11	110	97	74	0.27	0.19	0.15
08/10/05	9-2	1	10	24	31	0.08	0.11	0.13
08/10/05	9-2	2	12	22	28	0.09	0.12	0.13
08/10/05	9-2	3	7	16	18	0.13	0.16	0.12
08/10/05	9-2	4	41	3	19	0.00	0.04	0.18
08/10/05	9-2	5	4	13	12	0.00	0.23	0.28
08/10/05	9-2	6	7	6	11	0.21	0.33	0.48
08/10/05	9-2	7	12	22	7	0.38	0.22	0.25
08/10/05	9-2	8	7	13	7	0.43	0.31	0.16
08/10/05	9-2	9	8	11	5	0.20	0.35	0.19
08/10/05	9-2	10	7	8	15	0.37	0.34	0.47
08/10/05	9-2	11	11	14	17	0.38	0.33	0.08
08/10/05	10-1	1	10	12	16	0.04	0.35	0.21
08/10/05	10-1	2	7	15	16	0.19	0.31	0.17
08/10/05	10-1	3	4	7	14	0.19	0.42	0.48
08/10/05	10-1	4	13	25	31	0.11	0.45	0.28
08/10/05	10-1	5	20	32	36	0.07	0.19	0.16
08/10/05	10-1	6	43	69	80	0.04	0.10	0.00
08/10/05	10-1	7	24	33	54	0.06	0.08	0.04
08/10/05	10-1	8	39	40	40	0.06	0.12	0.07
08/10/05	10-1	9	30	57	77	0.07	0.06	0.02
08/10/05	10-1	10	30	30	34	0.05	0.08	0.06
08/10/05	10-1	11	18	14	10	0.01	0.02	0.33

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
08/08/05	8-5	1	silt, clay	silt, clay	silt, clay
08/08/05	8-5	2	silt, clay	silt, clay	silt, clay
08/08/05	8-5	3	silt, clay	silt, clay	silt, clay
08/08/05	8-5	4	silt, clay	silt, clay	silt, clay
08/08/05	8-5	5	silt, clay	silt, clay	silt, clay
08/08/05	8-5	6	silt, clay	silt, clay	silt, clay
08/08/05	8-5	7	silt, clay	silt, clay	silt, clay
08/08/05	8-5	8	silt, clay	silt, clay	silt, clay
08/08/05	8-5	9	silt, clay	silt, clay	silt, clay
08/08/05	8-5	10	silt, clay	silt, clay	silt, clay
08/08/05	8-5	11	silt, clay	silt, clay	silt, clay
08/08/05	9-1	1	sand, silt, gravel	sand, silt	sand, silt, gravel
08/08/05	9-1	2	sand, silt	sand, silt, gravel	sand, silt, gravel
08/08/05	9-1	3	sand, silt	sand, silt, gravel	sand, silt, gravel
08/08/05	9-1	4	sand, silt	sand, silt	sand, silt
08/08/05	9-1	5	sand,silt, grave, cobble	sand, silt, cobble	sand, silt, gravel
08/08/05	9-1	6	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
08/08/05	9-1	7	sand, silt, gravel	sand, silt, gravel	sand, silt, gravel
08/08/05	9-1	8	sand, silt	sand, silt, gravel	sand, silt, gravel, cobble
08/08/05	9-1	9	sand, silt, gravel	sand, silt, gravel	sand, silt
08/08/05	9-1	10	sand, silt	sand, silt	sand, silt, gravel
08/08/05	9-1	11	sand, silt	sand, silt	sand, silt
08/10/05	9-2	1	sand, silt	sand, silt	sand, silt
08/10/05	9-2	2	sand, silt	sand, silt	sand, silt
08/10/05	9-2	3	sand, silt	sand, silt	sand, silt
08/10/05	9-2	4	sand, silt, clay	sand, silt	sand, silt
08/10/05	9-2	5	sand, silt	sand, silt	sand, silt
08/10/05	9-2	6	sand, silt, clay, gravel	sand, silt	sand, silt, gravel
08/10/05	9-2	7	sand, silt	sand, silt	sand, silt
08/10/05	9-2	8	sand, silt	sand, silt, gravel	sand, silt, gravel
08/10/05	9-2	9	sand, silt	sand, silt, gravel	sand, silt, gravel
08/10/05	9-2	10	sand, silt	sand, silt	sand, silt
08/10/05	9-2	11	sand, silt	sand, silt	sand, silt
08/10/05	10-1	1	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	10-1	2	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	3	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	10-1	4	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	10-1	5	sand, silt, clay	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	10-1	6	sand, silt, clay	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	7	sand, silt, clay	sand, silt, clay, gravel	sand, silt, clay
08/10/05	10-1	8	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	10-1	9	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	10-1	10	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	10-1	11	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
08/08/05	8-5	1			
08/08/05	8-5	2			
08/08/05	8-5	3			
08/08/05	8-5	4			
08/08/05	8-5	5			
08/08/05	8-5	6			
08/08/05	8-5	7			
08/08/05	8-5	8			
08/08/05	8-5	9			
08/08/05	8-5	10			
08/08/05	8-5	11			
08/08/05	9-1	1			
08/08/05	9-1	2			
08/08/05	9-1	3			
08/08/05	9-1	4			
08/08/05	9-1	5	15	10	10
08/08/05	9-1	6			
08/08/05	9-1	7			
08/08/05	9-1	8			
08/08/05	9-1	9			
08/08/05	9-1	10			
08/08/05	9-1	11			
08/10/05	9-2	1			
08/10/05	9-2	2			
08/10/05	9-2	3			
08/10/05	9-2	4			
08/10/05	9-2	5			
08/10/05	9-2	6			
08/10/05	9-2	7			
08/10/05	9-2	8			
08/10/05	9-2	9			
08/10/05	9-2	10			
08/10/05	9-2	11			
08/10/05	10-1	1			
08/10/05	10-1	2			
08/10/05	10-1	3			
08/10/05	10-1	4			
08/10/05	10-1	5			
08/10/05	10-1	6			
08/10/05	10-1	7			
08/10/05	10-1	8			
08/10/05	10-1	9			
08/10/05	10-1	10			
08/10/05	10-1	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
08/12/05	10-2	1	Channel	11.3	14.3	0.0
08/12/05	10-2	2	Channel	9.2	12.0	0.0
08/12/05	10-2	3	Channel	9.3	10.7	1.0
08/12/05	10-2	4	Channel	10.2	12.3	0.0
08/12/05	10-2	5	Channel	10.5	11.9	0.0
08/12/05	10-2	6	Channel	8.7	9.2	0.0
08/12/05	10-2	7	Channel	8.0	8.9	0.0
08/12/05	10-2	8	Channel	11.3	12.4	0.0
08/12/05	10-2	9	Channel	10.6	12.5	0.0
08/12/05	10-2	10	Channel	11.5	12.2	0.0
08/12/05	10-2	11	Channel	11.9	13.2	0.0
08/11/05	10-3	1	Channel	22.8	26.4	0.0
08/11/05	10-3	2	Channel	24.4	28.6	0.0
08/11/05	10-3	3	Channel	25.3	30.4	0.0
08/11/05	10-3	4	Channel	23.6	27.8	0.0
08/11/05	10-3	5	Channel	22.3	28.1	0.0
08/11/05	10-3	6	Channel	20.1	30.2	0.0
08/11/05	10-3	7	Channel	23.0	24.8	0.0
08/11/05	10-3	8	Channel	19.8	27.6	0.0
08/11/05	10-3	9	Channel	20.4	23.7	0.0
08/11/05	10-3	10	Island	10.8	41.6	26.8
08/11/05	10-3	11	Island	19.0	37.3	15.2
08/11/05	10-4	1	Channel	8.8	12.0	0.0
08/11/05	10-4	2	Channel	9.0	12.2	0.0
08/11/05	10-4	3	Channel	8.2	11.3	0.0
08/11/05	10-4	4	Channel	9.4	13.7	0.0
08/11/05	10-4	5	Channel	7.1	15.3	0.0
08/11/05	10-4	6	Channel	9.9	13.3	0.0
08/11/05	10-4	7	Channel	8.7	17.4	0.0
08/11/05	10-4	8	Channel	8.7	17.4	0.0
08/11/05	10-4	9	Channel	11.0	17.1	0.0
08/11/05	10-4	10	Channel	13.5	13.3	0.0
08/11/05	10-4	11	Channel	11.2	13.7	0.0
08/18/05	10-5	1	Channel	23.5	33.0	0.0
08/18/05	10-5	2	Channel	20.0	25.8	0.0
08/18/05	10-5	3	Channel	22.1	30.0	0.0
08/18/05	10-5	4	Channel	27.2	30.1	0.0
08/18/05	10-5	5	Channel	21.4	29.6	0.0
08/18/05	10-5	6	Channel	19.3	22.8	0.0
08/18/05	10-5	7	Channel	17.9	23.3	0.0
08/18/05	10-5	8	Riffle	7.3	28.8	0.0
08/18/05	10-5	9	Channel	15.6	17.8	0.0
08/18/05	10-5	10	Channel	14.8	16.4	0.0
08/18/05	10-5	11	Channel	16.8	18.9	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
08/12/05	10-2	1	0	34.2	25.3	12	11	Grazing
08/12/05	10-2	2	0	39.0	27.6	14	17	Grazing
08/12/05	10-2	3	0	34.0	34.0	13	17	Grazing
08/12/05	10-2	4	0	39.0	32.2	17	17	Grazing
08/12/05	10-2	5	0	36.2	35.0	12	17	Grazing
08/12/05	10-2	6	0	32.0	30.7	6	11	Grazing
08/12/05	10-2	7	0	27.8	32.5	14	17	Grazing
08/12/05	10-2	8	0	34.0	34.5	15	17	Grazing
08/12/05	10-2	9	0	45.4	34.9	17	9	Grazing
08/12/05	10-2	10	0	36.7	48.0	8	17	Grazing
08/12/05	10-2	11	0	42.0	33.5	17	17	Grazing
08/11/05	10-3	1	0	21.8	28.0	14	8	Grazing
08/11/05	10-3	2	0	16.1	21.3	3	7	Grazing
08/11/05	10-3	3	0	19.3	21.2	12	10	Grazing
08/11/05	10-3	4	0	18.6	20.7	4	17	Grazing
08/11/05	10-3	5	0	21.2	20.2	11	11	Grazing
08/11/05	10-3	6	0	25.2	19.8	8	0	Grazing
08/11/05	10-3	7	0	24.7	21.8	12	17	Grazing
08/11/05	10-3	8	0	21.0	24.0	15	11	Grazing
08/11/05	10-3	9	0	16.7	21.7	7	12	Grazing
08/11/05	10-3	10	355	19.2	16.1	17	17	Grazing
08/11/05	10-3	11	10	24.2	14.6	9	17	Grazing
08/11/05	10-4	1	0	35.9	31.2	11	8	Grazing
08/11/05	10-4	2	0	26.5	51.7	10	17	Grazing
08/11/05	10-4	3	0	40.0	35.2	13	13	Grazing
08/11/05	10-4	4	0	40.7	24.6	14	13	Grazing
08/11/05	10-4	5	0	43.5	16.8	13	0	Grazing
08/11/05	10-4	6	0	53.9	21.8	15	0	Grazing
08/11/05	10-4	7	0	77.8	21.2	17	0	Grazing
08/11/05	10-4	8	0	25.7	22.6	1	0	Grazing
08/11/05	10-4	9	0	29.3	40.0	5	14	Grazing
08/11/05	10-4	10	0	30.2	41.4	17	17	Grazing
08/11/05	10-4	11	0	24.5	47.2	0	17	Grazing
08/18/05	10-5	1	0	20.8	15.3	17	5	Grazing
08/18/05	10-5	2	0	22.1	17.2	14	0	Grazing
08/18/05	10-5	3	0	22.0	17.7	0	0	Grazing
08/18/05	10-5	4	0	20.7	20.8	17	3	Grazing
08/18/05	10-5	5	0	21.2	20.1	7	4	Grazing
08/18/05	10-5	6	0	24.0	21.2	6	4	Grazing
08/18/05	10-5	7	0	14.5	19.0	2	0	Grazing
08/18/05	10-5	8	20	12.6	41.5	0	4	Grazing
08/18/05	10-5	9	0	17.7	36.2	5	9	Grazing
08/18/05	10-5	10	0	27.6	26.6	11	16	Grazing
08/18/05	10-5	11	0	20.8	27.7	11	17	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
08/12/05	10-2	1	37.7	32.0	1.5	1.4	90	80
08/12/05	10-2	2	47.7	40.2	1.6	1.9	90	90
08/12/05	10-2	3	75.8	55.9	1.1	1.1	90	80
08/12/05	10-2	4	58.5	26.2	1.3	0.7	100	90
08/12/05	10-2	5	56.9	39.2	1.3	1.0	90	60
08/12/05	10-2	6	43.2	35.0	1.0	0.9	80	60
08/12/05	10-2	7	70.3	39.5	1.0	1.1	95	90
08/12/05	10-2	8	55.7	55.4	1.2	2.0	95	90
08/12/05	10-2	9	79.4	51.5	1.3	1.3	90	95
08/12/05	10-2	10	45.5	49.2	1.3	1.2	90	80
08/12/05	10-2	11	33.0	54.5	1.2	1.5	55	80
08/11/05	10-3	1	33.5	35.7	1.1	1.1	95	100
08/11/05	10-3	2	26.2	33.4	1.2	1.3	95	100
08/11/05	10-3	3	27.1	24.6	1.3	0.9	100	95
08/11/05	10-3	4	25.3	38.5	1.0	1.1	80	100
08/11/05	10-3	5	28.8	29.8	1.1	2.1	90	90
08/11/05	10-3	6	28.8	14.6	1.0	1.4	80	90
08/11/05	10-3	7	50.0	44.0	0.9	1.2	50	95
08/11/05	10-3	8	65.8	34.5	1.1	2.6	40	90
08/11/05	10-3	9	21.7	39.9	0.8	1.8	80	100
08/11/05	10-3	10	64.4	31.7	1.5	1.1	2	90
08/11/05	10-3	11	50.0	51.2	4.7	1.0	0	90
08/11/05	10-4	1	46.7	15.6	0.9	0.9	70	95
08/11/05	10-4	2	27.0	27.1	0.7	0.7	70	95
08/11/05	10-4	3	28.7	24.1	0.8	0.8	60	90
08/11/05	10-4	4	24.8	17.2	0.7	0.8	80	90
08/11/05	10-4	5	21.1	15.3	0.8	0.8	60	75
08/11/05	10-4	6	43.5	20.7	1.3	0.9	40	60
08/11/05	10-4	7	45.5	16.7	1.0	0.8	70	60
08/11/05	10-4	8	14.3	18.6	0.6	0.8	60	80
08/11/05	10-4	9	31.5	47.2	1.3	1.3	50	70
08/11/05	10-4	10	45.7	112.9	4.7	1.9	90	0
08/11/05	10-4	11	31.3	123.8	1.4	1.8	50	1
08/18/05	10-5	1	19.7	18.6	0.7	1.1	90	80
08/18/05	10-5	2	38.5	17.5	1.0	0.9	80	95
08/18/05	10-5	3	18.2	14.1	1.1	1.1	90	70
08/18/05	10-5	4	29.5	33.5	0.8	1.2	100	85
08/18/05	10-5	5	20.3	30.1	1.0	1.2	70	90
08/18/05	10-5	6	26.0	24.1	1.3	1.2	90	80
08/18/05	10-5	7	29.0	12.8	1.0	1.0	95	30
08/18/05	10-5	8	8.3	42.7	0.5	1.1	40	95
08/18/05	10-5	9	30.2	58.7	1.0	1.1	80	2
08/18/05	10-5	10	39.0	44.0	1.1	0.9	2	20
08/18/05	10-5	11	23.7	35.7	0.5	0.7	90	100

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
08/12/05	10-2	1	yes	yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	2		yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	3	yes	yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	4	yes	yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	5	yes	yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	6		yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	7		yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	8		yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	9	yes		sand, silt, clay	sand, silt, clay
08/12/05	10-2	10		yes	sand, silt, clay	sand, silt, clay
08/12/05	10-2	11		yes	sand, silt, clay	sand, silt, clay
08/11/05	10-3	1			sand, silt, clay	sand, silt, clay
08/11/05	10-3	2			sand, silt, clay	sand, silt, clay
08/11/05	10-3	3			sand, silt, clay	sand, silt, clay
08/11/05	10-3	4			sand, silt, clay	sand, silt, clay
08/11/05	10-3	5			sand, silt, clay	sand, silt, clay
08/11/05	10-3	6	yes		sand, silt, clay	sand, silt, clay
08/11/05	10-3	7	yes	yes	sand, silt, clay	sand, silt, clay
08/11/05	10-3	8	yes	yes	sand, silt, clay	sand, silt, clay
08/11/05	10-3	9			sand, silt, clay	sand, silt, clay
08/11/05	10-3	10	yes		sand, silt, clay	sand, silt, gravel
08/11/05	10-3	11		yes	sand, silt, clay	sand, silt, clay
08/11/05	10-4	1	yes		sand, silt, clay, bedrock	sand, silt, clay
08/11/05	10-4	2	yes		sand, silt, clay, bedrock	sand, silt, clay
08/11/05	10-4	3	yes		sand, silt, bedrock	sand, silt, clay
08/11/05	10-4	4	yes		sand, silt, bedrock	sand, silt, clay
08/11/05	10-4	5	yes		sand, silt, bedrock	sand, silt, clay
08/11/05	10-4	6	yes		sand, silt, bedrock	sand, silt, clay
08/11/05	10-4	7	yes		sand, silt, bedrock	sand, silt, clay
08/11/05	10-4	8	yes		sand, silt, bedrock	sand, silt, clay
08/11/05	10-4	9	yes	yes	sand, silt, clay	sand, silt, bedrock
08/11/05	10-4	10	yes	yes	sand, silt, clay	bedrock
08/11/05	10-4	11		yes	sand, silt, clay	bedrock
08/18/05	10-5	1			sand, silt, clay	sand, silt, clay
08/18/05	10-5	2			sand, silt, clay	sand, silt, clay
08/18/05	10-5	3			sand, silt, clay	sand, silt, clay
08/18/05	10-5	4			sand, silt, clay	sand, silt, clay
08/18/05	10-5	5			sand, silt, clay	sand, silt, clay
08/18/05	10-5	6			sand, silt, clay	sand, silt, clay
08/18/05	10-5	7			sand, silt, clay	sand, silt, clay, gravel
08/18/05	10-5	8		yes	sand, silt, clay, cobble	sand, silt, clay
08/18/05	10-5	9		yes	sand, silt, cobble	sand, silt, clay
08/18/05	10-5	10			sand, gravel, cobble	sand, silt, clay
08/18/05	10-5	11			sand, gravel, cobble	sand, silt, clay

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
08/12/05	10-2	1			
08/12/05	10-2	2			
08/12/05	10-2	3			
08/12/05	10-2	4			
08/12/05	10-2	5			
08/12/05	10-2	6			
08/12/05	10-2	7			
08/12/05	10-2	8			
08/12/05	10-2	9			
08/12/05	10-2	10			
08/12/05	10-2	11			
08/11/05	10-3	1	PW / WG	widgeon grass	widgeon grass
08/11/05	10-3	2	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-3	3	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-3	4			widgeon grass
08/11/05	10-3	5		widgeon grass	widgeon grass
08/11/05	10-3	6		widgeon grass	widgeon grass
08/11/05	10-3	7	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-3	8		PW / WG	PW / WG
08/11/05	10-3	9		PW / WG	PW / WG
08/11/05	10-3	10			widgeon grass
08/11/05	10-3	11			widgeon grass
08/11/05	10-4	1			
08/11/05	10-4	2			
08/11/05	10-4	3			
08/11/05	10-4	4			
08/11/05	10-4	5	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-4	6	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-4	7	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-4	8	widgeon grass	widgeon grass	widgeon grass
08/11/05	10-4	9	widgeon grass	widgeon grass	pondweed
08/11/05	10-4	10			
08/11/05	10-4	11			
08/18/05	10-5	1			PW / WG
08/18/05	10-5	2	widgeon grass		
08/18/05	10-5	3	widgeon grass		pondweed
08/18/05	10-5	4	widgeon grass		widgeon grass
08/18/05	10-5	5	widgeon grass	widgeon grass	widgeon grass
08/18/05	10-5	6			
08/18/05	10-5	7			widgeon grass
08/18/05	10-5	8			
08/18/05	10-5	9			
08/18/05	10-5	10			
08/18/05	10-5	11	widgeon grass		

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
08/12/05	10-2	1	13	6	6	0.48	0.03	0.19
08/12/05	10-2	2	6	18	14	0.14	0.23	0.32
08/12/05	10-2	3	29	15	14	0.06	0.21	0.24
08/12/05	10-2	4	11	17	30	0.16	0.23	0.18
08/12/05	10-2	5	18	18	19	0.14	0.15	0.21
08/12/05	10-2	6	31	45	32	0.14	0.15	0.08
08/12/05	10-2	7	46	38	41	0.08	0.15	0.02
08/12/05	10-2	8	25	27	30	0.05	0.10	0.02
08/12/05	10-2	9	32	23	33	0.06	0.12	0.12
08/12/05	10-2	10	22	21	24	0.03	0.17	0.04
08/12/05	10-2	11	11	17	25	0.11	0.14	0.14
08/11/05	10-3	1	43	44	102	0.00	0.00	0.03
08/11/05	10-3	2	27	27	42	0.00	0.06	0.00
08/11/05	10-3	3	30	19	12	0.14	0.00	0.13
08/11/05	10-3	4	53	53	22	0.05	0.00	0.02
08/11/05	10-3	5	52	27	19	0.02	0.00	0.00
08/11/05	10-3	6	58	50	35	0.00	0.01	0.00
08/11/05	10-3	7	49	50	31	0.00	0.00	0.00
08/11/05	10-3	8	52	46	38	0.07	0.00	0.00
08/11/05	10-3	9	47	47	33	0.00	0.00	0.00
08/11/05	10-3	10	33	39	21	0.22	0.11	0.25
08/11/05	10-3	11	8	35	26	0.00	0.05	0.07
08/11/05	10-4	1	77	90	59	0.00	0.00	0.00
08/11/05	10-4	2	70	83	67	0.00	0.00	0.00
08/11/05	10-4	3	50	63	54	0.03	0.01	0.01
08/11/05	10-4	4	52	61	47	0.00	0.03	0.03
08/11/05	10-4	5	27	27	22	0.06	0.09	0.08
08/11/05	10-4	6	32	29	31	0.10	0.05	0.11
08/11/05	10-4	7	20	25	23	0.10	0.03	0.14
08/11/05	10-4	8	19	23	18	0.12	0.13	0.12
08/11/05	10-4	9	42	52	32	0.02	0.07	0.00
08/11/05	10-4	10	29	37	39	0.00	0.05	0.01
08/11/05	10-4	11	36	43	33	0.00	0.05	0.00
08/18/05	10-5	1	54	32	27	0.00	0.00	0.00
08/18/05	10-5	2	28	36	40	0.00	0.00	0.00
08/18/05	10-5	3	24	33	23	0.00	0.00	0.00
08/18/05	10-5	4	28	41	30	0.00	0.00	0.00
08/18/05	10-5	5	20	17	29	0.00	0.15	0.03
08/18/05	10-5	6	57	57	40	0.00	0.01	0.08
08/18/05	10-5	7	43	22	14	0.03	0.03	0.07
08/18/05	10-5	8	22	12	16	0.18	0.21	0.07
08/18/05	10-5	9	53	62	51	0.00	0.00	0.00
08/18/05	10-5	10	75	79	68	0.00	0.00	0.00
08/18/05	10-5	11	22	48	109	0.00	0.00	0.00

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
08/12/05	10-2	1	sand, silt, clay, gravel	sand, silt, clay	sand, silt, clay
08/12/05	10-2	2	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	3	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	4	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	5	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	6	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	7	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	8	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	9	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	10	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/12/05	10-2	11	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/11/05	10-3	1	silt, clay	silt, clay	bedrock
08/11/05	10-3	2	silt, clay	silt, clay	sand, silt, clay
08/11/05	10-3	3	silt, clay	silt, clay	bedrock
08/11/05	10-3	4	bedrock	bedrock	silt, clay
08/11/05	10-3	5	bedrock	silt, clay	silt, clay
08/11/05	10-3	6	bedrock	silt, clay, bedrock	silt, clay
08/11/05	10-3	7	silt, clay, bedrock	silt, clay, bedrock	silt, clay
08/11/05	10-3	8	bedrock	silt, clay, bedrock	silt, clay
08/11/05	10-3	9	bedrock	silt, clay, bedrock	silt, clay, bedrock
08/11/05	10-3	10	bedrock	bedrock	silt, clay, gravel
08/11/05	10-3	11	bedrock	bedrock	silt, clay, gravel
08/11/05	10-4	1	silt, clay	silt, clay	silt, clay
08/11/05	10-4	2	silt, clay	silt, clay	silt, clay
08/11/05	10-4	3	silt, clay	silt, clay	silt, clay
08/11/05	10-4	4	silt, clay	silt, clay	silt, clay
08/11/05	10-4	5	silt, clay	silt, clay	silt, clay
08/11/05	10-4	6	silt, clay	silt, clay	silt, clay
08/11/05	10-4	7	silt, clay	silt, clay	silt, clay
08/11/05	10-4	8	silt, clay	silt, clay	silt, clay
08/11/05	10-4	9	silt, clay	silt, clay	silt, clay
08/11/05	10-4	10	silt, clay	silt, clay	silt, clay
08/11/05	10-4	11	silt, clay	silt, clay	silt, clay
08/18/05	10-5	1	sand, silt, gravel	sand, silt, gravel	sand, silt
08/18/05	10-5	2	sand, silt	sand, silt	sand, silt
08/18/05	10-5	3	sand, silt	sand, silt	sand, silt
08/18/05	10-5	4	sand, silt	sand, silt	sand, silt
08/18/05	10-5	5	sand, silt	sand, silt	sand, silt
08/18/05	10-5	6	bedrock	bedrock	bedrock
08/18/05	10-5	7	sand, silt, gravel, bedrock	sand, silt, gravel, bedrock	sand, silt, gravel, bedrock
08/18/05	10-5	8	bedrock, gravel	bedrock	bedrock
08/18/05	10-5	9	bedrock	bedrock, cobble	bedrock
08/18/05	10-5	10	bedrock	bedrock	sand, silt, cobble, bedrock
08/18/05	10-5	11	sand, silt, gravel, bedrock	sand, silt, gravel, bedrock	silt, bedrock

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
08/12/05	10-2	1			
08/12/05	10-2	2			
08/12/05	10-2	3			
08/12/05	10-2	4			
08/12/05	10-2	5			
08/12/05	10-2	6			
08/12/05	10-2	7			
08/12/05	10-2	8			
08/12/05	10-2	9			
08/12/05	10-2	10			
08/12/05	10-2	11			
08/11/05	10-3	1			100
08/11/05	10-3	2			
08/11/05	10-3	3			100
08/11/05	10-3	4	100	100	
08/11/05	10-3	5	100		
08/11/05	10-3	6	100	100	
08/11/05	10-3	7	100	100	
08/11/05	10-3	8	100	100	
08/11/05	10-3	9	100	100	100
08/11/05	10-3	10	100	100	
08/11/05	10-3	11	100	100	
08/11/05	10-4	1			
08/11/05	10-4	2			
08/11/05	10-4	3			
08/11/05	10-4	4			
08/11/05	10-4	5			
08/11/05	10-4	6			
08/11/05	10-4	7			
08/11/05	10-4	8			
08/11/05	10-4	9			
08/11/05	10-4	10			
08/11/05	10-4	11			
08/18/05	10-5	1			
08/18/05	10-5	2			
08/18/05	10-5	3			
08/18/05	10-5	4			
08/18/05	10-5	5			
08/18/05	10-5	6	100	100	100
08/18/05	10-5	7	100	100	100
08/18/05	10-5	8	100	100	100
08/18/05	10-5	9	100	100	100
08/18/05	10-5	10	100	100	100
08/18/05	10-5	11	100	100	100

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
08/10/05	11-1	1	Channel	4.2	25.7	0.0
08/10/05	11-1	2	Channel	1.1	20.4	0.0
08/10/05	11-1	3	Channel	1.6	22.9	0.0
08/10/05	11-1	4	Channel	4.9	21.5	0.0
08/10/05	11-1	5	Channel	6.2	15.4	0.0
08/10/05	11-1	6	Channel	5.7	19.6	0.0
08/10/05	11-1	7	Channel	8.5	18.5	0.0
08/10/05	11-1	8	Channel	10.5	16.8	0.0
08/10/05	11-1	9	Braid	11.2	16.8	6.1
08/10/05	11-1	10	Channel	9.2	16.5	0.0
08/10/05	11-1	11	Braid	12.4	20.2	4.7
08/10/05	11-2	1	Channel	6.5	8.9	0.0
08/10/05	11-2	2	Channel	6.5	9.7	0.0
08/10/05	11-2	3	Channel	6.4	8.1	0.0
08/10/05	11-2	4	Channel	6.0	7.8	0.0
08/10/05	11-2	5	Channel	6.9	11.1	0.0
08/10/05	11-2	6	Channel	6.7	8.6	0.0
08/10/05	11-2	7	Channel	6.5	9.9	0.0
08/10/05	11-2	8	Channel	6.7	10.3	0.0
08/10/05	11-2	9	Channel	6.9	9.6	0.0
08/10/05	11-2	10	Channel	6.9	10.2	0.0
08/10/05	11-2	11	Channel	7.2	10.0	0.0
08/18/05	11-4	1	Channel	2.2	11.0	0.0
08/18/05	11-4	2	Channel	3.2	16.2	0.0
08/18/05	11-4	3	Riffle	2.2	15.7	0.0
08/18/05	11-4	4	Channel	6.4	16.9	0.0
08/18/05	11-4	5	Channel	3.0	10.6	0.0
08/18/05	11-4	6	Channel	4.5	11.2	0.0
08/18/05	11-4	7	Channel	3.7	10.0	0.0
08/18/05	11-4	8	Channel	4.2	11.5	0.0
08/18/05	11-4	9	Channel	4.2	11.2	0.0
08/18/05	11-4	10	Channel	3.9	12.6	0.0
08/18/05	11-4	11	Channel	6.4	14.0	0.0
08/18/05	11-5	1	Channel	4.6	9.4	0.0
08/18/05	11-5	2	Channel	4.4	12.4	0.0
08/18/05	11-5	3	Channel	5.9	12.4	0.0
08/18/05	11-5	4	Channel	5.4	9.7	0.0
08/18/05	11-5	5	Channel	6.6	11.9	0.0
08/18/05	11-5	6	Channel	4.7	13.7	0.0
08/18/05	11-5	7	Channel	6.6	12.1	0.0
08/18/05	11-5	8	Channel	6.6	23.5	0.0
08/18/05	11-5	9	Channel	3.9	22.6	0.0
08/18/05	11-5	10	Channel	6.6	17.7	0.0
08/18/05	11-5	11	Channel	4.9	14.1	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
08/10/05	11-1	1	20	16.1	21.7	0	0	Grazing
08/10/05	11-1	2	0	17.0	39.7	0	15	Grazing
08/10/05	11-1	3	320	34.5	16.0	2	0	Grazing
08/10/05	11-1	4	20	45.0	15.8	12	0	Grazing
08/10/05	11-1	5	20	30.6	19.5	0	13	Grazing
08/10/05	11-1	6	5	17.7	29.3	0	14	Grazing
08/10/05	11-1	7	0	13.5	24.8	0	17	Grazing
08/10/05	11-1	8	345	20.7	27.6	0	13	Grazing
08/10/05	11-1	9	330	19.0	19.0	15	17	Grazing
08/10/05	11-1	10	0	15.8	19.2	13	0	Grazing
08/10/05	11-1	11	20	22.6	20.5	13	0	Grazing
08/10/05	11-2	1	0	38.2	21.0	12	17	Grazing
08/10/05	11-2	2	0	36.0	32.5	5	16	Grazing
08/10/05	11-2	3	0	34.0	35.5	16	13	Grazing
08/10/05	11-2	4	0	39.5	27.5	16	17	Grazing
08/10/05	11-2	5	0	24.3	32.7	17	2	Grazing
08/10/05	11-2	6	0	29.5	19.6	17	3	Grazing
08/10/05	11-2	7	0	48.4	31.5	17	17	Grazing
08/10/05	11-2	8	0	42.7	34.4	17	14	Grazing
08/10/05	11-2	9	0	36.0	52.2	7	17	Grazing
08/10/05	11-2	10	0	47.2	24.8	17	12	Grazing
08/10/05	11-2	11	0	19.0	34.2	8	17	Grazing
08/18/05	11-4	1	350	26.5	35.5	0	6	Grazing
08/18/05	11-4	2	345	28.8	27.7	0	0	Grazing
08/18/05	11-4	3	340	57.0	19.3	13	11	Grazing
08/18/05	11-4	4	30	57.0	22.7	17	0	Grazing
08/18/05	11-4	5	0	31.6	40.5	10	3	Grazing
08/18/05	11-4	6	5	22.2	36.4	3	8	Grazing
08/18/05	11-4	7	355	18.0	35.5	2	4	Grazing
08/18/05	11-4	8	0	14.0	38.5	0	5	Grazing
08/18/05	11-4	9	0	15.8	37.5	0	8	Grazing
08/18/05	11-4	10	5	26.7	36.5	0	2	Grazing
08/18/05	11-4	11	10	24.8	52.4	2	13	Grazing
08/18/05	11-5	1	10	27.2	45.4	10	3	Grazing
08/18/05	11-5	2	0	24.5	46.5	3	11	Grazing
08/18/05	11-5	3	10	27.7	57.5	8	16	Grazing
08/18/05	11-5	4	0	25.1	56.5	3	8	Grazing
08/18/05	11-5	5	0	35.5	56.4	2	8	Grazing
08/18/05	11-5	6	355	28.7	54.9	0	12	Grazing
08/18/05	11-5	7	5	21.5	53.4	0	5	Grazing
08/18/05	11-5	8	0	35.0	43.5	0	2	Grazing
08/18/05	11-5	9	355	29.0	24.7	0	0	Grazing
08/18/05	11-5	10	350	30.6	19.3	4	0	Grazing
08/18/05	11-5	11	345	24.3	24.7	6	0	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
08/10/05	11-1	1	11.3	18.6	1.9	1.7	20	10
08/10/05	11-1	2	9.8	43.4	1.9	1.5	10	100
08/10/05	11-1	3	38.2	10.1	1.4	1.5	30	5
08/10/05	11-1	4	47.9	13.6	2.7	1.8	40	5
08/10/05	11-1	5	15.3	41.7	2.1	1.6	20	100
08/10/05	11-1	6	11.6	56.4	1.8	1.6	2	95
08/10/05	11-1	7	16.8	50.4	1.0	1.7	5	90
08/10/05	11-1	8	19.7	40.2	1.3	2.4	10	95
08/10/05	11-1	9	44.4	50.0	1.3	1.7	95	95
08/10/05	11-1	10	49.0	15.0	1.2	1.6	70	20
08/10/05	11-1	11	41.5	37.2	1.7	1.8	90	80
08/10/05	11-2	1	42.2	59.7	1.0	1.0	95	95
08/10/05	11-2	2	52.5	27.6	1.6	0.7	50	20
08/10/05	11-2	3	51.0	75.3	1.3	1.3	85	90
08/10/05	11-2	4	34.9	54.5	1.0	1.1	70	95
08/10/05	11-2	5	64.1	20.2	1.2	1.5	90	20
08/10/05	11-2	6	66.0	36.2	1.2	1.4	75	50
08/10/05	11-2	7	41.7	52.7	1.2	1.1	50	60
08/10/05	11-2	8	39.7	55.5	0.9	0.9	50	95
08/10/05	11-2	9	41.2	34.7	0.9	1.1	90	95
08/10/05	11-2	10	38.0	28.5	1.3	1.0	80	80
08/10/05	11-2	11	34.5	39.7	1.3	1.3	50	80
08/18/05	11-4	1	15.1	16.7	0.5	0.6	100	90
08/18/05	11-4	2	16.1	14.3	0.8	0.8	80	90
08/18/05	11-4	3	21.7	22.1	0.9	0.6	100	70
08/18/05	11-4	4	41.5	14.6	1.0	0.7	10	80
08/18/05	11-4	5	18.8	12.8	0.8	0.6	90	80
08/18/05	11-4	6	13.8	15.3	0.9	0.7	100	70
08/18/05	11-4	7	16.5	16.7	0.8	0.6	100	95
08/18/05	11-4	8	13.8	14.6	0.8	0.7	90	80
08/18/05	11-4	9	16.2	15.1	0.7	1.0	90	70
08/18/05	11-4	10	9.3	10.8	0.7	0.7	80	60
08/18/05	11-4	11	12.8	35.9	0.8	0.9	90	90
08/18/05	11-5	1	27.1	12.6	0.6	1.0	60	90
08/18/05	11-5	2	10.6	44.0	0.8	1.3	80	80
08/18/05	11-5	3	14.3	14.8	0.6	0.9	90	2
08/18/05	11-5	4	12.6	24.7	1.1	1.2	90	0
08/18/05	11-5	5	14.1	28.7	0.8	1.2	80	0
08/18/05	11-5	6	14.8	14.6	0.7	0.8	40	10
08/18/05	11-5	7	9.5	28.8	0.5	1.0	50	80
08/18/05	11-5	8	12.3	10.8	0.4	1.0	20	20
08/18/05	11-5	9	9.1	10.7	1.0	0.8	30	70
08/18/05	11-5	10	14.3	13.3	0.5	0.8	20	95
08/18/05	11-5	11	14.3	13.3	0.4	0.6	90	85

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
08/10/05	11-1	1			sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	11-1	2			sand, silt, clay, gravel	sand, silt, clay
08/10/05	11-1	3	yes		sand, silt, clay	sand, silt, clay, gravel
08/10/05	11-1	4	yes		sand, silt, clay	sand, silt, clay, gravel
08/10/05	11-1	5			sand, silt, clay, gravel	sand, silt, clay
08/10/05	11-1	6		yes	sand, silt, clay, gravel	sand, silt
08/10/05	11-1	7	yes	yes	sand, silt, clay, gravel	sand, silt
08/10/05	11-1	8		yes	sand, silt, clay	sand, silt, clay
08/10/05	11-1	9			sand, silt, clay	sand, silt, clay
08/10/05	11-1	10	yes		sand, silt, clay	sand, silt, clay
08/10/05	11-1	11			sand, silt, clay	sand, silt, clay
08/10/05	11-2	1	yes	yes	sand, silt, clay	sand, silt, clay
08/10/05	11-2	2	yes	yes	sand, silt, clay	sand, silt, clay
08/10/05	11-2	3	yes	yes	sand, silt, clay	sand, silt, clay
08/10/05	11-2	4		yes	sand, silt, clay	sand, silt, clay
08/10/05	11-2	5			sand, silt, clay	sand, silt, clay
08/10/05	11-2	6			sand, silt, clay	sand, silt, clay
08/10/05	11-2	7	yes		sand, silt, clay	sand, silt, clay
08/10/05	11-2	8		yes	sand, silt, clay	sand, silt, clay
08/10/05	11-2	9			sand, silt, clay	sand, silt, clay
08/10/05	11-2	10			sand, silt, clay	sand, silt, clay
08/10/05	11-2	11			sand, silt, clay	sand, silt, clay
08/18/05	11-4	1			sand, silt	sand, silt
08/18/05	11-4	2			sand, silt	sand, silt
08/18/05	11-4	3		yes	sand, silt, gravel	sand, silt, gravel
08/18/05	11-4	4	yes		sand, silt, boulder	sand, silt
08/18/05	11-4	5			sand, silt	sand, silt
08/18/05	11-4	6			sand, silt	sand, silt
08/18/05	11-4	7			sand, silt	sand, silt
08/18/05	11-4	8			sand, silt	sand, silt
08/18/05	11-4	9			sand, silt	sand, silt
08/18/05	11-4	10			sand, silt	sand, silt
08/18/05	11-4	11			sand, silt	sand, silt
08/18/05	11-5	1			sand, silt, clay	sand, silt, clay
08/18/05	11-5	2		yes	sand, silt, clay	sand, silt, boulder
08/18/05	11-5	3		yes	sand, silt, clay	sand, silt, gravel
08/18/05	11-5	4		yes	sand, silt, clay	sand, silt, gravel, BR
08/18/05	11-5	5	yes	yes	sand, silt, clay	sand, silt, gravel, BLD
08/18/05	11-5	6	yes	yes	sand, silt, clay, gravel	sand, silt, clay, boulder
08/18/05	11-5	7			sand, silt, clay	sand, silt, boulder
08/18/05	11-5	8			sand, silt, clay	sand, silt, boulder
08/18/05	11-5	9			sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	10			sand, silt, clay	sand, silt, clay
08/18/05	11-5	11			sand, silt, clay	sand, silt, clay, gravel

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
08/10/05	11-1	1			
08/10/05	11-1	2			
08/10/05	11-1	3			
08/10/05	11-1	4			
08/10/05	11-1	5			
08/10/05	11-1	6			
08/10/05	11-1	7			
08/10/05	11-1	8			
08/10/05	11-1	9			
08/10/05	11-1	10			
08/10/05	11-1	11			
08/10/05	11-2	1			
08/10/05	11-2	2			
08/10/05	11-2	3			
08/10/05	11-2	4			
08/10/05	11-2	5			
08/10/05	11-2	6			
08/10/05	11-2	7			
08/10/05	11-2	8			
08/10/05	11-2	9			
08/10/05	11-2	10			
08/10/05	11-2	11			
08/18/05	11-4	1	widgeon grass	widgeon grass	widgeon grass
08/18/05	11-4	2	salt grass	widgeon grass	salt grass
08/18/05	11-4	3	salt grass		salt grass
08/18/05	11-4	4		widgeon grass	widgeon grass
08/18/05	11-4	5	WG / SG	widgeon grass	WG / SG
08/18/05	11-4	6	widgeon grass	widgeon grass	widgeon grass
08/18/05	11-4	7	WG / SG	widgeon grass	widgeon grass
08/18/05	11-4	8	widgeon grass	widgeon grass	WG / SG
08/18/05	11-4	9	WG / SG	widgeon grass	widgeon grass
08/18/05	11-4	10	WG / SG	WG / SG	widgeon grass
08/18/05	11-4	11	widgeon grass	widgeon grass	widgeon grass
08/18/05	11-5	1	widgeon grass	widgeon grass	widgeon grass
08/18/05	11-5	2	widgeon grass	widgeon grass	widgeon grass
08/18/05	11-5	3	widgeon grass	widgeon grass	
08/18/05	11-5	4	widgeon grass		widgeon grass
08/18/05	11-5	5	widgeon grass		widgeon grass
08/18/05	11-5	6	widgeon grass		widgeon grass
08/18/05	11-5	7	widgeon grass		widgeon grass
08/18/05	11-5	8			widgeon grass
08/18/05	11-5	9			
08/18/05	11-5	10	widgeon grass		
08/18/05	11-5	11	widgeon grass	widgeon grass	widgeon grass

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
08/10/05	11-1	1	5	5	5	0.05	0.14	0.07
08/10/05	11-1	2	5	5	5	0.21	0.27	0.29
08/10/05	11-1	3	41	28	12	0.00	0.00	0.00
08/10/05	11-1	4	25	15	3	0.01	0.00	0.00
08/10/05	11-1	5	5	15	17	0.01	0.00	0.00
08/10/05	11-1	6	12	23	39	0.00	0.00	0.00
08/10/05	11-1	7	5	17	34	0.00	0.00	0.00
08/10/05	11-1	8	5	18	12	0.00	0.00	0.00
08/10/05	11-1	9	8	5	4	0.00	0.01	0.04
08/10/05	11-1	10	7	12	7	0.00	0.00	0.01
08/10/05	11-1	11	4	4	5	0.05	0.00	0.03
08/10/05	11-2	1	33	46	45	0.00	0.00	0.00
08/10/05	11-2	2	31	41	32	0.00	0.00	0.00
08/10/05	11-2	3	35	41	34	0.00	0.00	0.00
08/10/05	11-2	4	31	41	39	0.00	0.00	0.00
08/10/05	11-2	5	31	33	32	0.00	0.00	0.00
08/10/05	11-2	6	31	33	34	0.00	0.00	0.00
08/10/05	11-2	7	30	39	32	0.00	0.00	0.00
08/10/05	11-2	8	34	35	32	0.00	0.00	0.00
08/10/05	11-2	9	32	35	31	0.00	0.00	0.00
08/10/05	11-2	10	28	36	29	0.00	0.00	0.00
08/10/05	11-2	11	26	37	33	0.00	0.00	0.00
08/18/05	11-4	1	29	26	28	0.06	0.07	0.06
08/18/05	11-4	2	7	13	9	0.04	0.29	0.05
08/18/05	11-4	3	7	6	7	0.18	0.30	0.38
08/18/05	11-4	4	18	12	7	0.06	0.01	0.05
08/18/05	11-4	5	9	14	21	0.09	0.16	0.06
08/18/05	11-4	6	17	11	12	0.03	0.09	0.08
08/18/05	11-4	7	11	13	17	0.00	0.10	0.13
08/18/05	11-4	8	24	23	20	0.07	0.13	0.02
08/18/05	11-4	9	13	21	25	0.00	0.05	0.06
08/18/05	11-4	10	13	17	23	0.08	0.03	0.07
08/18/05	11-4	11	22	51	41	0.02	0.00	0.00
08/18/05	11-5	1	62	82	46	0.00	0.00	0.00
08/18/05	11-5	2	45	47	41	0.00	0.00	0.00
08/18/05	11-5	3	23	25	25	0.00	0.00	0.00
08/18/05	11-5	4	13	13	14	0.00	0.00	0.00
08/18/05	11-5	5	10	3	5	0.11	0.00	0.00
08/18/05	11-5	6	7	12	3	0.00	0.00	0.00
08/18/05	11-5	7	6	4	14	0.00	0.01	0.00
08/18/05	11-5	8	13	7	4	0.00	0.02	0.00
08/18/05	11-5	9	11	12	6	0.00	0.05	0.01
08/18/05	11-5	10	12	13	9	0.00	0.00	0.00
08/18/05	11-5	11	10	23	5	0.00	0.03	0.00

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
08/10/05	11-1	1	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	11-1	2	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-1	3	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	11-1	4	sand, silt, clay	sand, silt, clay, gravel	sand, silt, clay, gravel
08/10/05	11-1	5	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-1	6	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-1	7	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-1	8	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-1	9	sand, silt, clay	sand, silt, clay	sand, silt, clay, gravel
08/10/05	11-1	10	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-1	11	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/10/05	11-2	1	silt, clay	silt, clay	silt, clay
08/10/05	11-2	2	silt, clay	silt, clay	silt, clay
08/10/05	11-2	3	silt, clay	silt, clay	silt, clay
08/10/05	11-2	4	silt, clay	silt, clay	silt, clay
08/10/05	11-2	5	silt, clay	silt, clay	silt, clay
08/10/05	11-2	6	silt, clay	silt, clay	silt, clay
08/10/05	11-2	7	silt, clay	silt, clay	silt, clay
08/10/05	11-2	8	silt, clay	silt, clay	silt, clay
08/10/05	11-2	9	silt, clay	silt, clay	silt, clay
08/10/05	11-2	10	silt, clay	silt, clay	silt, clay
08/10/05	11-2	11	silt, clay	silt, clay	silt, clay
08/18/05	11-4	1	silt, gravel	silt, gravel	silt, gravel
08/18/05	11-4	2	silt, clay, cobble	silt, clay, cobble	silt, clay, cobble
08/18/05	11-4	3	cobble, gravel	cobble, gravel	cobble, gravel
08/18/05	11-4	4	boulder, cobble, gravel	sand, silt, clay, gravel	sand, silt, clay
08/18/05	11-4	5	sand, silt, clay, cobble	sand, silt, clay	sand, silt, clay, gravel
08/18/05	11-4	6	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/18/05	11-4	7	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/18/05	11-4	8	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/18/05	11-4	9	sand, silt, clay	sand, silt, clay	sand, silt, clay
08/18/05	11-4	10	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-4	11	sand, silt, clay	sand, silt, clay	sand, silt, clay, gravel
08/18/05	11-5	1	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	2	sand, silt, clay, gravel	sand, silt, clay, gravel	bedrock
08/18/05	11-5	3	bedrock	bedrock	sand, silt, clay, gravel
08/18/05	11-5	4	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	5	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	6	sand, silt, clay, gravel	sand, silt, clay, gravel, boulder	sand, silt, clay, gravel
08/18/05	11-5	7	sand, silt, clay, gravel	sand, silt, clay, bedrock	sand, silt, bedrock
08/18/05	11-5	8	sand, silt, clay	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	9	sand, silt, clay, gravel	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	10	sand, silt, clay	sand, silt, clay, gravel	sand, silt, clay, gravel
08/18/05	11-5	11	sand, silt, clay	sand, silt, clay	sand, silt, clay

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
08/10/05	11-1	1			
08/10/05	11-1	2			
08/10/05	11-1	3			
08/10/05	11-1	4			
08/10/05	11-1	5			
08/10/05	11-1	6			
08/10/05	11-1	7			
08/10/05	11-1	8			
08/10/05	11-1	9			
08/10/05	11-1	10			
08/10/05	11-1	11			
08/10/05	11-2	1			
08/10/05	11-2	2			
08/10/05	11-2	3			
08/10/05	11-2	4			
08/10/05	11-2	5			
08/10/05	11-2	6			
08/10/05	11-2	7			
08/10/05	11-2	8			
08/10/05	11-2	9			
08/10/05	11-2	10			
08/10/05	11-2	11			
08/18/05	11-4	1			
08/18/05	11-4	2			
08/18/05	11-4	3			
08/18/05	11-4	4			
08/18/05	11-4	5			
08/18/05	11-4	6			
08/18/05	11-4	7			
08/18/05	11-4	8			
08/18/05	11-4	9			
08/18/05	11-4	10			
08/18/05	11-4	11			
08/18/05	11-5	1			
08/18/05	11-5	2			100
08/18/05	11-5	3	100	100	
08/18/05	11-5	4			
08/18/05	11-5	5			
08/18/05	11-5	6			
08/18/05	11-5	7		100	100
08/18/05	11-5	8			
08/18/05	11-5	9			
08/18/05	11-5	10			
08/18/05	11-5	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
10/23/05	8-1	1	Run	24.3	30.8	0.0
10/23/05	8-1	2	Run	24.2	31.5	0.0
10/23/05	8-1	3	Run	24.0	31.8	0.0
10/23/05	8-1	4	Run	24.5	32.2	0.0
10/23/05	8-1	5	Run	22.6	30.8	0.0
10/23/05	8-1	6	Run	22.5	27.5	0.0
10/23/05	8-1	7	Run	21.8	32.5	0.0
10/23/05	8-1	8	Run	21.4	30.7	0.0
10/23/05	8-1	9	Run	21.2	30.7	0.0
10/23/05	8-1	10	Run	21.0	30.5	0.0
10/23/05	8-1	11	Run	20.4	29.9	0.0
10/23/05	8-2	1	Run	22.4	28.9	0.0
10/23/05	8-2	2	Run	22.7	26.0	0.0
10/23/05	8-2	3	Run	21.0	24.7	0.0
10/23/05	8-2	4	Run	19.9	24.3	0.0
10/23/05	8-2	5	Run	19.7	27.8	0.0
10/23/05	8-2	6	Run	19.6	22.2	0.0
10/23/05	8-2	7	Run	19.2	26.4	0.0
10/23/05	8-2	8	Run	20.6	23.3	0.0
10/23/05	8-2	9	Run	24.6	27.9	0.0
10/23/05	8-2	10	Run	25.8	31.8	0.0
10/23/05	8-2	11	Run	21.1	21.7	0.0
10/23/05	8-3	1	Run	15.6	25.7	0.0
10/23/05	8-3	2	Run	19.2	25.7	0.0
10/23/05	8-3	3	Run	19.5	27.6	0.0
10/23/05	8-3	4	Run	18.9	27.2	0.0
10/23/05	8-3	5	Run	21.6	28.4	0.0
10/23/05	8-3	6	Run	19.4	26.5	0.0
10/23/05	8-3	7	Run	17.1	22.6	0.0
10/23/05	8-3	8	Run	15.8	25.9	0.0
10/23/05	8-3	9	Run	16.3	24.3	0.0
10/23/05	8-3	10	Run	17.8	23.0	0.0
10/23/05	8-3	11	Run	17.4	27.1	0.0
10/01/05	8-4	1	Run	14.4	15.9	0.0
10/01/05	8-4	2	Run	18.3	22.1	0.0
10/01/05	8-4	3	Run	16.9	25.7	0.0
10/01/05	8-4	4	Run	12.3	26.0	0.0
10/01/05	8-4	5	Run	14.2	22.6	0.0
10/01/05	8-4	6	Run	15.4	22.6	0.0
10/01/05	8-4	7	Run	17.2	23.4	0.0
10/01/05	8-4	8	Run	17.0	20.7	0.0
10/01/05	8-4	9	Run	19.0	21.5	0.0
10/01/05	8-4	10	Run	15.1	22.9	0.0
10/01/05	8-4	11	Run	16.7	24.1	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
10/23/05	8-1	1	0	33.2	34.5	15	17	Grazing
10/23/05	8-1	2	0	30.5	35.5	17	17	Grazing
10/23/05	8-1	3	0	32.2	31.6	6	17	Grazing
10/23/05	8-1	4	0	41.7	29.3	17	17	Grazing
10/23/05	8-1	5	0	36.0	34.5	17	17	Grazing
10/23/05	8-1	6	0	46.3	41.0	7	17	Grazing
10/23/05	8-1	7	0	35.5	32.0	10	17	Grazing
10/23/05	8-1	8	0	35.5	47.7	17	17	Grazing
10/23/05	8-1	9	0	35.0	31.7	11	14	Grazing
10/23/05	8-1	10	0	13.7	35.9	17	17	Grazing
10/23/05	8-1	11	0	44.5	45.2	17	17	Grazing
10/23/05	8-2	1	0	45.9	28.5	17	17	Grazing
10/23/05	8-2	2	0	49.0	34.7	17	16	Grazing
10/23/05	8-2	3	0	42.5	37.2	17	17	Grazing
10/23/05	8-2	4	0	41.0	28.2	17	16	Grazing
10/23/05	8-2	5	0	43.0	32.0	7	17	Grazing
10/23/05	8-2	6	0	45.0	37.2	17	17	Grazing
10/23/05	8-2	7	0	38.2	38.1	17	17	Grazing
10/23/05	8-2	8	0	42.2	28.5	17	17	Grazing
10/23/05	8-2	9	0	28.5	36.7	8	17	Grazing
10/23/05	8-2	10	0	46.2	33.2	17	17	Grazing
10/23/05	8-2	11	0	31.2	13.3	6	17	Grazing
10/23/05	8-3	1	5	54.2	51.9	17	17	Grazing
10/23/05	8-3	2	5	43.4	39.5	17	17	Grazing
10/23/05	8-3	3	0	33.5	36.7	17	16	Grazing
10/23/05	8-3	4	0	43.7	40.7	17	17	Grazing
10/23/05	8-3	5	350	39.2	41.0	17	17	Grazing
10/23/05	8-3	6	0	49.4	26.7	17	14	Grazing
10/23/05	8-3	7	55	51.0	39.9	17	8	Grazing
10/23/05	8-3	8	355	46.5	34.5	17	15	Grazing
10/23/05	8-3	9	0	21.7	43.5	5	16	Grazing
10/23/05	8-3	10	0	48.5	38.2	12	17	Grazing
10/23/05	8-3	11	0	36.2	47.0	17	17	Grazing
10/01/05	8-4	1	0	43.7	43.2	17	10	Grazing
10/01/05	8-4	2	0	53.5	49.0	17	17	Grazing
10/01/05	8-4	3	0	58.2	35.0	16	17	Grazing
10/01/05	8-4	4	0	41.0	78.5	3	17	Grazing
10/01/05	8-4	5	0	34.2	56.7	15	17	Grazing
10/01/05	8-4	6	0	34.2	57.7	16	16	Grazing
10/01/05	8-4	7	0	58.5	34.5	17	12	Grazing
10/01/05	8-4	8	0	32.0	55.5	17	17	Grazing
10/01/05	8-4	9	0	36.4	55.5	17	17	Grazing
10/01/05	8-4	10	0	58.7	30.4	17	12	Grazing
10/01/05	8-4	11	0	54.9	34.4	17	10	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
10/23/05	8-1	1	32.7	26.3	2.1	2.3	5	5
10/23/05	8-1	2	23.3	18.2	2.9	3.0	5	5
10/23/05	8-1	3	28.0	24.6	2.8	3.2	5	5
10/23/05	8-1	4	28.2	31.7	3.1	3.4	5	5
10/23/05	8-1	5	22.0	51.2	2.5	2.4	5	5
10/23/05	8-1	6	22.7	72.4	3.0	3.5	5	5
10/23/05	8-1	7	34.5	40.7	3.4	3.0	10	5
10/23/05	8-1	8	23.3	49.4	3.4	3.5	5	5
10/23/05	8-1	9	33.2	33.0	2.7	3.5	5	5
10/23/05	8-1	10	45.6	36.2	2.8	3.9	5	5
10/23/05	8-1	11	36.9	39.2	3.4	3.4	5	5
10/23/05	8-2	1	49.4	39.3	1.4	2.0	15	15
10/23/05	8-2	2	83.1	42.5	1.6	2.1	25	10
10/23/05	8-2	3	86.6	58.2	1.6	2.2	15	10
10/23/05	8-2	4	77.2	38.5	1.2	1.2	25	5
10/23/05	8-2	5	79.0	72.0	1.8	2.3	60	30
10/23/05	8-2	6	36.1	46.4	2.3	2.7	70	15
10/23/05	8-2	7	32.2	29.7	1.6	2.5	25	15
10/23/05	8-2	8	62.1	68.5	1.3	2.3	40	10
10/23/05	8-2	9	45.4	78.2	1.3	2.5	40	10
10/23/05	8-2	10	52.1	38.1	1.6	2.9	20	10
10/23/05	8-2	11	86.4	77.3	1.5	1.2	30	30
10/23/05	8-3	1	38.2	17.0	2.7	2.0	10	10
10/23/05	8-3	2	38.9	30.6	2.4	2.2	10	10
10/23/05	8-3	3	26.2	54.2	2.1	3.0	10	20
10/23/05	8-3	4	25.2	38.2	1.9	1.9	5	10
10/23/05	8-3	5	36.7	20.2	2.1	2.1	5	5
10/23/05	8-3	6	78.0	49.5	2.7	1.6	10	70
10/23/05	8-3	7	60.0	31.2	2.7	1.1	5	60
10/23/05	8-3	8	30.2	42.0	2.2	2.0	15	10
10/23/05	8-3	9	52.0	35.4	2.2	1.7	10	10
10/23/05	8-3	10	37.0	37.2	2.8	1.6	20	40
10/23/05	8-3	11	55.5	49.0	2.5	1.2	60	60
10/01/05	8-4	1	60.5	27.2	2.6	1.1	20	50
10/01/05	8-4	2	52.0	55.2	2.0	2.0	40	40
10/01/05	8-4	3	28.2	51.5	1.7	1.9	50	40
10/01/05	8-4	4	20.2	52.9	2.1	2.5	90	40
10/01/05	8-4	5	30.1	46.7	2.2	2.2	50	50
10/01/05	8-4	6	51.2	25.1	2.1	2.6	40	30
10/01/05	8-4	7	48.7	30.2	2.2	2.2	80	40
10/01/05	8-4	8	63.7	52.5	2.5	2.2	40	30
10/01/05	8-4	9	79.8	52.4	1.8	2.6	50	30
10/01/05	8-4	10	49.7	27.2	2.2	2.3	50	50
10/01/05	8-4	11	54.2	30.5	2.3	2.3	30	40

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
10/23/05	8-1	1	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	2	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	3	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	4	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	5	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	6	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	7	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	8	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	9	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	10	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-1	11	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	1	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	2	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	3	Yes		Sand / Clay	Sand / Clay
10/23/05	8-2	4	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	5	Yes		Sand / Clay	Sand / Clay
10/23/05	8-2	6	Yes		Sand / Clay	Sand / Clay
10/23/05	8-2	7	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	8	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	9	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	10	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-2	11	Yes		Sand / Clay / Bedrock	Sand / Clay
10/23/05	8-3	1	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	2	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	3	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	4		Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	5	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	6	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	7	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	8	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	9	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	10	Yes	Yes	Sand / Clay	Sand / Clay
10/23/05	8-3	11	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	8-4	1	Yes		Sand / Clay	Sand / Clay
10/01/05	8-4	2	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	8-4	3		Yes	Sand / Clay	Sand / Clay
10/01/05	8-4	4	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	8-4	5	Yes		Sand / Clay	Sand / Clay
10/01/05	8-4	6		Yes	Sand / Clay	Sand / Clay
10/01/05	8-4	7	Yes		Sand / Clay	Sand / Clay
10/01/05	8-4	8			Sand / Clay	Sand / Clay
10/01/05	8-4	9			Sand / Clay	Sand / Clay
10/01/05	8-4	10		Yes	Sand / Clay	Sand / Clay
10/01/05	8-4	11			Sand / Clay	Sand / Clay

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
10/23/05	8-1	1			
10/23/05	8-1	2			
10/23/05	8-1	3			
10/23/05	8-1	4			
10/23/05	8-1	5			
10/23/05	8-1	6			
10/23/05	8-1	7			
10/23/05	8-1	8			
10/23/05	8-1	9			
10/23/05	8-1	10			
10/23/05	8-1	11			
10/23/05	8-2	1			
10/23/05	8-2	2			
10/23/05	8-2	3			
10/23/05	8-2	4			
10/23/05	8-2	5			
10/23/05	8-2	6			
10/23/05	8-2	7			
10/23/05	8-2	8			
10/23/05	8-2	9			
10/23/05	8-2	10			
10/23/05	8-2	11			
10/23/05	8-3	1			
10/23/05	8-3	2			
10/23/05	8-3	3			
10/23/05	8-3	4			
10/23/05	8-3	5			
10/23/05	8-3	6			
10/23/05	8-3	7			
10/23/05	8-3	8			
10/23/05	8-3	9			
10/23/05	8-3	10			
10/23/05	8-3	11			
10/01/05	8-4	1			
10/01/05	8-4	2			
10/01/05	8-4	3			
10/01/05	8-4	4			
10/01/05	8-4	5			
10/01/05	8-4	6			
10/01/05	8-4	7			
10/01/05	8-4	8			
10/01/05	8-4	9			
10/01/05	8-4	10			
10/01/05	8-4	11			

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
10/23/05	8-1	1	51	34	34	0.31	0.27	0.28
10/23/05	8-1	2	46	36	37	0.33	0.35	0.35
10/23/05	8-1	3	36	30	56	0.38	0.33	0.30
10/23/05	8-1	4	42	31	68	0.33	0.27	0.37
10/23/05	8-1	5	48	52	88	0.24	0.19	0.22
10/23/05	8-1	6	61	55	76	0.13	0.15	0.19
10/23/05	8-1	7	56	65	63	0.28	0.26	0.17
10/23/05	8-1	8	63	70	80	0.13	0.16	0.18
10/23/05	8-1	9	56	69	89	0.13	0.14	0.16
10/23/05	8-1	10	73	80	92	0.14	0.14	0.07
10/23/05	8-1	11	107	89	74	0.17	0.17	0.02
10/23/05	8-2	1	84	108	128	0.14	0.12	0.08
10/23/05	8-2	2	107	99	112	0.11	0.09	0.12
10/23/05	8-2	3	106	113	106	0.10	0.12	0.10
10/23/05	8-2	4	119	137	143	0.09	0.09	0.05
10/23/05	8-2	5	103	144	139	0.06	0.13	0.08
10/23/05	8-2	6	126	151	166	0.10	0.12	0.09
10/23/05	8-2	7	111	152	156	0.08	0.10	0.09
10/23/05	8-2	8	103	110	150	0.24	0.10	0.08
10/23/05	8-2	9	55	99	67	0.16	0.23	0.00
10/23/05	8-2	10	47	70	46	0.35	0.16	0.11
10/23/05	8-2	11	54	28	48	0.36	0.50	0.27
10/23/05	8-3	1	50	74	61	0.27	0.50	0.17
10/23/05	8-3	2	52	87	78	0.01	0.33	0.02
10/23/05	8-3	3	32	62	83	0.23	0.25	0.28
10/23/05	8-3	4	43	41	73	0.14	0.21	0.37
10/23/05	8-3	5	51	44	31	0.25	0.27	0.32
10/23/05	8-3	6	103	76	49	0.14	0.14	0.08
10/23/05	8-3	7	130	105	69	0.19	0.19	0.17
10/23/05	8-3	8	118	83	59	0.25	0.15	0.20
10/23/05	8-3	9	121	81	46	0.24	0.19	0.20
10/23/05	8-3	10	90	80	53	0.26	0.24	0.16
10/23/05	8-3	11	82	79	69	0.23	0.24	0.21
10/01/05	8-4	1	55	34	28	0.26	0.34	0.32
10/01/05	8-4	2	49	38	28	0.11	0.22	0.23
10/01/05	8-4	3	17	33	48	0.26	0.32	0.32
10/01/05	8-4	4	36	53	43	0.30	0.30	0.26
10/01/05	8-4	5	26	37	44	0.30	0.42	0.28
10/01/05	8-4	6	22	29	41	0.31	0.44	0.43
10/01/05	8-4	7	51	67	41	0.15	0.20	0.25
10/01/05	8-4	8	50	26	17	0.33	0.32	0.28
10/01/05	8-4	9	52	46	46	0.30	0.22	0.05
10/01/05	8-4	10	38	36	34	0.25	0.26	0.31
10/01/05	8-4	11	31	30	31	0.32	0.35	0.32

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
10/23/05	8-1	1	Sand	Sand	Sand / Silt
10/23/05	8-1	2	Sand	Sand	Sand
10/23/05	8-1	3	Sand / Silt	Sand	Sand
10/23/05	8-1	4	Sand	Sand	Sand
10/23/05	8-1	5	Sand / Silt / Clay	Sand	Sand
10/23/05	8-1	6	Sand / Silt	Sand	Sand
10/23/05	8-1	7	Sand	Sand	Sand / Silt / Clay
10/23/05	8-1	8	Sand	Sand	Sand / Silt / Clay
10/23/05	8-1	9	Sand	Sand	Sand
10/23/05	8-1	10	Sand / Clay	Sand	Sand
10/23/05	8-1	11	Sand	Sand	Sand
10/23/05	8-2	1	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-2	2	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-2	3	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-2	4	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-2	5	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-2	6	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-2	7	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay / Gravel
10/23/05	8-2	8	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay / Gravel
10/23/05	8-2	9	Sand / Silt / Clay	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / GR / BR
10/23/05	8-2	10	Sand / Silt / Clay / Gravel	Sand / Silt / CB / GR / BR	Sand / Silt / Clay / GR / BR
10/23/05	8-2	11	Sand / Silt / Clay / GR / BR	Sand / Silt / Clay / GR / BR	Sand / Silt / Clay / GR / BR
10/23/05	8-3	1	Sand / Clay	Sand / Clay	Sand / Clay
10/23/05	8-3	2	Sand / Clay	Sand / Clay / Gravel	Sand / Silt / Clay
10/23/05	8-3	3	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay / Gravel
10/23/05	8-3	4	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-3	5	Sand / Clay	Sand / Clay	Sand / Clay / Gravel
10/23/05	8-3	6	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/23/05	8-3	7	Sand / Clay	Sand / Clay	Sand / Silt / Clay
10/23/05	8-3	8	Sand / Clay	Sand / Clay	Sand / Clay
10/23/05	8-3	9	Sand / Clay	Sand / Clay	Sand / Clay
10/23/05	8-3	10	Sand / Clay / Gravel	Sand / Clay / Gravel	Sand / Clay / Gravel
10/23/05	8-3	11	Sand / Clay	Sand / Clay	Sand / Clay
10/01/05	8-4	1	Sand	Sand	Sand
10/01/05	8-4	2	Sand	Sand	Sand
10/01/05	8-4	3	Sand	Sand	Sand
10/01/05	8-4	4	Sand	Sand / Gravel	Sand / Gravel
10/01/05	8-4	5	Sand	Sand	Sand
10/01/05	8-4	6	Sand	Sand	Sand
10/01/05	8-4	7	Sand / Clay	Sand	Sand
10/01/05	8-4	8	Sand	Sand	Sand
10/01/05	8-4	9	Sand	Sand	Sand
10/01/05	8-4	10	Sand	Sand / Gravel	Sand / Gravel
10/01/05	8-4	11	Sand	Sand	Sand

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
10/23/05	8-1	1			
10/23/05	8-1	2			
10/23/05	8-1	3			
10/23/05	8-1	4			
10/23/05	8-1	5			
10/23/05	8-1	6			
10/23/05	8-1	7			
10/23/05	8-1	8			
10/23/05	8-1	9			
10/23/05	8-1	10			
10/23/05	8-1	11			
10/23/05	8-2	1			
10/23/05	8-2	2			
10/23/05	8-2	3			
10/23/05	8-2	4			
10/23/05	8-2	5			
10/23/05	8-2	6			
10/23/05	8-2	7			
10/23/05	8-2	8			
10/23/05	8-2	9			10.0
10/23/05	8-2	10		10.0	
10/23/05	8-2	11	15.0	15.0	5.0
10/23/05	8-3	1			
10/23/05	8-3	2			
10/23/05	8-3	3			
10/23/05	8-3	4			
10/23/05	8-3	5			
10/23/05	8-3	6			
10/23/05	8-3	7			
10/23/05	8-3	8			
10/23/05	8-3	9			
10/23/05	8-3	10			
10/23/05	8-3	11			
10/01/05	8-4	1			
10/01/05	8-4	2			
10/01/05	8-4	3			
10/01/05	8-4	4			
10/01/05	8-4	5			
10/01/05	8-4	6			
10/01/05	8-4	7			
10/01/05	8-4	8			
10/01/05	8-4	9			
10/01/05	8-4	10			
10/01/05	8-4	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
10/01/05	8-5	1	Run	9.1	11.4	0.0
10/01/05	8-5	2	Run	8.7	16.5	0.0
10/01/05	8-5	3	Run	8.9	14.9	0.0
10/01/05	8-5	4	Run	9.1	14.0	0.0
10/01/05	8-5	5	Run	9.6	13.6	0.0
10/01/05	8-5	6	Run	12.0	16.8	0.0
10/01/05	8-5	7	Run	12.3	16.0	0.0
10/01/05	8-5	8	Run	10.7	14.1	0.0
10/01/05	8-5	9	Run	13.9	17.8	0.0
10/01/05	8-5	10	Run	12.3	15.5	0.0
10/01/05	8-5	11	Run	8.9	14.8	0.0
10/01/05	9-1	1	Pool	18.4	20.8	0.0
10/01/05	9-1	2	Pool	18.9	20.5	0.0
10/01/05	9-1	3	Pool	18.2	20.3	0.0
10/01/05	9-1	4	Pool	17.3	24.3	0.0
10/01/05	9-1	5	Pool	22.0	23.8	0.0
10/01/05	9-1	6	Pool	16.6	21.7	0.0
10/01/05	9-1	7	Pool	18.9	20.6	0.0
10/01/05	9-1	8	Pool	19.8	22.7	0.0
10/01/05	9-1	9	Pool	19.8	22.2	0.0
10/01/05	9-1	10	Pool	19.3	28.2	0.0
10/01/05	9-1	11	Pool	22.1	27.7	0.0
10/08/05	9-2	1	Run	27.8	43.3	8.6
10/08/05	9-2	2	Run	37.6	44.4	0.0
10/08/05	9-2	3	Run	40.0	47.8	0.0
10/08/05	9-2	4	Run	32.5	35.0	0.0
10/08/05	9-2	5	Run	33.0	46.6	0.0
10/08/05	9-2	6	Run	37.8	49.6	0.0
10/08/05	9-2	7	Run	37.1	49.9	0.0
10/08/05	9-2	8	Run	36.3	44.7	4.7
10/08/05	9-2	9	Run	31.6	46.6	0.0
10/08/05	9-2	10	Run	24.8	41.5	0.0
10/08/05	9-2	11	Run	23.5	32.1	0.0
10/01/05	10-1	1	Pool	30.1	34.6	0.0
10/01/05	10-1	2	Riffle	8.7	39.6	0.0
10/01/05	10-1	3	Run	7.5	41.0	0.0
10/01/05	10-1	4	Run	9.9	37.4	0.0
10/01/05	10-1	5	Run	20.3	45.3	0.0
10/01/05	10-1	6	Run	13.3	46.9	0.0
10/01/05	10-1	7	Run	12.8	47.1	0.0
10/01/05	10-1	8	Run	14.2	44.2	0.0
10/01/05	10-1	9	Run	16.0	48.2	0.0
10/01/05	10-1	10	Run	16.0	49.2	0.0
10/01/05	10-1	11	Run	14.0	47.7	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
10/01/05	8-5	1	0	10.1	48.2	17	17	Grazing
10/01/05	8-5	2	0	13.6	60.9	17	17	Grazing
10/01/05	8-5	3	0	15.5	77.3	17	17	Grazing
10/01/05	8-5	4	0	14.1	58.2	17	16	Grazing
10/01/05	8-5	5	0	12.1	57.0	17	17	Grazing
10/01/05	8-5	6	0	13.3	39.5	17	17	Grazing
10/01/05	8-5	7	0	14.1	45.2	17	14	Grazing
10/01/05	8-5	8	0	14.6	45.2	17	17	Grazing
10/01/05	8-5	9	0	12.1	41.0	13	17	Grazing
10/01/05	8-5	10	0	11.5	47.2	9	17	Grazing
10/01/05	8-5	11	0	12.8	40.4	17	17	Grazing
10/01/05	9-1	1	0	22.1	12.0	2	17	Grazing
10/01/05	9-1	2	0	22.6	20.1	17	17	Grazing
10/01/05	9-1	3	0	29.8	10.1	9	10	Grazing
10/01/05	9-1	4	0	19.8	16.7	0	17	Grazing
10/01/05	9-1	5	0	11.7	14.1	15	11	Grazing
10/01/05	9-1	6	0	9.3	27.2	0	17	Grazing
10/01/05	9-1	7	0	1.6	25.1	7	17	Grazing
10/01/05	9-1	8	0	7.6	13.5	16	11	Grazing
10/01/05	9-1	9	0	17.0	6.8	15	14	Grazing
10/01/05	9-1	10	0	25.1	6.1	16	0	Grazing
10/01/05	9-1	11	0	12.3	8.3	7	0	Grazing
10/08/05	9-2	1	0	6.5	15.8	0	3	Grazing
10/08/05	9-2	2	0	8.6	12.6	0	17	Grazing
10/08/05	9-2	3	0	8.1	11.8	0	17	Grazing
10/08/05	9-2	4	0	10.6	12.8	17	17	Grazing
10/08/05	9-2	5	0	9.5	14.8	0	17	Grazing
10/08/05	9-2	6	350	12.6	12.0	0	17	Grazing
10/08/05	9-2	7	0	10.8	16.0	0	10	Grazing
10/08/05	9-2	8	335	16.0	10.1	5	0	Grazing
10/08/05	9-2	9	345	17.7	11.8	12	0	Grazing
10/08/05	9-2	10	0	25.0	15.3	0	17	Grazing
10/08/05	9-2	11	0	18.7	14.6	17	0	Grazing
10/01/05	10-1	1	30	18.2	19.2	3	12	Grazing
10/01/05	10-1	2	20	14.3	46.2	0	17	Grazing
10/01/05	10-1	3	5	12.8	38.0	0	17	Grazing
10/01/05	10-1	4	0	13.0	24.5	0	17	Grazing
10/01/05	10-1	5	0	13.6	20.6	0	13	Grazing
10/01/05	10-1	6	0	13.0	40.9	0	17	Grazing
10/01/05	10-1	7	0	14.1	23.6	0	4	Grazing
10/01/05	10-1	8	0	13.1	18.7	0	17	Grazing
10/01/05	10-1	9	5	10.6	22.6	0	17	Grazing
10/01/05	10-1	10	10	13.3	25.2	0	17	Grazing
10/01/05	10-1	11	0	12.1	38.2	0	17	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
10/01/05	8-5	1	28.8	43.5	0.5	1.6	100	70
10/01/05	8-5	2	23.1	41.7	0.7	1.9	100	100
10/01/05	8-5	3	11.3	37.4	0.8	3.1	100	90
10/01/05	8-5	4	23.0	27.1	0.6	2.3	100	100
10/01/05	8-5	5	17.7	28.0	0.9	2.2	100	100
10/01/05	8-5	6	26.5	28.7	0.8	2.9	100	100
10/01/05	8-5	7	27.5	27.2	2.0	1.2	100	70
10/01/05	8-5	8	29.7	40.9	0.8	2.0	100	100
10/01/05	8-5	9	33.4	26.5	1.2	1.5	100	100
10/01/05	8-5	10	21.7	22.8	0.8	1.3	100	100
10/01/05	8-5	11	17.7	37.5	0.8	1.5	100	90
10/01/05	9-1	1	18.1	34.2	1.0	0.8	60	40
10/01/05	9-1	2	47.2	46.5	0.9	0.8	20	30
10/01/05	9-1	3	21.5	27.0	1.0	0.7	10	40
10/01/05	9-1	4	55.2	9.3	1.5	0.7	20	25
10/01/05	9-1	5	14.6	44.9	0.9	1.6	50	40
10/01/05	9-1	6	6.5	58.4	0.8	1.6	30	80
10/01/05	9-1	7	26.7	49.2	0.8	1.6	30	30
10/01/05	9-1	8	36.5	30.1	1.0	2.3	60	60
10/01/05	9-1	9	14.3	41.4	1.2	1.1	50	40
10/01/05	9-1	10	44.0	5.1	1.6	1.3	10	20
10/01/05	9-1	11	42.9	16.0	1.0	0.7	40	60
10/08/05	9-2	1	17.6	31.2	1.4	1.4	20	80
10/08/05	9-2	2	14.5	38.0	1.6	1.8	25	75
10/08/05	9-2	3	17.2	34.9	1.4	1.6	10	70
10/08/05	9-2	4	48.2	38.5	1.1	2.1	60	70
10/08/05	9-2	5	11.0	37.4	1.5	1.9	10	80
10/08/05	9-2	6	11.8	48.0	1.5	2.0	15	85
10/08/05	9-2	7	34.5	32.7	1.7	2.0	75	75
10/08/05	9-2	8	55.7	20.6	2.1	1.6	25	70
10/08/05	9-2	9	46.5	10.6	1.5	1.7	40	75
10/08/05	9-2	10	39.9	7.0	2.3	1.8	40	15
10/08/05	9-2	11	41.5	11.6	1.8	1.7	40	15
10/01/05	10-1	1	30.1	48.5	1.6	1.5	80	100
10/01/05	10-1	2	44.0	8.0	1.4	1.5	5	70
10/01/05	10-1	3	70.3	8.8	1.4	1.5	5	90
10/01/05	10-1	4	13.3	64.0	1.3	1.4	5	80
10/01/05	10-1	5	13.0	39.9	1.5	1.7	5	100
10/01/05	10-1	6	16.7	47.7	1.7	1.5	5	90
10/01/05	10-1	7	13.8	47.0	1.8	1.7	5	100
10/01/05	10-1	8	11.8	59.7	2.1	1.3	5	90
10/01/05	10-1	9	15.5	57.3	1.7	1.6	10	90
10/01/05	10-1	10	13.1	67.5	1.5	1.7	10	60
10/01/05	10-1	11	12.8	81.1	1.8	1.7	20	70

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
10/01/05	8-5	1			Sand / Clay	Sand / Clay
10/01/05	8-5	2			Sand / Clay	Sand / Clay
10/01/05	8-5	3		Yes	Sand / Clay	Sand / Clay
10/01/05	8-5	4			Sand / Clay	Sand / Clay
10/01/05	8-5	5	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	8-5	6		Yes	Sand / Clay	Sand / Clay
10/01/05	8-5	7		Yes	Sand / Clay	Sand / Clay
10/01/05	8-5	8	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	8-5	9	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	8-5	10			Sand / Clay	Sand / Clay
10/01/05	8-5	11			Sand / Clay	Sand / Clay
10/01/05	9-1	1			Sand / Clay	Sand / Clay / Gravel
10/01/05	9-1	2		Yes	Sand / Clay	Sand / Clay
10/01/05	9-1	3	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	9-1	4	Yes		Sand / Clay	Sand / Clay
10/01/05	9-1	5		Yes	Sand / Clay / Gravel	Sand / Clay
10/01/05	9-1	6		Yes	Sand / Clay	Sand / Clay / Gravel
10/01/05	9-1	7	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	9-1	8	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	9-1	9		Yes	Sand / Clay	Sand / Clay / Gravel
10/01/05	9-1	10	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	9-1	11	Yes		Sand / Clay / Gravel	Sand / Clay
10/08/05	9-2	1		Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	2	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	3	Yes		Sand / Clay	Sand / Clay
10/08/05	9-2	4	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	5		Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	6	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	7	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	8	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	9-2	9	Yes	Yes	Sand / Clay	Sand / Clay / Gravel
10/08/05	9-2	10	Yes	Yes	Sand / Clay	Sand / Clay / Gravel
10/08/05	9-2	11	Yes		Sand / Clay	Sand / Clay
10/01/05	10-1	1		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	2		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	3		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	4			Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	5			Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	6		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	7		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	8		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	9			Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	10		Yes	Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl
10/01/05	10-1	11			Sand / Silt / Clay / Gl	Sand / Silt / Clay / Gl

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
10/01/05	8-5	1			
10/01/05	8-5	2			
10/01/05	8-5	3			
10/01/05	8-5	4			
10/01/05	8-5	5			
10/01/05	8-5	6	vegetation		
10/01/05	8-5	7			
10/01/05	8-5	8	vegetation		
10/01/05	8-5	9			
10/01/05	8-5	10			vegetation
10/01/05	8-5	11			
10/01/05	9-1	1			
10/01/05	9-1	2	pondweed		
10/01/05	9-1	3			pondweed
10/01/05	9-1	4			pondweed
10/01/05	9-1	5			
10/01/05	9-1	6	pondweed		
10/01/05	9-1	7	pondweed		
10/01/05	9-1	8			
10/01/05	9-1	9			pondweed
10/01/05	9-1	10			
10/01/05	9-1	11			
10/08/05	9-2	1			
10/08/05	9-2	2			
10/08/05	9-2	3			
10/08/05	9-2	4			
10/08/05	9-2	5			
10/08/05	9-2	6			
10/08/05	9-2	7			
10/08/05	9-2	8			
10/08/05	9-2	9			
10/08/05	9-2	10			
10/08/05	9-2	11			
10/01/05	10-1	1			
10/01/05	10-1	2			
10/01/05	10-1	3			
10/01/05	10-1	4			
10/01/05	10-1	5			
10/01/05	10-1	6			
10/01/05	10-1	7			
10/01/05	10-1	8			
10/01/05	10-1	9			
10/01/05	10-1	10			
10/01/05	10-1	11			

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
10/01/05	8-5	1	63	68	72	0.01	0.04	0.03
10/01/05	8-5	2	62	70	67	0.01	0.06	0.05
10/01/05	8-5	3	63	70	66	0.00	0.09	0.01
10/01/05	8-5	4	55	73	72	0.00	0.06	0.04
10/01/05	8-5	5	58	70	61	0.02	0.08	0.03
10/01/05	8-5	6	21	72	68	0.00	0.04	0.04
10/01/05	8-5	7	61	73	67	0.01	0.06	0.02
10/01/05	8-5	8	67	76	69	0.01	0.04	0.00
10/01/05	8-5	9	64	81	67	0.01	0.04	0.00
10/01/05	8-5	10	73	80	71	0.00	0.03	0.00
10/01/05	8-5	11	74	77	69	0.02	0.04	0.00
10/01/05	9-1	1	57	76	57	0.00	0.00	0.00
10/01/05	9-1	2	27	64	60	0.00	0.00	0.00
10/01/05	9-1	3	90	66	13	0.00	0.00	0.02
10/01/05	9-1	4	129	113	51	0.00	0.00	0.00
10/01/05	9-1	5	22	22	20	0.00	0.00	0.00
10/01/05	9-1	6	6	42	51	0.00	0.00	0.00
10/01/05	9-1	7	38	42	51	0.00	0.00	0.00
10/01/05	9-1	8	61	58	17	0.00	0.00	0.00
10/01/05	9-1	9	63	92	51	0.00	0.00	0.00
10/01/05	9-1	10	86	78	34	0.00	0.00	0.00
10/01/05	9-1	11	67	67	62	0.00	0.00	0.00
10/08/05	9-2	1	2	33	68	0.00	0.48	0.65
10/08/05	9-2	2	12	39	61	0.00	0.45	0.53
10/08/05	9-2	3	15	46	60	0.19	0.32	0.53
10/08/05	9-2	4	31	31	55	0.21	0.47	0.63
10/08/05	9-2	5	31	39	47	0.37	0.40	0.63
10/08/05	9-2	6	22	53	34	0.37	0.48	0.53
10/08/05	9-2	7	41	38	32	0.37	0.45	0.27
10/08/05	9-2	8	55	27	8	0.47	0.65	0.07
10/08/05	9-2	9	56	52	13	0.51	0.50	0.35
10/08/05	9-2	10	74	65	30	0.55	0.61	0.34
10/08/05	9-2	11	85	59	43	0.42	0.55	0.42
10/01/05	10-1	1	8	17	22	0.26	0.17	0.28
10/01/05	10-1	2	7	17	47	0.37	0.65	0.94
10/01/05	10-1	3	23	42	41	0.36	0.61	0.53
10/01/05	10-1	4	55	57	57	0.38	0.34	0.06
10/01/05	10-1	5	22	44	67	0.24	0.31	0.15
10/01/05	10-1	6	31	39	57	0.10	0.29	0.09
10/01/05	10-1	7	24	50	44	0.10	0.24	0.12
10/01/05	10-1	8	16	26	29	0.16	0.24	0.20
10/01/05	10-1	9	20	25	25	0.19	0.29	0.24
10/01/05	10-1	10	8	12	17	0.30	0.44	0.51
10/01/05	10-1	11	6	19	26	0.00	0.24	0.59

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
10/01/05	8-5	1	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	2	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	3	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	4	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	5	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	6	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	7	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	8	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	9	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	10	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	8-5	11	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	9-1	1	Sand / Silt / Clay	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / Gravel
10/01/05	9-1	2	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / Gravel
10/01/05	9-1	3	Sand / Silt / Clay / GR / CB	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / GR / CB
10/01/05	9-1	4	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/01/05	9-1	5	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / GR / CB	Sand / Silt / Clay / GR / CB
10/01/05	9-1	6	Sand / Silt / Clay / GR / CB	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / Gravel
10/01/05	9-1	7	Sand / Silt / Clay	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / Gravel
10/01/05	9-1	8	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / Gravel	Sand / Silt / Clay / GR / CB
10/01/05	9-1	9	Sand / Silt / Clay / Gravel	Sand / Silt / Clay	Sand / Silt / Clay
10/01/05	9-1	10	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/01/05	9-1	11	Sand / Silt / Clay	Sand / Silt / Clay	Sand / Silt / Clay
10/08/05	9-2	1	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	9-2	2	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/08/05	9-2	3	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/08/05	9-2	4	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	9-2	5	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	9-2	6	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/08/05	9-2	7	Sand / Silt	Sand / Silt / Gravel	Sand / Silt
10/08/05	9-2	8	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/08/05	9-2	9	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/08/05	9-2	10	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	9-2	11	Sand / Silt	Sand / Silt	Sand / Silt
10/01/05	10-1	1	Sand / Silt / Clay	Sand / Silt	Sand / Silt / Clay / Gravel
10/01/05	10-1	2	Sand / Silt / Clay	Sand / Silt / Gravel	Sand / Silt / Gravel
10/01/05	10-1	3	Sand / Gravel	Sand / Gravel	Sand / Gravel
10/01/05	10-1	4	Sand / Silt / Gravel	Sand / Gravel	Sand / Gravel
10/01/05	10-1	5	Sand / Gravel	Sand / Gravel	Sand / Gravel
10/01/05	10-1	6	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Gravel
10/01/05	10-1	7	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/01/05	10-1	8	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Silt / Gravel
10/01/05	10-1	9	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Silt / Gravel
10/01/05	10-1	10	Sand / Gravel	Sand / Gravel	Sand / Gravel
10/01/05	10-1	11	Sand / Gravel	Sand / Silt / Gravel	Sand / Gravel

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
10/01/05	8-5	1			
10/01/05	8-5	2			
10/01/05	8-5	3			
10/01/05	8-5	4			
10/01/05	8-5	5			
10/01/05	8-5	6			
10/01/05	8-5	7			
10/01/05	8-5	8			
10/01/05	8-5	9			
10/01/05	8-5	10			
10/01/05	8-5	11			
10/01/05	9-1	1			
10/01/05	9-1	2			
10/01/05	9-1	3			
10/01/05	9-1	4			
10/01/05	9-1	5			
10/01/05	9-1	6			
10/01/05	9-1	7			
10/01/05	9-1	8			
10/01/05	9-1	9			
10/01/05	9-1	10			
10/01/05	9-1	11			
10/08/05	9-2	1			
10/08/05	9-2	2			
10/08/05	9-2	3			
10/08/05	9-2	4			
10/08/05	9-2	5			
10/08/05	9-2	6			
10/08/05	9-2	7			
10/08/05	9-2	8			
10/08/05	9-2	9			
10/08/05	9-2	10			
10/08/05	9-2	11			
10/01/05	10-1	1			
10/01/05	10-1	2			
10/01/05	10-1	3			
10/01/05	10-1	4			
10/01/05	10-1	5			
10/01/05	10-1	6			
10/01/05	10-1	7			
10/01/05	10-1	8			
10/01/05	10-1	9			
10/01/05	10-1	10			
10/01/05	10-1	11			

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
10/02/05	10-2	1	Run	8.8	12.3	0.0
10/02/05	10-2	2	Run	9.2	11.4	0.0
10/02/05	10-2	3	Run	9.0	11.4	0.0
10/02/05	10-2	4	Run	9.4	10.3	0.0
10/02/05	10-2	5	Run	8.5	10.6	0.0
10/02/05	10-2	6	Run	8.1	9.5	0.0
10/02/05	10-2	7	Run	10.9	12.6	0.0
10/02/05	10-2	8	Run	10.4	12.7	0.0
10/02/05	10-2	9	Run	11.0	12.7	0.0
10/02/05	10-2	10	Run	11.7	13.7	0.0
10/02/05	10-2	11	Run	11.7	12.7	0.0
10/02/05	10-3	1	Pool	21.7	24.8	0.0
10/02/05	10-3	2	Pool	23.9	28.5	0.0
10/02/05	10-3	3	Pool	24.2	30.0	0.0
10/02/05	10-3	4	Pool	21.7	26.4	0.0
10/02/05	10-3	5	Pool	22.8	28.1	0.0
10/02/05	10-3	6	Pool	19.6	30.6	0.0
10/02/05	10-3	7	Pool	22.6	23.1	0.0
10/02/05	10-3	8	Pool	19.7	24.2	0.0
10/02/05	10-3	9	Pool	21.6	30.5	0.0
10/02/05	10-3	10	Run	17.4	44.3	14.2
10/02/05	10-3	11	Run	19.6	34.5	9.8
10/02/05	10-4	1	Pool	10.5	12.1	0.0
10/02/05	10-4	2	Pool	8.2	14.5	0.0
10/02/05	10-4	3	Pool	9.9	13.7	0.0
10/02/05	10-4	4	Pool	8.0	15.3	0.0
10/02/05	10-4	5	Pool	5.7	15.6	0.0
10/02/05	10-4	6	Run	8.3	16.2	0.0
10/02/05	10-4	7	Run	8.3	20.7	0.0
10/02/05	10-4	8	Rifle	7.1	18.5	0.0
10/02/05	10-4	9	Pool	11.5	15.0	0.0
10/02/05	10-4	10	Pool	11.7	12.1	0.0
10/02/05	10-4	11	Pool	4.9	14.4	0.0
10/02/05	10-5	1	Pool	24.0	30.0	0.0
10/02/05	10-5	2	Pool	22.3	28.7	0.0
10/02/05	10-5	3	Pool	24.0	32.8	0.0
10/02/05	10-5	4	Pool	24.5	29.8	0.0
10/02/05	10-5	5	Pool	22.2	25.8	0.0
10/02/05	10-5	6	Pool	15.9	24.0	0.0
10/02/05	10-5	7	Riffle	6.6	31.0	0.0
10/02/05	10-5	8	Pool	15.2	16.5	0.0
10/02/05	10-5	9	Pool	14.4	16.3	0.0
10/02/05	10-5	10	Pool	15.1	20.2	0.0
10/02/05	10-5	11	Pool	16.4	22.6	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
10/02/05	10-2	1	0	24.7	21.5	5	17	Grazing
10/02/05	10-2	2	0	28.7	24.8	11	17	Grazing
10/02/05	10-2	3	0	33.0	28.0	17	11	Grazing
10/02/05	10-2	4	0	34.2	33.9	17	17	Grazing
10/02/05	10-2	5	0	29.0	17.5	7	2	Grazing
10/02/05	10-2	6	0	28.7	28.0	17	17	Grazing
10/02/05	10-2	7	0	41.7	39.2	0	17	Grazing
10/02/05	10-2	8	0	29.6	30.1	17	17	Grazing
10/02/05	10-2	9	0	25.2	35.7	15	17	Grazing
10/02/05	10-2	10	0	29.3	40.9	17	17	Grazing
10/02/05	10-2	11	0	29.5	34.2	17	17	Grazing
10/02/05	10-3	1	0	17.2	24.5	5	17	Grazing
10/02/05	10-3	2	0	12.0	18.1	0	12	Grazing
10/02/05	10-3	3	0	17.6	24.0	0	7	Grazing
10/02/05	10-3	4	0	16.2	18.0	0	17	Grazing
10/02/05	10-3	5	0	19.5	17.3	14	0	Grazing
10/02/05	10-3	6	0	18.7	23.7	5	0	Grazing
10/02/05	10-3	7	0	20.6	17.8	17	17	Grazing
10/02/05	10-3	8	0	21.2	27.8	17	17	Grazing
10/02/05	10-3	9	0	24.8	20.3	0	0	Grazing
10/02/05	10-3	10	50	17.6	19.1	0	17	Grazing
10/02/05	10-3	11	0	24.7	18.7	10	15	Grazing
10/02/05	10-4	1		39.0	27.7	17	8	Grazing
10/02/05	10-4	2		44.2	55.5	0	17	Grazing
10/02/05	10-4	3		44.0	36.5	17	0	Grazing
10/02/05	10-4	4		28.7	29.6	6	0	Grazing
10/02/05	10-4	5		47.0	25.6	17	0	Grazing
10/02/05	10-4	6		46.7	22.2	17	0	Grazing
10/02/05	10-4	7		22.3	22.2	0	0	Grazing
10/02/05	10-4	8		38.9	22.2	0	0	Grazing
10/02/05	10-4	9		28.0	49.7	0	17	Grazing
10/02/05	10-4	10		24.3	47.5	0	8	Grazing
10/02/05	10-4	11		16.6	63.5	0	14	Grazing
10/02/05	10-5	1	0	34.2	21.8	4	0	Grazing
10/02/05	10-5	2	0	18.3	16.2	17	17	Grazing
10/02/05	10-5	3	0	14.6	19.7	17	0	Grazing
10/02/05	10-5	4	0	16.8	17.8	10	3	Grazing
10/02/05	10-5	5	0	19.7	16.5	0	8	Grazing
10/02/05	10-5	6	0	23.7	16.6	11	0	Grazing
10/02/05	10-5	7	20	10.8	37.0	0	9	Grazing
10/02/05	10-5	8	350	16.7	27.6	17	17	Grazing
10/02/05	10-5	9	0	17.5	26.5	14	17	Grazing
10/02/05	10-5	10	0	22.1	26.8	17	17	Grazing
10/02/05	10-5	11	0	21.5	24.2	16	17	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
10/02/05	10-2	1	49.5	45.0	1.3	1.1	80	80
10/02/05	10-2	2	61.9	39.9	1.3	1.4	80	90
10/02/05	10-2	3	60.5	39.5	1.5	1.6	70	80
10/02/05	10-2	4	46.2	67.0	1.0	1.1	90	95
10/02/05	10-2	5	37.7	60.9	1.2	1.2	60	75
10/02/05	10-2	6	35.3	59.7	1.0	1.1	60	80
10/02/05	10-2	7	43.0	48.5	1.1	1.6	40	60
10/02/05	10-2	8	42.7	59.5	1.3	1.1	50	50
10/02/05	10-2	9	45.2	43.5	1.1	1.7	90	60
10/02/05	10-2	10	53.7	48.5	1.2	1.6	75	70
10/02/05	10-2	11	50.5	65.5	1.2	1.0	80	70
10/02/05	10-3	1	24.7	25.2	1.3	1.1	90	90
10/02/05	10-3	2	27.1	37.5	0.9	1.0	95	90
10/02/05	10-3	3	25.3	25.7	1.5	1.7	70	80
10/02/05	10-3	4	22.3	34.0	1.4	1.4	75	90
10/02/05	10-3	5	29.3	26.8	1.5	1.7	90	90
10/02/05	10-3	6	29.3	21.8	1.2	1.9	90	80
10/02/05	10-3	7	76.6	30.0	1.0	1.0	80	90
10/02/05	10-3	8	57.7	34.4	1.1	1.5	80	90
10/02/05	10-3	9	22.0	22.1	1.6	1.5	60	80
10/02/05	10-3	10	42.2	42.0	3.0	1.4	30	50
10/02/05	10-3	11	35.2	59.7	3.3	1.7	5	95
10/02/05	10-4	1	46.7	24.2	1.9	1.1	100	90
10/02/05	10-4	2	24.1	30.5	1.0	1.0	15	85
10/02/05	10-4	3	74.4	24.8	1.3	1.1	35	75
10/02/05	10-4	4	25.2	20.3	1.3	1.2	15	75
10/02/05	10-4	5	40.2	19.7	1.0	0.9	40	35
10/02/05	10-4	6	22.0	20.2	1.5	1.5	80	45
10/02/05	10-4	7	26.3	20.0	1.3	1.0	45	60
10/02/05	10-4	8	13.3	13.8	1.7	1.3	75	80
10/02/05	10-4	9	37.5	9.0	2.2	2.5	85	10
10/02/05	10-4	10	32.5	123.3	1.3	1.9	90	5
10/02/05	10-4	11	12.5	62.5	1.6	2.3	65	10
10/02/05	10-5	1	38.0	16.5	1.2	1.1	95	95
10/02/05	10-5	2	35.7	16.8	1.5	1.2	60	60
10/02/05	10-5	3	35.0	16.1	1.7	1.1	80	60
10/02/05	10-5	4	20.2	25.2	1.2	1.1	90	85
10/02/05	10-5	5	18.6	31.6	1.1	1.2	95	90
10/02/05	10-5	6	28.8	20.6	1.3	1.2	90	100
10/02/05	10-5	7	14.1	45.9	1.8	1.3	70	60
10/02/05	10-5	8	41.2	51.2	0.8	1.2	100	75
10/02/05	10-5	9	49.2	39.5	1.4	0.9	60	40
10/02/05	10-5	10	29.7	43.7	1.4	0.9	60	50
10/02/05	10-5	11	21.1	38.9	1.2	0.8	70	50

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
10/02/05	10-2	1	Yes		Sand / Clay	Sand / Clay
10/02/05	10-2	2	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	3	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	4	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	5	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	6	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	7		Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	8	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	9		Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	10		Yes	Sand / Clay	Sand / Clay
10/02/05	10-2	11		Yes	Sand / Clay	Sand / Clay
10/02/05	10-3	1			Sand / Clay	Sand / Clay
10/02/05	10-3	2			Sand / Clay	Sand / Clay
10/02/05	10-3	3			Sand / Clay	Sand / Clay
10/02/05	10-3	4			Sand / Clay	Sand / Clay
10/02/05	10-3	5	Yes		Sand / Clay	Sand / Clay
10/02/05	10-3	6			Sand / Clay	Sand / Clay
10/02/05	10-3	7	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-3	8	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-3	9	Yes		Sand / Clay	Sand / Clay
10/02/05	10-3	10	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-3	11	Yes	Yes	Sand / Clay	Sand / Clay
10/02/05	10-4	1			Sand / Clay / Bedrock	Sand / Clay
10/02/05	10-4	2			Sand / Clay / Bedrock	Sand / Clay
10/02/05	10-4	3	Yes		Sand / Clay / Bedrock	Sand / Clay
10/02/05	10-4	4		Yes	Sand / Clay / Bedrock	Sand / Clay
10/02/05	10-4	5			Sand / Clay	Sand / Clay
10/02/05	10-4	6			Sand / Clay	Sand / Clay
10/02/05	10-4	7			Sand / Clay	Sand / Clay
10/02/05	10-4	8			Sand / Clay	Sand / Clay
10/02/05	10-4	9			Sand / Clay	Bedrock
10/02/05	10-4	10			Sand / Clay	Bedrock
10/02/05	10-4	11			Sand / Clay	Bedrock
10/02/05	10-5	1			Sand / Clay	Sand / Clay
10/02/05	10-5	2			Sand / Clay	Sand / Clay
10/02/05	10-5	3			Sand / Clay	Sand / Clay
10/02/05	10-5	4			Sand / Clay	Sand / Clay
10/02/05	10-5	5			Sand / Clay	Sand / Clay
10/02/05	10-5	6			Sand / Clay	Sand / Clay
10/02/05	10-5	7		Yes	Sand / Clay / Gravel	Sand / Clay / Gravel
10/02/05	10-5	8		Yes	Sand / Clay / Gravel	Sand / Clay / Gravel
10/02/05	10-5	9		Yes	Sand / Clay / Gravel	Sand / Clay / Gravel
10/02/05	10-5	10			Sand / Clay / Gravel	Sand / Clay / Gravel
10/02/05	10-5	11			Sand / Clay / Gravel	Sand / Clay / Gravel

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
10/02/05	10-2	1			
10/02/05	10-2	2			
10/02/05	10-2	3			
10/02/05	10-2	4			
10/02/05	10-2	5			
10/02/05	10-2	6			
10/02/05	10-2	7			
10/02/05	10-2	8			
10/02/05	10-2	9			
10/02/05	10-2	10			
10/02/05	10-2	11			
10/02/05	10-3	1	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-3	2	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-3	3	widgeon grass	widgeon grass	
10/02/05	10-3	4			widgeon grass
10/02/05	10-3	5		widgeon grass	widgeon grass
10/02/05	10-3	6	widgeon grass		widgeon grass
10/02/05	10-3	7			widgeon grass
10/02/05	10-3	8			widgeon grass
10/02/05	10-3	9		widgeon grass	widgeon grass
10/02/05	10-3	10	Moss		widgeon grass
10/02/05	10-3	11		widgeon grass	
10/02/05	10-4	1			
10/02/05	10-4	2			
10/02/05	10-4	3			
10/02/05	10-4	4			
10/02/05	10-4	5	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-4	6	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-4	7	WG / PW	WG / PW	widgeon grass
10/02/05	10-4	8	WG / PW	widgeon grass	widgeon grass
10/02/05	10-4	9			
10/02/05	10-4	10			
10/02/05	10-4	11			
10/02/05	10-5	1	widgeon grass		
10/02/05	10-5	2	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-5	3	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-5	4	widgeon grass	widgeon grass	widgeon grass
10/02/05	10-5	5	widgeon grass	widgeon grass	
10/02/05	10-5	6	widgeon grass		
10/02/05	10-5	7	widgeon grass	widgeon grass	
10/02/05	10-5	8			
10/02/05	10-5	9			
10/02/05	10-5	10			
10/02/05	10-5	11		widgeon grass	widgeon grass

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
10/02/05	10-2	1	8	23	17	0.00	0.36	0.26
10/02/05	10-2	2	10	12	8	0.23	0.30	0.25
10/02/05	10-2	3	23	37	58	0.05	0.16	0.08
10/02/05	10-2	4	34	30	29	0.09	0.10	0.14
10/02/05	10-2	5	45	44	77	0.07	0.11	0.08
10/02/05	10-2	6	74	66	45	0.05	0.09	0.01
10/02/05	10-2	7	122	68	91	0.00	0.07	0.00
10/02/05	10-2	8	61	67	74	0.01	0.07	0.06
10/02/05	10-2	9	33	24	17	0.00	0.12	0.13
10/02/05	10-2	10	79	29	54	0.04	0.13	0.08
10/02/05	10-2	11	44	38	49	0.04	0.09	0.02
10/02/05	10-3	1	47	70	102	0.00	0.00	0.00
10/02/05	10-3	2	33	31	46	0.03	0.01	0.04
10/02/05	10-3	3	36	22	17	0.13	0.22	0.15
10/02/05	10-3	4	59	57	26	0.10	0.02	0.00
10/02/05	10-3	5	58	32	26	0.04	0.01	0.16
10/02/05	10-3	6	51	40	71	0.03	0.00	0.00
10/02/05	10-3	7	57	59	36	0.07	0.00	0.00
10/02/05	10-3	8	53	55	43	0.05	0.04	0.00
10/02/05	10-3	9	40	47	17	0.10	0.03	0.06
10/02/05	10-3	10	17	40	33	0.73	0.19	0.10
10/02/05	10-3	11	24	21	36	0.02	0.14	0.14
10/02/05	10-4	1	95	102	66	0.00	0.02	0.03
10/02/05	10-4	2	53	65	60	0.02	0.01	0.00
10/02/05	10-4	3	41	55	42	0.00	0.04	0.00
10/02/05	10-4	4	30	39	38	0.00	0.07	0.07
10/02/05	10-4	5	14	23	18	0.10	0.27	0.27
10/02/05	10-4	6	17	20	10	0.01	0.10	0.14
10/02/05	10-4	7	17	12	7	0.34	0.22	0.11
10/02/05	10-4	8	11	41	13	0.28	0.03	0.13
10/02/05	10-4	9	38	45	65	0.00	0.08	0.00
10/02/05	10-4	10	31	42	54	0.01	0.01	0.03
10/02/05	10-4	11	46	58	46	0.06	0.07	0.06
10/02/05	10-5	1	36	31	33	0.01	0.04	0.01
10/02/05	10-5	2	42	23	25	0.00	0.00	0.00
10/02/05	10-5	3	38	14	26	0.00	0.00	0.00
10/02/05	10-5	4	33	36	24	0.00	0.00	0.00
10/02/05	10-5	5	22	25	33	0.00	0.00	0.00
10/02/05	10-5	6	48	55	39	0.00	0.01	0.00
10/02/05	10-5	7	17	7	6	0.51	0.50	0.35
10/02/05	10-5	8	37	46	58	0.00	0.00	0.01
10/02/05	10-5	9	69	78	73	0.00	0.01	0.00
10/02/05	10-5	10	28	41	59	0.00	0.50	0.00
10/02/05	10-5	11	23	52	84	0.00	0.00	0.00

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
10/02/05	10-2	1	Sand / Silt / Gravel	Sand / Silt	Sand / Silt
10/02/05	10-2	2	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/02/05	10-2	3	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	4	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	5	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	6	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	7	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	8	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	9	Sand / Silt	Sand / Silt / Gravel	Sand / Silt
10/02/05	10-2	10	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-2	11	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-3	1	Silt / Bedrock	Silt / Bedrock	Silt / Bedrock
10/02/05	10-3	2	Silt	Silt	Silt
10/02/05	10-3	3	Silt / Bedrock	Silt / Bedrock	Gravel / Cobble / Bedrock
10/02/05	10-3	4	Bedrock	Bedrock	Silt / Bedrock
10/02/05	10-3	5	Bedrock	Silt / Bedrock	Silt / Bedrock
10/02/05	10-3	6	Silt / Bedrock	Bedrock	Silt / Bedrock
10/02/05	10-3	7	Bedrock	Silt / Bedrock	Silt / Bedrock
10/02/05	10-3	8	Bedrock	Silt / Bedrock	Silt / Bedrock
10/02/05	10-3	9	Silt / Bedrock	Silt / Gravel	Silt
10/02/05	10-3	10	Bedrock	Bedrock	Silt / Gravel / Bedrock
10/02/05	10-3	11	Silt / Gravel / Bedrock	Silt	Silt / Gravel / Bedrock
10/02/05	10-4	1	Silt	Silt	Silt
10/02/05	10-4	2	Silt	Silt	Silt
10/02/05	10-4	3	Silt	Silt	Silt
10/02/05	10-4	4	Silt	Silt	Silt
10/02/05	10-4	5	Silt	Silt	Silt
10/02/05	10-4	6	Silt	Silt	Silt
10/02/05	10-4	7	Silt	Silt	Silt
10/02/05	10-4	8	Silt	Silt	Silt
10/02/05	10-4	9	Silt	Silt	Silt
10/02/05	10-4	10	Silt	Silt	Silt
10/02/05	10-4	11	Silt	Silt	Silt
10/02/05	10-5	1	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-5	2	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-5	3	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-5	4	Sand / Silt	Sand / Silt	Sand / Silt
10/02/05	10-5	5	Sand / Silt / Gravel	Sand / Silt	Sand / Silt / Gravel / BR
10/02/05	10-5	6	Sand / Silt / Bedrock	Bedrock	Sand / Silt / Bedrock
10/02/05	10-5	7	Gravel / Bedrock	Gravel / Bedrock	Gravel / Bedrock
10/02/05	10-5	8	Bedrock	Gravel / Bedrock	Bedrock
10/02/05	10-5	9	Bedrock	Bedrock	Boulder / Bedrock
10/02/05	10-5	10	Gravel / Boulder / BR	Gravel / Boulder / BR	Sand / Silt / Gravel / BR
10/02/05	10-5	11	Gravel / Cobble / BR	Sand / Silt / Bedrock	Sand / Silt / Gravel / BR

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
10/02/05	10-2	1			
10/02/05	10-2	2			
10/02/05	10-2	3			
10/02/05	10-2	4			
10/02/05	10-2	5			
10/02/05	10-2	6			
10/02/05	10-2	7			
10/02/05	10-2	8			
10/02/05	10-2	9			
10/02/05	10-2	10			
10/02/05	10-2	11			
10/02/05	10-3	1	100		
10/02/05	10-3	2			
10/02/05	10-3	3	100	100	100
10/02/05	10-3	4	100	100	100
10/02/05	10-3	5	100	100	100
10/02/05	10-3	6	100	100	100
10/02/05	10-3	7	100	100	100
10/02/05	10-3	8	100	100	100
10/02/05	10-3	9	100	100	
10/02/05	10-3	10	100	100	100
10/02/05	10-3	11	100		100
10/02/05	10-4	1			
10/02/05	10-4	2			
10/02/05	10-4	3			
10/02/05	10-4	4			
10/02/05	10-4	5			
10/02/05	10-4	6			
10/02/05	10-4	7			
10/02/05	10-4	8			
10/02/05	10-4	9			
10/02/05	10-4	10			
10/02/05	10-4	11			
10/02/05	10-5	1			
10/02/05	10-5	2			
10/02/05	10-5	3			
10/02/05	10-5	4			
10/02/05	10-5	5			100.0
10/02/05	10-5	6	100.0	100.0	100.0
10/02/05	10-5	7	100.0	100.0	100.0
10/02/05	10-5	8	100.0	100.0	100.0
10/02/05	10-5	9	100.0	100.0	100.0
10/02/05	10-5	10	100.0	100.0	100.0
10/02/05	10-5	11	100.0	100.0	100.0

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
10/08/05	11-1	1	Run	16.4	25.7	0.0
10/08/05	11-1	2	Run	11.0	24.9	0.0
10/08/05	11-1	3	Run	13.2	26.4	5.2
10/08/05	11-1	4	Run	9.6	15.6	0.0
10/08/05	11-1	5	Run	13.5	18.6	0.0
10/08/05	11-1	6	Run	9.8	18.8	0.0
10/08/05	11-1	7	Run	14.2	17.6	0.0
10/08/05	11-1	8	Run	14.9	18.3	0.0
10/08/05	11-1	9	Run	15.0	16.2	0.0
10/08/05	11-1	10	Run	16.8	20.7	0.0
10/08/05	11-1	11	Run	16.6	18.9	0.0
10/01/05	11-2	1	Run	7.5	10.2	0.0
10/01/05	11-2	2	Run	8.0	10.8	0.0
10/01/05	11-2	3	Run	8.7	11.6	0.0
10/01/05	11-2	4	Run	7.9	9.8	0.0
10/01/05	11-2	5	Run	8.0	10.1	0.0
10/01/05	11-2	6	Run	8.8	11.8	0.0
10/01/05	11-2	7	Run	7.8	9.9	0.0
10/01/05	11-2	8	Run	8.1	8.7	0.0
10/01/05	11-2	9	Run	8.9	9.2	0.0
10/01/05	11-2	10	Run	8.9	11.6	0.0
10/01/05	11-2	11	Run	9.3	10.2	0.0
10/07/05	11-3	1	Run	10.5	24.3	0.0
10/07/05	11-3	2	Run	6.8	21.6	0.0
10/07/05	11-3	3	Run	15.1	24.1	0.0
10/07/05	11-3	4	Run	15.7	22.0	0.0
10/07/05	11-3	5	Run	16.1	20.2	0.0
10/07/05	11-3	6	Run	17.4	22.0	0.0
10/07/05	11-3	7	Riffle	17.1	19.5	0.0
10/07/05	11-3	8	Riffle	11.2	18.8	3.5
10/07/05	11-3	9	Run	13.9	17.0	0.0
10/07/05	11-3	10	Run	14.6	18.7	0.0
10/07/05	11-3	11	Run	16.0	18.4	0.0
10/09/05	11-4	1	Run	2.2	12.3	0.0
10/09/05	11-4	2	Run	2.3	14.4	0.0
10/09/05	11-4	3	Riffle	2.5	15.7	0.0
10/09/05	11-4	4	Riffle	3.1	16.4	0.0
10/09/05	11-4	5	Pool	9.2	19.1	0.0
10/09/05	11-4	6	Run	3.5	10.5	0.0
10/09/05	11-4	7	Run	4.4	9.8	0.0
10/09/05	11-4	8	Run	4.1	9.4	0.0
10/09/05	11-4	9	Run	4.2	10.8	0.0
10/09/05	11-4	10	Run	3.9	11.7	0.0
10/09/05	11-4	11	Pool	7.7	14.6	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
10/08/05	11-1	1	10	13.8	12.5	0	0	Grazing
10/08/05	11-1	2	350	13.6	19.2	0	11	Grazing
10/08/05	11-1	3	330	22.7	13.6	6	0	Grazing
10/08/05	11-1	4	20	51.7	16.7	17	15	Grazing
10/08/05	11-1	5	25	19.7	27.8	0	13	Grazing
10/08/05	11-1	6	0	13.8	26.0	0	17	Grazing
10/08/05	11-1	7	0	19.7	20.7	10	17	Grazing
10/08/05	11-1	8	0	17.8	18.6	16	17	Grazing
10/08/05	11-1	9	0	16.7	16.0	17	16	Grazing
10/08/05	11-1	10	0	18.2	21.7	17	17	Grazing
10/08/05	11-1	11	0	17.6	20.7	17	17	Grazing
10/01/05	11-2	1	0	18.2	26.7	12	17	Grazing
10/01/05	11-2	2	0	29.3	21.8	17	16	Grazing
10/01/05	11-2	3	0	28.1	20.3	17	2	Grazing
10/01/05	11-2	4	0	40.0	36.2	11	17	Grazing
10/01/05	11-2	5	0	35.9	26.0	17	17	Grazing
10/01/05	11-2	6	0	24.6	30.5	17	1	Grazing
10/01/05	11-2	7	0	32.2	15.8	16	17	Grazing
10/01/05	11-2	8	0	51.9	36.5	17	17	Grazing
10/01/05	11-2	9	0	34.5	14.0	17	17	Grazing
10/01/05	11-2	10	0	12.5	14.0	17	7	Grazing
10/01/05	11-2	11	0	32.5	38.7	17	17	Grazing
10/07/05	11-3	1	350	20.2	14.6	4	0	Grazing
10/07/05	11-3	2	355	19.5	5.0	4	0	Grazing
10/07/05	11-3	3	0	21.6	6.5	17	17	Grazing
10/07/05	11-3	4	10	19.5	10.8	10	17	Grazing
10/07/05	11-3	5	25	17.8	13.6	11	17	Grazing
10/07/05	11-3	6	0	18.5	16.0	17	2	Grazing
10/07/05	11-3	7	330	13.8	12.3	12	15	Grazing
10/07/05	11-3	8	0	15.6	13.6	17	17	Grazing
10/07/05	11-3	9	10	20.1	18.5	17	17	Grazing
10/07/05	11-3	10	5	18.8	18.7	2	17	Grazing
10/07/05	11-3	11	0	15.5	7.6	11	17	Grazing
10/09/05	11-4	1	0	25.2	30.8	0	0	Grazing
10/09/05	11-4	2	350	22.1	27.8	0	0	Grazing
10/09/05	11-4	3	348	16.8	18.5	0	0	Grazing
10/09/05	11-4	4	340	41.5	17.3	17	0	Grazing
10/09/05	11-4	5	50	35.9	21.1	17	0	Grazing
10/09/05	11-4	6	0	29.7	38.7	0	0	Grazing
10/09/05	11-4	7	0	12.6	37.9	0	0	Grazing
10/09/05	11-4	8	350	21.7	30.7	8	0	Grazing
10/09/05	11-4	9	0	14.6	35.7	0	0	Grazing
10/09/05	11-4	10	0	13.8	29.2	0	0	Grazing
10/09/05	11-4	11	0	19.2	43.0	0	17	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
10/08/05	11-1	1	12.3	21.3	1.1	1.6	10	15
10/08/05	11-1	2	9.3	46.9	1.3	1.6	40	70
10/08/05	11-1	3	59.5	23.1	2.6	1.6	15	70
10/08/05	11-1	4	47.4	37.2	2.0	1.4	30	80
10/08/05	11-1	5	18.5	61.5	1.2	1.8	60	90
10/08/05	11-1	6	15.3	45.4	1.4	2.0	15	75
10/08/05	11-1	7	50.7	45.4	1.7	2.1	80	80
10/08/05	11-1	8	48.4	58.2	1.4	1.7	80	80
10/08/05	11-1	9	47.0	39.5	1.2	1.3	75	60
10/08/05	11-1	10	56.0	33.2	1.4	1.8	90	85
10/08/05	11-1	11	82.6	42.2	2.1	1.7	90	85
10/01/05	11-2	1	47.4	37.7	1.1	1.0	100	100
10/01/05	11-2	2	36.2	32.0	1.2	1.1	80	100
10/01/05	11-2	3	29.2	43.4	1.3	0.8	90	90
10/01/05	11-2	4	27.2	44.0	1.0	0.8	60	75
10/01/05	11-2	5	35.2	31.1	1.0	0.9	75	80
10/01/05	11-2	6	46.5	27.7	1.2	1.1	70	60
10/01/05	11-2	7	44.7	41.2	1.2	1.0	80	70
10/01/05	11-2	8	38.4	57.4	0.6	0.8	80	90
10/01/05	11-2	9	39.0	32.0	1.1	0.8	70	85
10/01/05	11-2	10	44.0	27.7	1.0	0.8	95	80
10/01/05	11-2	11	64.5	39.5	0.6	0.7	70	100
10/07/05	11-3	1	34.7	11.1	1.9	1.7	50	90
10/07/05	11-3	2	43.4	12.1	1.7	1.8	95	95
10/07/05	11-3	3	53.2	14.8	2.0	1.8	95	60
10/07/05	11-3	4	43.4	29.2	1.6	1.8	95	50
10/07/05	11-3	5	39.0	39.5	1.4	1.4	90	90
10/07/05	11-3	6	44.9	21.3	1.4	1.8	95	50
10/07/05	11-3	7	44.7	33.7	1.5	1.1	90	75
10/07/05	11-3	8	57.0	39.7	1.6	1.8	95	80
10/07/05	11-3	9	50.7	36.5	1.2	1.5	95	95
10/07/05	11-3	10	45.2	45.5	1.4	1.3	60	85
10/07/05	11-3	11	46.9	44.5	1.2	1.9	90	90
10/09/05	11-4	1	9.1	14.3	0.7	0.7	90	90
10/09/05	11-4	2	11.6	14.0	0.7	1.2	90	75
10/09/05	11-4	3	11.8	13.3	0.6	0.9	90	90
10/09/05	11-4	4	90.0	9.8	1.2	0.9	10	85
10/09/05	11-4	5	90.0	13.3	1.1	1.0	20	75
10/09/05	11-4	6	12.0	15.6	0.6	0.5	80	75
10/09/05	11-4	7	29.2	15.6	0.7	0.6	75	85
10/09/05	11-4	8	20.2	18.6	0.5	0.6	80	80
10/09/05	11-4	9	9.8	14.3	0.6	0.7	90	90
10/09/05	11-4	10	14.1	17.3	0.7	0.8	80	70
10/09/05	11-4	11	8.8	26.0	0.6	0.6	75	70

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
10/08/05	11-1	1	Yes	Yes	Sand / Clay / Gravel	Sand / Clay
10/08/05	11-1	2	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	11-1	3	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	11-1	4	Yes		Sand / Clay	Sand / Clay
10/08/05	11-1	5	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	11-1	6	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	11-1	7		Yes	Sand / Clay	Sand / Clay
10/08/05	11-1	8	Yes		Sand / Clay	Sand / Clay
10/08/05	11-1	9	Yes	Yes	Sand / Clay	Sand / Clay
10/08/05	11-1	10	Yes		Sand / Clay	Sand / Clay
10/08/05	11-1	11	Yes		Sand / Clay	Sand / Clay
10/01/05	11-2	1	Yes		Sand / Clay	Sand / Clay
10/01/05	11-2	2	Yes	Yes	Sand / Clay	Sand / Clay
10/01/05	11-2	3			Sand / Clay	Sand / Clay
10/01/05	11-2	4			Sand / Clay	Sand / Clay
10/01/05	11-2	5			Sand / Clay	Sand / Clay
10/01/05	11-2	6			Sand / Clay	Sand / Clay
10/01/05	11-2	7			Sand / Clay	Sand / Clay
10/01/05	11-2	8			Sand / Clay	Sand / Clay
10/01/05	11-2	9			Sand / Clay	Sand / Clay
10/01/05	11-2	10			Sand / Clay	Sand / Clay
10/01/05	11-2	11			Sand / Clay	Sand / Clay
10/07/05	11-3	1	Yes		Sand / Clay	Sand / Clay
10/07/05	11-3	2			Sand / Clay	Sand / Clay
10/07/05	11-3	3			Sand / Clay	Sand / Clay
10/07/05	11-3	4		Yes	Sand / Clay	Sand / Clay
10/07/05	11-3	5		Yes	Sand / Clay	Sand / Clay
10/07/05	11-3	6		Yes	Sand / Clay	Sand / Clay
10/07/05	11-3	7		Yes	Sand / Clay	Sand / Clay
10/07/05	11-3	8		Yes	Sand / Clay	Sand / Clay
10/07/05	11-3	9			Sand / Clay	Sand / Clay
10/07/05	11-3	10	Yes	Yes	Sand / Clay	Sand / Clay
10/07/05	11-3	11			Sand / Clay	Sand / Clay
10/09/05	11-4	1			Sand / Clay	Sand / Clay
10/09/05	11-4	2			Sand / Clay	Sand / Clay
10/09/05	11-4	3			Sand / Clay	Sand / Clay / Gl / Ce
10/09/05	11-4	4	Yes		Sand / Clay	Sand / Clay
10/09/05	11-4	5	Yes		Sand / Clay	Sand / Clay
10/09/05	11-4	6			Sand / Clay	Sand / Clay
10/09/05	11-4	7		Yes	Sand / Clay	Sand / Clay
10/09/05	11-4	8			Sand / Clay	Sand / Clay
10/09/05	11-4	9	Yes		Sand / Clay	Sand / Clay
10/09/05	11-4	10			Sand / Clay	Sand / Clay
10/09/05	11-4	11			Sand / Clay	Sand / Clay

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
10/08/05	11-1	1			
10/08/05	11-1	2			
10/08/05	11-1	3			
10/08/05	11-1	4			
10/08/05	11-1	5			
10/08/05	11-1	6			
10/08/05	11-1	7			
10/08/05	11-1	8			
10/08/05	11-1	9			
10/08/05	11-1	10			
10/08/05	11-1	11			
10/01/05	11-2	1			
10/01/05	11-2	2			
10/01/05	11-2	3			
10/01/05	11-2	4			
10/01/05	11-2	5			
10/01/05	11-2	6			
10/01/05	11-2	7			
10/01/05	11-2	8			
10/01/05	11-2	9			
10/01/05	11-2	10			
10/01/05	11-2	11			
10/07/05	11-3	1			
10/07/05	11-3	2			
10/07/05	11-3	3			
10/07/05	11-3	4			
10/07/05	11-3	5			
10/07/05	11-3	6			
10/07/05	11-3	7			
10/07/05	11-3	8			
10/07/05	11-3	9			
10/07/05	11-3	10			
10/07/05	11-3	11			
10/09/05	11-4	1	widgeon grass		
10/09/05	11-4	2	salt grass	widgeon grass	SG / WG
10/09/05	11-4	3	salt grass	SG / WG	SG / WG
10/09/05	11-4	4	widgeon grass		
10/09/05	11-4	5		widgeon grass	SG / WG
10/09/05	11-4	6	widgeon grass		SG / WG
10/09/05	11-4	7	widgeon grass	widgeon grass	SG / WG
10/09/05	11-4	8	salt grass		SG / WG
10/09/05	11-4	9	widgeon grass	widgeon grass	salt grass
10/09/05	11-4	10	SG / WG	widgeon grass	widgeon grass
10/09/05	11-4	11	SG / WG	widgeon grass	widgeon grass

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
10/08/05	11-1	1	9	38	18	0.02	0.43	0.45
10/08/05	11-1	2	29	43	50	0.39	0.49	0.42
10/08/05	11-1	3	26	49	27	0.00	0.57	0.49
10/08/05	11-1	4	29	51	17	0.20	0.50	0.26
10/08/05	11-1	5	13	23	36	0.44	0.32	0.40
10/08/05	11-1	6	13	31	57	0.24	0.45	0.46
10/08/05	11-1	7	38	50	44	0.14	0.29	0.23
10/08/05	11-1	8	36	32	32	0.11	0.15	0.22
10/08/05	11-1	9	29	30	26	0.38	0.27	0.20
10/08/05	11-1	10	23	15	28	0.37	0.38	0.25
10/08/05	11-1	11	36	17	16	0.34	0.31	0.27
10/01/05	11-2	1	76	92	78	0.20	0.15	0.09
10/01/05	11-2	2	71	89	72	0.10	0.14	0.07
10/01/05	11-2	3	65	79	58	0.16	0.15	0.12
10/01/05	11-2	4	63	84	77	0.18	0.19	0.16
10/01/05	11-2	5	53	79	73	0.15	0.15	0.08
10/01/05	11-2	6	70	73	30	0.13	0.15	0.04
10/01/05	11-2	7	72	78	67	0.16	0.19	0.10
10/01/05	11-2	8	76	78	68	0.20	0.17	0.12
10/01/05	11-2	9	50	77	70	0.12	0.17	0.15
10/01/05	11-2	10	55	76	63	0.12	0.12	0.08
10/01/05	11-2	11	60	76	60	0.13	0.18	0.15
10/07/05	11-3	1	12	18	7	0.51	0.57	0.17
10/07/05	11-3	2	26	18	12	0.37	0.43	0.25
10/07/05	11-3	3	13	13	6	0.45	0.24	0.08
10/07/05	11-3	4	9	13	6	0.29	0.44	0.10
10/07/05	11-3	5	6	12	13	0.15	0.37	0.33
10/07/05	11-3	6	5	2	40	0.02	0.00	0.52
10/07/05	11-3	7	8	11	9	0.28	0.31	0.04
10/07/05	11-3	8	13	2	8	0.40	0.01	0.17
10/07/05	11-3	9	20	12	8	0.36	0.17	0.18
10/07/05	11-3	10	12	9	17	0.25	0.19	0.34
10/07/05	11-3	11	8	7	22	0.04	0.14	0.24
10/09/05	11-4	1	37	42	41	0.00	0.27	0.16
10/09/05	11-4	2	20	24	20	0.32	0.34	0.38
10/09/05	11-4	3	7	13	21	0.41	0.94	0.60
10/09/05	11-4	4	21	14	12	0.48	0.52	0.19
10/09/05	11-4	5	36	17	13	0.13	0.13	0.14
10/09/05	11-4	6	16	28	22	0.09	0.23	0.12
10/09/05	11-4	7	18	16	18	0.30	0.28	0.27
10/09/05	11-4	8	20	27	16	0.04	0.23	0.51
10/09/05	11-4	9	28	28	17	0.29	0.16	0.04
10/09/05	11-4	10	16	27	43	0.01	0.17	0.23
10/09/05	11-4	11	35	49	32	0.00	0.19	0.00

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
10/08/05	11-1	1	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/08/05	11-1	2	Sand / Silt	Sand / Silt / Gravel	Sand / Silt
10/08/05	11-1	3	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Silt / Gravel
10/08/05	11-1	4	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	11-1	5	Sand / Silt / Gravel	Sand / Silt	Sand / Silt
10/08/05	11-1	6	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	11-1	7	Sand / Silt	Sand / Silt	Sand / Silt
10/08/05	11-1	8	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/08/05	11-1	9	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Silt
10/08/05	11-1	10	Sand / Silt	Sand / Silt / Gravel	Sand / Silt
10/08/05	11-1	11	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/01/05	11-2	1	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	2	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	3	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	4	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	5	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	6	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	7	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	8	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	9	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	10	Silt / Clay	Silt / Clay	Silt / Clay
10/01/05	11-2	11	Silt / Clay	Silt / Clay	Silt / Clay
10/07/05	11-3	1	Sand / Clay	Sand / Clay / Gravel	Sand / Clay
10/07/05	11-3	2	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	3	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	4	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	5	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	6	Sand / Clay	Sand / Clay	Sand / Clay / Gravel
10/07/05	11-3	7	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	8	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	9	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	10	Sand / Clay	Sand / Clay	Sand / Clay
10/07/05	11-3	11	Sand / Clay	Sand / Clay	Sand / Clay
10/09/05	11-4	1	Sand / Silt / GR / CB	Sand / Silt / GR / CB	Sand / Silt / GR / CB
10/09/05	11-4	2	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Silt / Gravel
10/09/05	11-4	3	Sand / Silt / GR / CB	Sand / Silt / GR / CB	Sand / Silt / GR / CB
10/09/05	11-4	4	Sand / Silt / GR / CB	Sand / Silt / GR / CB	Sand / Silt / GR / CB
10/09/05	11-4	5	Sand / Silt / Cobble	Sand / Silt	Sand / Silt / Gravel
10/09/05	11-4	6	Sand / Silt	Sand / Silt / GR / CB	Sand / Silt / Cobble
10/09/05	11-4	7	Sand / Silt	Sand / Silt	Sand / Silt
10/09/05	11-4	8	Sand / Silt	Sand / Silt / Gravel	Sand / Silt
10/09/05	11-4	9	Sand / Silt	Sand / Silt	Sand / Silt
10/09/05	11-4	10	Sand / Silt	Sand / Silt	Sand / Silt / Gravel
10/09/05	11-4	11	Sand / Silt / Cobble	Sand / Silt	Sand / Silt

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
10/08/05	11-1	1			
10/08/05	11-1	2			
10/08/05	11-1	3			
10/08/05	11-1	4			
10/08/05	11-1	5			
10/08/05	11-1	6			
10/08/05	11-1	7			
10/08/05	11-1	8			
10/08/05	11-1	9			
10/08/05	11-1	10			
10/08/05	11-1	11			
10/01/05	11-2	1			
10/01/05	11-2	2			
10/01/05	11-2	3			
10/01/05	11-2	4			
10/01/05	11-2	5			
10/01/05	11-2	6			
10/01/05	11-2	7			
10/01/05	11-2	8			
10/01/05	11-2	9			
10/01/05	11-2	10			
10/01/05	11-2	11			
10/07/05	11-3	1			
10/07/05	11-3	2			
10/07/05	11-3	3			
10/07/05	11-3	4			
10/07/05	11-3	5			
10/07/05	11-3	6			
10/07/05	11-3	7			
10/07/05	11-3	8			
10/07/05	11-3	9			
10/07/05	11-3	10			
10/07/05	11-3	11			
10/09/05	11-4	1	10.0	10.0	10.0
10/09/05	11-4	2			
10/09/05	11-4	3	15.0	15.0	15.0
10/09/05	11-4	4	5.0	5.0	5.0
10/09/05	11-4	5	20.0		
10/09/05	11-4	6		5.0	90.0
10/09/05	11-4	7			
10/09/05	11-4	8			
10/09/05	11-4	9			
10/09/05	11-4	10			
10/09/05	11-4	11	30.0		

Date	Site	Transect	Habitat type	Wetted channel width (m)	Bank-full width (m)	Channel features width (m)
10/09/05	11-5	1	Run	5.6	10.4	0.0
10/09/05	11-5	2	Pool	3.7	7.8	0.0
10/09/05	11-5	3	Pool	5.4	12.1	0.0
10/09/05	11-5	4	Run	6.6	10.2	0.0
10/09/05	11-5	5	Run	7.1	11.2	0.0
10/09/05	11-5	6	Run	6.8	10.3	0.0
10/09/05	11-5	7	Run	8.0	13.1	0.0
10/09/05	11-5	8	Run	7.0	15.1	0.0
10/09/05	11-5	9	Run	6.4	11.9	0.0
10/09/05	11-5	10	Run	4.9	10.8	0.0
10/09/05	11-5	11	Run	8.5	13.5	0.0

Date	Site	Transect	Flow aspect	Canopy angle (°)		Canopy closure		Riparian land use
				Left	Right	Left	Right	
10/09/05	11-5	1	10	24.2	38.5	11	4	Grazing
10/09/05	11-5	2	0	23.7	68.3	0	16	Grazing
10/09/05	11-5	3	0	31.1	28.1	0	0	Grazing
10/09/05	11-5	4	0	25.7	61.5	11	1	Grazing
10/09/05	11-5	5	0	33.4	55.5	9	8	Grazing
10/09/05	11-5	6	0	24.0	52.7	0	13	Grazing
10/09/05	11-5	7	0	29.2	45.2	5	0	Grazing
10/09/05	11-5	8	0	26.7	29.2	0	0	Grazing
10/09/05	11-5	9	0	25.7	18.3	3	0	Grazing
10/09/05	11-5	10	0	26.0	25.2	17	0	Grazing
10/09/05	11-5	11	10	21.7	30.1	6	0	Grazing

Date	Site	Transect	Bank angle (°)		Bank height (m)		Bank vegetative cover (%)	
			Left	Right	Left	Right	Left	Right
10/09/05	11-5	1	28.7	20.7	0.5	1.2	70	80
10/09/05	11-5	2	24.0	51.9	0.6	1.0	90	90
10/09/05	11-5	3	19.0	32.6	0.4	0.7	90	30
10/09/05	11-5	4	21.6	28.2	0.6	1.0	80	20
10/09/05	11-5	5	24.6	26.8	0.7	1.2	85	20
10/09/05	11-5	6	18.3	28.8	0.6	1.4	75	15
10/09/05	11-5	7	12.6	13.6	0.5	1.0	60	30
10/09/05	11-5	8	14.3	12.8	0.5	0.8	40	60
10/09/05	11-5	9	15.0	17.8	0.5	0.6	70	80
10/09/05	11-5	10	17.7	16.2	0.5	0.9	85	80
10/09/05	11-5	11	35.0	17.8	0.5	0.9	95	90

Date	Site	Transect	Bank erosion		Bank substrate	
			Left	Right	Left	Right
10/09/05	11-5	1		Yes	Sand / Clay	Sand / Clay
10/09/05	11-5	2		Yes	Sand / Clay	Sand / Clay / 'Bedrock'
10/09/05	11-5	3		Yes	Sand / Clay	Sand / Clay / 'Bedrock'
10/09/05	11-5	4		Yes	Sand / Clay	Sand / Clay / 'Bedrock'
10/09/05	11-5	5		Yes	Sand / Clay	Sand / Clay / 'Bedrock'
10/09/05	11-5	6			Sand / Clay	Sand / Clay / 'Bedrock'
10/09/05	11-5	7	Yes	Yes	Sand / Clay	Sand / Clay / 'Bedrock'
10/09/05	11-5	8	Yes	Yes	Sand / Clay	Sand / Clay / Gravel
10/09/05	11-5	9	Yes		Sand / Clay	Sand / Clay
10/09/05	11-5	10	Yes		Sand / Clay	Sand / Clay
10/09/05	11-5	11		Yes	Sand / Clay	Sand / Clay / 'Bedrock'

Date	Site	Transect	Aquatic cover features		
			Left	Middle	Right
10/09/05	11-5	1	widgeon grass	widgeon grass	salt grass
10/09/05	11-5	2			
10/09/05	11-5	3	widgeon grass	widgeon grass	widgeon grass
10/09/05	11-5	4		widgeon grass	widgeon grass
10/09/05	11-5	5		widgeon grass	
10/09/05	11-5	6	widgeon grass		salt grass
10/09/05	11-5	7	widgeon grass	widgeon grass	widgeon grass
10/09/05	11-5	8			
10/09/05	11-5	9	widgeon grass		widgeon grass
10/09/05	11-5	10	widgeon grass	widgeon grass	widgeon grass
10/09/05	11-5	11	widgeon grass		widgeon grass

Date	Site	Transect	Depth (cm)			Velocity (m/s)		
			Left	Middle	Right	Left	Middle	Right
10/09/05	11-5	1	21	31	21	0.14	0.19	0.12
10/09/05	11-5	2	45	72	39	0.04	0.05	0.03
10/09/05	11-5	3	31	42	37	0.05	0.05	0.02
10/09/05	11-5	4	25	26	16	0.18	0.08	0.07
10/09/05	11-5	5	14	9	9	0.19	0.24	0.14
10/09/05	11-5	6	12	23	12	0.19	0.30	0.09
10/09/05	11-5	7	14	11	23	0.08	0.24	0.00
10/09/05	11-5	8	17	16	10	0.22	0.18	0.12
10/09/05	11-5	9	18	18	21	0.09	0.24	0.17
10/09/05	11-5	10	13	30	15	0.30	0.37	0.24
10/09/05	11-5	11	27	23	19	0.05	0.17	0.03

Date	Site	Transect	Bed Substrate		
			Left	Middle	Right
10/09/05	11-5	1	Sand / Silt / Gravel	Sand / Silt	Sand / Silt
10/09/05	11-5	2	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/09/05	11-5	3	Sand / Silt / Gravel	Sand / Silt / Gravel / BR	Sand / Silt / Gravel
10/09/05	11-5	4	Sand / Silt / Gravel	Sand / Silt / Gravel	Sand / Silt / Gravel / Br
10/09/05	11-5	5	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/09/05	11-5	6	Sand / Silt	Sand / Silt / Gravel / Br	Sand / Silt / Gravel
10/09/05	11-5	7	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/09/05	11-5	8	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel
10/09/05	11-5	9	Sand / Silt / Gravel	Sand / Silt	Sand / Silt / Gravel
10/09/05	11-5	10	Sand / Silt	Sand / Silt	Sand / Silt
10/09/05	11-5	11	Sand / Silt	Sand / Silt / Gravel	Sand / Silt / Gravel

Date	Site	Transect	Embeddedness (%)		
			Left	Middle	Right
10/09/05	11-5	1			
10/09/05	11-5	2			
10/09/05	11-5	3		100.0	
10/09/05	11-5	4			
10/09/05	11-5	5			
10/09/05	11-5	6		10.0	
10/09/05	11-5	7			
10/09/05	11-5	8			
10/09/05	11-5	9			
10/09/05	11-5	10			
10/09/05	11-5	11			

ERRATUM

The following page should be substituted for page 14 of the report.

4.0 Results

4.1 Faunal Surveys of Brine Collection Areas

Faunal surveys of springs began in June 2005 and were completed in May 2006. In all, 16 springs were located (Table 1) along and in the North and South Wichita rivers within the brine emission areas. No springs were sampled on the Middle Fork of the Wichita River during these surveys- one large spring in the upper reaches of the river was observed, but not sampled, during the helicopter flyover during 14-15 March 2006. Most of the located springs were too small, too diffuse, or submerged within the river (i.e., spring boils) to allow sampling. In addition to sampling the North and South Wichita rivers, springs located along the lower course of Salt Creek, a major tributary to the upper North Wichita River also were sampled. Lewis and Dalquest (1957) collected water samples from a relatively large number of springs, particularly in the North Wichita River; however, many of these springs could not be located. The water table near the confluence of the North Wichita River Salt Creek is very shallow. Several small springs that feed into the river, which were sampled by Lewis and Dalquest (1957) could not be located. In addition, it appeared that some springs had changed location. This area appears to be hydrologically very dynamic and many of the springs sampled by Lewis and Dalquest apparently are either greatly reduced in volume or no longer issue water. Faunal surveys were conducted at four springs (numbers 7, 8, 10+11, and 13 in Table 1) large enough to allow sampling. Photographs of these four spring sites are presented in Figure 2.

Two additional large springs, outside the brine emission areas, were discovered during the flyover (Table 1). One spring was located on upper Salt Creek, a tributary of