
PHASE 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study

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To: City of Winnipeg Project Management Committee
Study Team Members

Subject: **Fish Habitat Technical Memorandum # FH 01**

**PHYSICAL DATA TO CHARACTERIZE FISH HABITAT IN THE RED AND
ASSINIBOINE RIVERS**

January, 2000

EXECUTIVE SUMMARY

This memorandum is one of a series of three memoranda that have been produced to describe fish habitat in the Red and Assiniboine rivers within the City of Winnipeg Ammonia Criteria Study Area. This memorandum describes the physical attributes of fish habitat, while two other memoranda describe water chemistry and the invertebrate community. Data from all three memoranda will be used to explain fish distributions within the Study Area.

Two surveys to describe the physical attributes of fish habitat in the Red and Assiniboine rivers were conducted during fall, 1998 and summer 1999. To facilitate development of a sampling regime, each river was divided into segments based on river meanders. Straight river portions leading out of, and into, river bends comprised "straight" segments, and river bends comprised "river bend" segments. The Red and Assiniboine rivers were divided into 86 and 30 segments, respectively.

During the first survey, water depth and water velocity were measured, and substrate composition and compaction were qualitatively determined at quarter points on a transect across the middle of each segment. During the second survey, water depth was measured and substrate composition and compaction were qualitatively determined at quarter points on four equally spaced transects within each segment. Shoreline and riparian features were qualitatively described during both surveys. Water velocity profiles were measured across two typical Red River segments. All segments, transects, quarter points and key shoreline features are geo-referenced with UTM coordinates. Data are presented by river segment.

Data presented in this memorandum will be used to produce a digital map of the physical features of fish habitat in the Red and Assiniboine rivers.

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1.0

INTRODUCTION

Fish distribution, abundance and health are dependent on the quality and quantity of aquatic habitat. Aquatic habitat is generally a function of physical (e.g., water depth, water velocity, substrate, riparian conditions), chemical (e.g., pH, dissolved oxygen, turbidity, water temperature, ammonia) and biological (e.g., benthic invertebrate community composition and abundance) factors. To explain differences in distribution, abundance and condition of fish between locations, we must have an understanding of how aquatic habitat parameters differ among those sites.

This technical memorandum is one of a series of three memoranda that have been prepared to describe fish habitat within the Study Area (Figure 1) and contribute to our understanding of fish distributions in the Red and Assiniboine rivers. It describes the physical attributes of fish habitat including water depths, water velocities, substrates, and riparian conditions. A description of water chemistry and the invertebrate fauna of the the Red and Assiniboine rivers within the Study Area are provided in two other technical memoranda entitled:

Fish Habitat Technical Memorandum #FH 02: Benthic Invertebrate and Sediment Data to Characterize Fish Habitat in the Red and Assiniboine Rivers.

Fish Habitat Technical Memorandum #FH 03: Water Chemistry Data to Characterize Fish Habitat in the Red and Assiniboine Rivers.

The objective of this study was to document the physical attributes of fish habitat within those portions of the Red and Assiniboine rivers that lie within the Study Area for the City of Winnipeg Ammonia Criteria Study. The focus of the study was to provide information to describe regional (reach) differences in habitats (i.e., macrohabitats) to contribute to explaining regional differences in fish distributions. Collecting information on microhabitats to explain local differences in fish utilization was outside the scope of the study.

Habitat information presented in this technical memorandum will be used to generate a fish habitat map that will assist in explaining fish distributions within the study area.

NEWPCC - North End Water Pollution Control Centre
 SEWPCC - South End Water Pollution Control Centre
 WEWPCC - West End Water Pollution Control Centre
 - Study Area

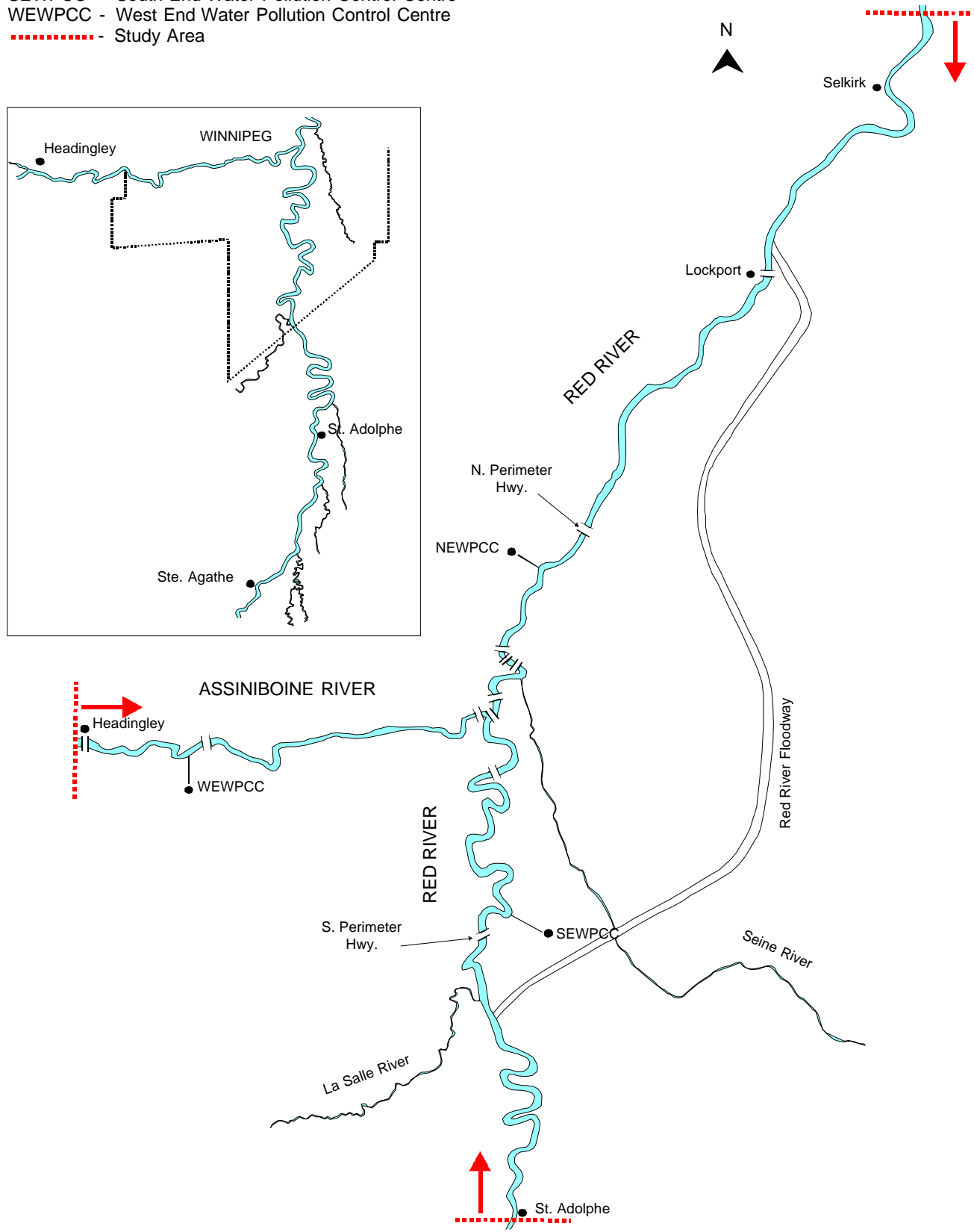


Figure 1. Study Area for the City of Winnipeg Ammonia Criteria Study.

2.0

METHODS

Prior to conducting the habitat field surveys, the Red and Assiniboine rivers were divided into segments to facilitate development of a sampling regime. Segments were designated on 1:50,000 topographic maps and were based on river meanders. Straight river portions leading out of, and into, river bends comprised "straight" segments, while river bends comprised "river bend" segments.

2.1 HABITAT SURVEY I

A field survey of physical habitat on the Red and Assiniboine rivers was conducted from October 21 to November 9, 1998. The survey encompassed all segments of the rivers within the study area and included the following tasks:

- C determining UTM coordinates for the start and finish of each river segment;
- C selecting a transect in the middle of each segment and determining the UTM co-ordinates for each end;
- C measuring depth at each of the three quarter points along each transect;
- C measuring water velocity at each of the three quarter points along each transect;
- C determining substrate composition and compaction at each quarter point along each transect;
- C documenting locations of special features (e.g., culverts, bridges) within each segment; and,
- C documenting riparian and shoreline conditions within each segment.

Left and right banks of the river were determined while facing upstream. Quarter points were located one quarter of the channel width from the right bank (R), at mid-channel (C), and one quarter of the river width from the left bank (L). All sampling was conducted from a boat. UTM coordinates were determined with a hand held navigational quality GPS unit. Accuracy of the UTM coordinates should be within 50 m. Depth was measured with a surveyors rod. Water velocities were measured at 60% of depth with a gurlly meter suspended on a 13 kg weight assembly. Substrates were determined by probing the bottom with a surveyors rod or by collecting an Ekman dredge sample. Substrates were classified qualitatively based on the presence or absence of a substrate type and by

compaction. Substrate classification included one or a combination of the following: clay, mud, sand, gravel, cobble, boulder and/or bedrock. Substrate compaction was classified as hard, medium or soft.

Qualitative riparian and shoreline conditions were documented for all shorelines within the study area. UTM coordinates were determined for special features such as docks and culverts.

2.2 HABITAT SURVEY II

Based on results from the first habitat survey, it was determined that additional data would be required to provide an adequate description of fish habitat. Consequently, a second survey was conducted from June 23 to July 9, 1999, with the objective of collecting supplementary depth and substrate data from four transects within each river segment. Transect 1 was located on the upstream border of the segment; Transect 2 was located one quarter of the way through the segment; Transect 3 was located half-way through the segment in the same general location at which measurements were collected during the first habitat survey; and, Transect 4 was located three quarters of the way through the segment. At each quarter point on each transect, depth was measured with a surveyors rod and composition and compaction of substrate was determined by probing the river bottom with a hollow metal pole. Classification of substrates was as described in Section 2.1. Information on riparian and shoreline conditions also were collected during the survey to supplement information collected during the first habitat survey.

2.3 WATER VELOCITY PROFILES

To gain a better understanding of how water velocities varied within the river channel, single water velocity profiles were measured in two separate "river bend" segments of the Red River. UTM coordinates of profile locations were determined with a hand-held navigational quality GPS unit. Ten depth and velocity measurements were collected from each transect. Measurements were taken at 5 m intervals for the first 15 m offshore, at 30 m from each shore, and at 40 m from each shore. Velocity was measured at 20% and 80% of depth. Depths were measured with a surveyors rod and velocity was measured with a gurlly meter attached to a 13 kg weight assembly.

2.4 STAGE AND DISCHARGE

James Street Pumping Station stage and a discharge are provided for each day segments were sampled. Discharge for Red River segments upstream of the Forks (1-48) reflect the discharge as measured at Ste. Agathe; discharge for Red River segments downstream of the Forks (49-86) reflect the discharge as measured at Lockport; and, discharge for Assiniboine River segments (101-130) reflect the discharge as measured at Headingly. **(Stage and discharge data will not be available until March, 2000. These data will be provided in a final edition of this memorandum at that time.)**

2.5 DATA SUMMARY

Habitat information collected during both habitat surveys are provided in the following sections.

Additional water velocity data for the Red and Assiniboine rivers were collected during the fish population study and will be provided in the Fish Populations Technical Memorandum. Additional substrate data, collected in conjunction with benthic invertebrate samples, are provided in the Fish Habitat Technical Memorandum #FH 02.

3.0 HABITAT DATA

The Red River was divided into 86 habitat segments, including 35 straight segments and 51 river bend segments (Figures 2 and 3). The Assiniboine River was divided into 30 segments, including 12 straight segments and 18 river bend segments (Figure 2).

Water velocity profiles were measured in Red River segments 40 and 43.



Figure 2. Fish habitat survey segments on the Red River, south of the Forks, and on the Assiniboine River.

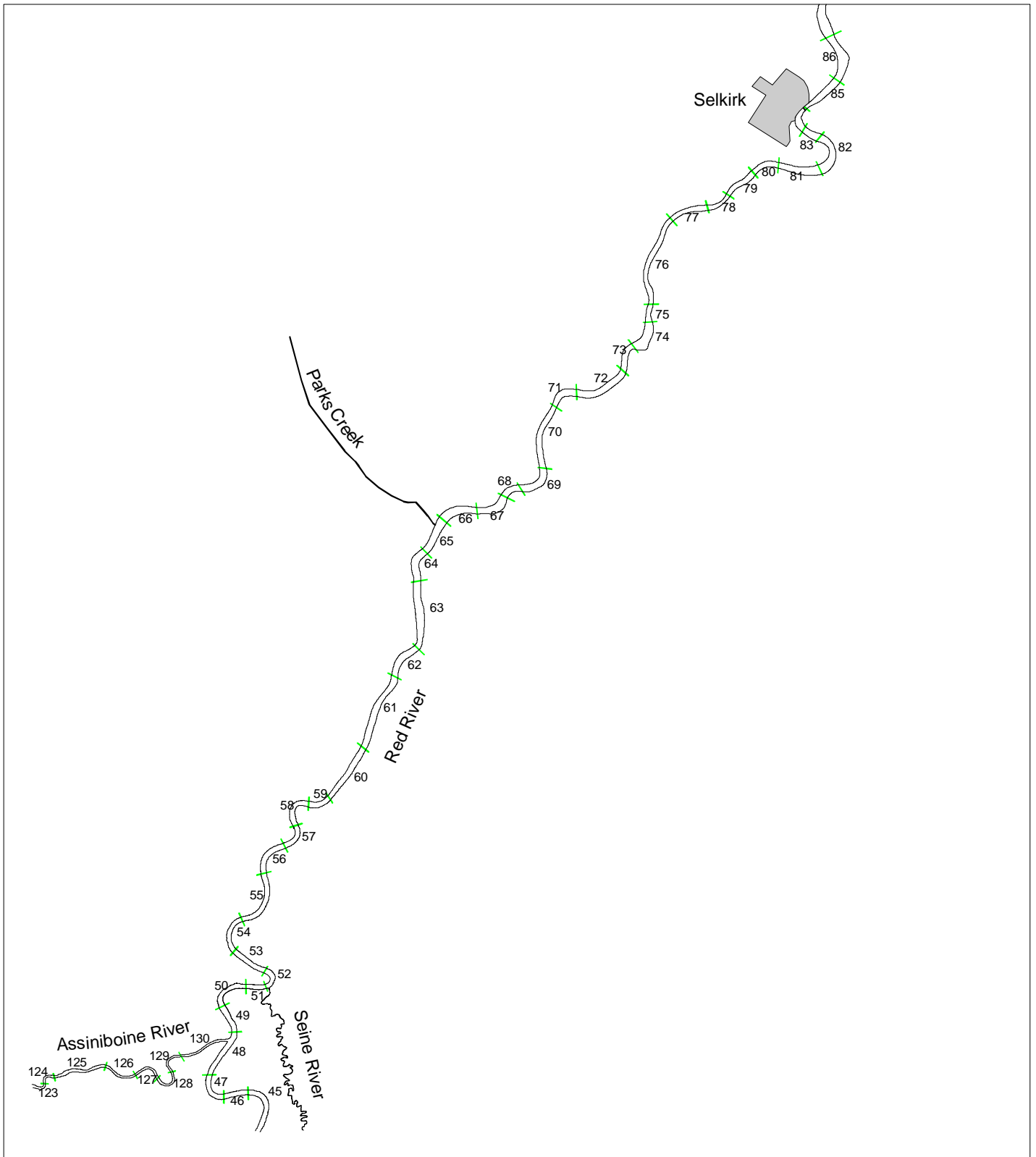


Figure 3. Fish habitat survey segments on the Red River north of the Forks.

3.1 RED RIVER (Segments 1-86)

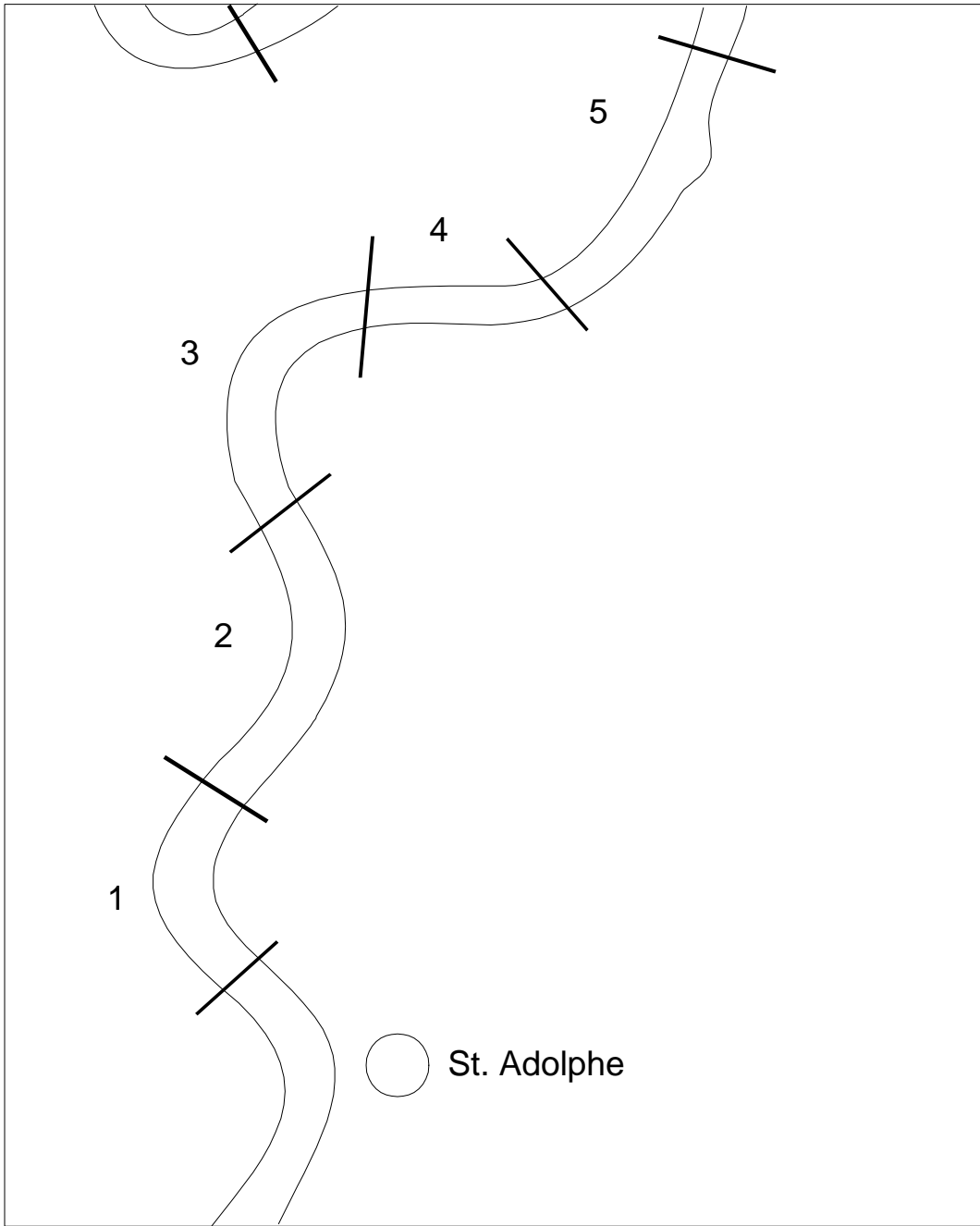


Figure 4. Red River segments 1 - 5.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 1 Start UTM 0635604E 5504285N

End UTM 0635697E 5504682N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635570E 5504485N

End UTM 0635551E 5504545N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.90	0.431	sand/gravel	hard
Center	4.59	0.442	cobble/gravel	hard
Right	3.46	0.535	mud/sand	hard

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
1.1	L	0635824	5504106	5.50	clay	medium
1.1	C	0635832	5504105	7.50	clay/gravel	hard
1.1	R	0635843	5504099	7.50	clay/mud	soft
1.2	L	0635634	5504262	5.50	clay	hard
1.2	C	0635597	5504274	6.00	clay	hard
1.2	R	0635596	5504203	5.50	clay	soft
1.3	L	0635591	5504474	5.50	clay	medium
1.3	C	0635558	5504471	8.00	clay/gravel	hard
1.3	R	0635557	5504390	5.00	clay	medium
1.4	L	0635679	5504543	7.50	clay/sand	medium
1.4	C	0635601	5504550	7.00	clay/sand	medium
1.4	R	0635605	5504581	5.50	clay	medium

SEGMENT: 1 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud beach and low grassy area; little erosion; occasional 1m fringe of willow
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Left Bank	-mud; steeper than RB; occasional scrub
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 2 Start UTM 0635697E 5504682N

End UTM 0635906E 5505337N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636036E 5505110N

End UTM 0635982E 5505098N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.93	0.289	mud/s.sand	hard
Center	5.9	0.426	mud	hard
Right	5.5	0.419	mud/silt	medium

HABITAT SURVEY II

Date 28 June 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
2.1	L	0635817	5504714	6.00	clay	soft
2.1	C	0635798	5504733	7.00	clay/sand	medium
2.1	R	0635763	5504800	4.50	clay	hard
2.2	L	0635997	5504921	6.00	clay	medium
2.2	C	0635985	5504976	7.50	clay/sand	soft
2.2	R	0635975	5504974	5.50	clay/sand	hard
2.3	L	0636076	5505257	5.50	clay/gravel	hard
2.3	C	0636019	5505133	8.50	clay/sand	hard
2.3	R	0635947	5505184	8.50	clay/sand	hard
2.4	L	0635987	5505373	5.00	clay	medium
2.4	C	0636002	5505275	8.00	clay	soft
2.4	R	0635937	5505207	6.00	clay	soft

SEGMENT: 2 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; some erosion exposing bush roots
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Left Bank	-mud; active erosion; scrub; deadfall pile; rip-rap
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 3 Start UTM 0635906E 5505337N
 End UTM 0636094E 5506069N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635750E 5505768N
 End UTM 0635715E 5505745N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.77	0.363	silt/mud	soft
Center	5.50	0.447	silt/mud	soft
Right	2.59	0.277	silt/mud	hard

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
3.1	L	0635944	5505438	5.00	clay	soft
3.1	C	0635856	5505401	7.00	clay/sand	medium
3.1	R	0635833	5505402	6.00	clay/sand	soft
3.2	L	0635805	5505593	6.00	clay	medium
3.2	C	0635788	5505589	7.00	clay/mud	soft
3.2	R	0635741	5505584	5.50	clay	hard
3.3	L	0635721	5505963	8.00	clay/mud	soft
3.3	C	0635720	5505964	6.00	clay	medium
3.3	R	0635700	5505908	5.50	clay	hard
3.4	L	0635906	5506014	5.50	clay/mud	soft
3.4	C	0635902	5506036	7.00	clay/sand	hard
3.4	R	0635896	5506046	5.00	clay/sand/gravel	hard

SEGMENT: 3 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; steep bank; grassy
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Left Bank	-mud; treed bank; cobble boat ramp
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 4 Start UTM 0636094E 5506069N

End UTM 0636710E 5506168N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636536E 5506080N

End UTM 0636542E 5506123N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.67	0.376	mud/silt	medium
Center	5.00	0.500	mud	medium
Right	7.60	0.391	mud/silt	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
4.1	L	0636196	5505915	6.50	clay	medium
4.1	C	0636109	5506097	8.50	sand/gravel	hard
4.1	R	0636153	5506118	3.00	clay/cobble/gravel	hard
4.2	L	0636176	5506043	5.50	clay	medium
4.2	C	0636177	5506056	6.50	sand	hard
4.2	R	0636287	5506119	3.00	cobble	hard
4.3	L	0636411	5506047	7.00	clay/sand	soft
4.3	C	0636342	5506077	6.50	clay	hard
4.3	R	0636323	5506043	5.00	clay/sand	hard
4.4	L	0636511	5505921	5.00	clay	hard
4.4	C	0636472	5506037	7.50	clay	soft
4.4	R	0636482	5506082	4.50	clay/sand	medium

SEGMENT: 4 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; willow fringe; steep and grassy
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Left Bank	-mud; bushes
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 5 Start UTM 0636710E 5506168N
 End UTM 0637090E 5506758N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636936E 5506506N
 End UTM 0637090E 5506758N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.72	0.499	mud	hard
Center	3.33	0.308	mud	hard
Right	3.28	0.382	sand/mud/cobble	hard

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
5.1	L	0636731	5506108	5.00	clay	medium
5.1	C	0636663	5506121	7.50	clay	soft
5.1	R	0636658	5506162	6.50	clay	medium
5.2	L	0636692	5506287	3.00	clay	hard
5.2	C	0636752	5506228	6.50	clay	hard
5.2	R	0636716	5506272	3.00	sand/gravel	hard
5.3	L	0636913	5506326	5.50	clay	hard
5.3	C	0636827	5506312	7.00	clay	hard
5.3	R	0636776	5506311		clay/sand	soft
5.4	L	0637059	5506556	5.50	clay/cobble	hard
5.4	C	0637025	5506591	5.50	clay/sand	hard
5.4	R	0637006	5506620	5.50	clay	medium

SEGMENT: 5 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; grassy; steep; erosion D/S end of segment
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Left Bank	-mud; rip-rap; deadfall; grassy slumps; erosion throughout
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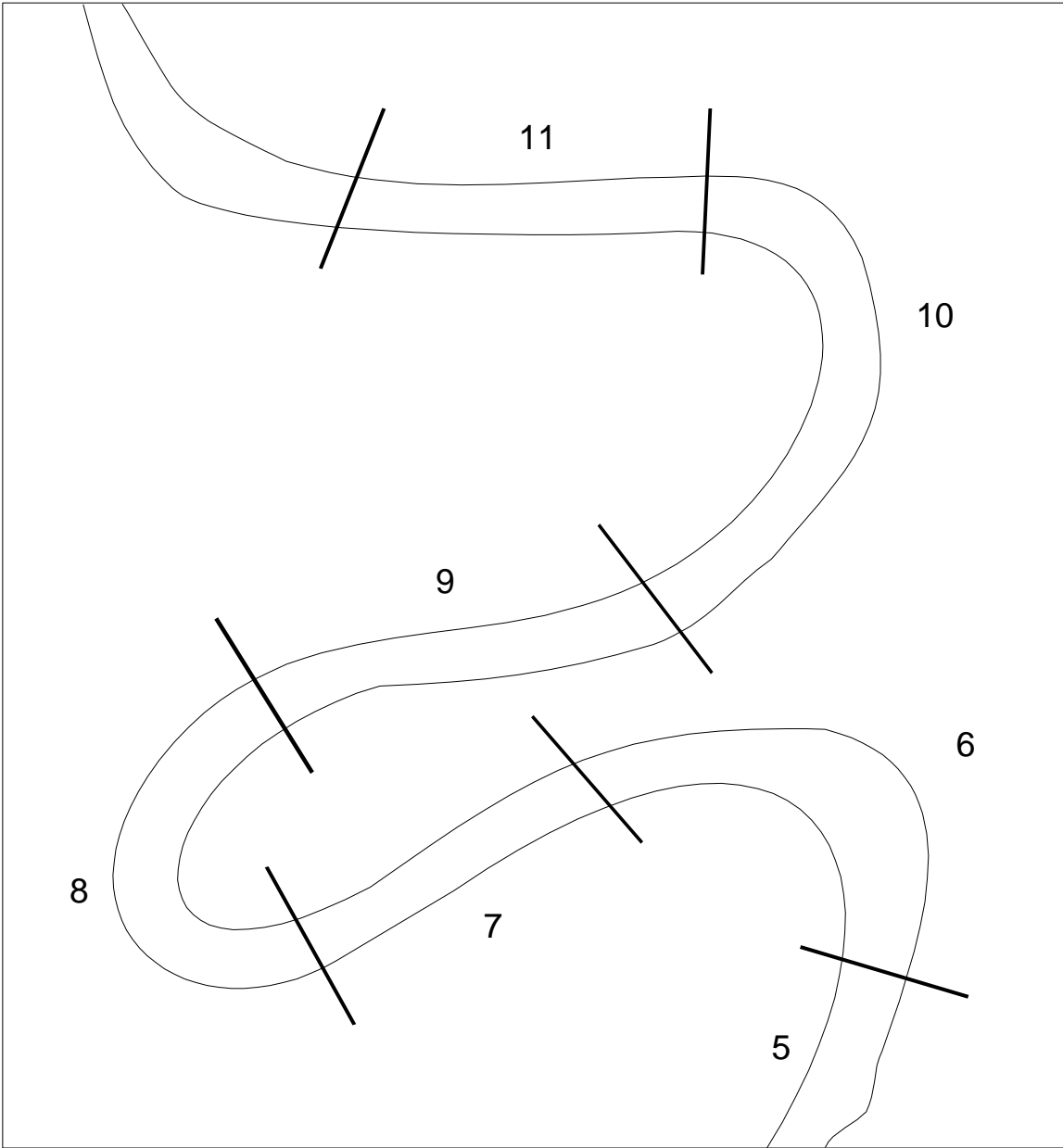


Figure 5. Red River segments 6 - 11.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 6 Start UTM 0637090E 5506758N
 End UTM 0636621E 5507355N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636999E 5507383N
 End UTM 0636979E 5507318N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.46	0.504	mud/cobble	medium
Center	5.00	0.663	mud/cobble	medium
Right	2.77	0.601	cobble/mud	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
6.1	L	0637191	5506813	5.00	clay	hard
6.1	C	0637122	5506847	5.25	sand	medium
6.1	R	0637086	5506861	5.25	clay	medium
6.2	L	0637221	5507048	4.50	clay	medium
6.2	C	0637198	5507048	5.00	sand	soft
6.2	R	0637127	5507132	5.00	sand	hard
6.3	L	0637121	5507299	5.00	clay	medium
6.3	C	0637115	5507280	7.50	sand/gravel	hard
6.3	R	0637081	5507260	5.50	clay	medium
6.4	L	0636878	5507377	4.50	clay	medium
6.4	C	0636784	5507434	6.00	clay/sand	medium
6.4	R	0636749	5507378	4.50	sand/gravel	medium

SEGMENT: 6 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; beaver cache; cobble; some erosion
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Left Bank	-mud; rocks/willows; low grassy and bushy bank eroding
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 7 Start UTM 0636621E 5507355N

End UTM 0635759E 5506998N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636116E 5507170N

End UTM 0636116E 5507099N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.86	0.573	mud	hard
Center	3.13	0.529	sand/gravel/mud	hard
Right	2.73	0.401	cobble/gravel	hard

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
7.1	L	0636556	5507386	4.50	clay	medium
7.1	C	0636770	5507464	8.00	clay/sand	medium
7.1	R	0636747	5507425	7.50	sand/cobble	medium
7.2	L	0636546	5507433	7.50	clay	soft
7.2	C	0636551	5507365	9.50	clay/sand	hard
7.2	R	0636616	5507385	3.00	clay	soft
7.3	L	0636353	5507262	5.00	clay/sand	hard
7.3	C	0636373	5507251	9.50	clay/sand	medium
7.3	R	0636355	5507185	5.50	clay	soft
7.4	L	0636130	5507211	6.50	clay/sand	medium
7.4	C	0636145	5507148	5.50	clay/sand	medium
7.4	R	0636146	5507150	3.50	clay/sand	medium

SEGMENT: 7 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; grassy/weeds/willow fringe; some deadfall; eroding bank with slumps
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Left Bank	-eroding mud bank; low grassy area; trees/scrub
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 8 Start UTM 0635759E 5506998N

End UTM 0635773E 5507593N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635347E 5506934N

End UTM 0635357E 5506949N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	6.50	0.406	gravel/mud	medium
Center	6.20	0.408	cobble	hard
Right	2.34	0.296	mud	hard

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
8.1	L	0635899	5506786	4.50	clay	hard
8.1	C	0635842	5507031	6.50	clay/sand	hard
8.1	R	0635900	5506954	5.00	clay/sand	medium
8.2	L	0635548	5506969	5.00	clay	hard
8.2	C	0635539	5506899	7.50	clay/sand	hard
8.2	R	0635531	5506876	5.50	clay	medium
8.3	L	0635390	5507020	7.00	clay/sand	medium
8.3	C	0635358	5507028	7.50	clay	soft
8.3	R	0635317	5507039	4.50	clay/sand/gravel	soft
8.4	L	0635504	5507362	5.00	clay/sand/cobble	medium
8.4	C	0635466	5507364	6.00	clay	hard
8.4	R	0636461	5507331	4.50	clay	medium

SEGMENT: 8 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; low grassy/bushy area; some erosion; some cobble
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Left Bank	-mud; steep grassy bank; some erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 9 Start UTM 0635773E 5507593N
 End UTM 0636666E 5507796N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636591E 5507724N
 End UTM 0636613E 5507690N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.22	0.387	mud/sand	hard
Center	5.20	0.500	mud/sand	hard
Right	5.40	0.308	mud	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
9.1	L	0635700	5507565	6.50	clay	medium
9.1	C	0635677	5507545	8.50	clay	medium
9.1	R	0635647	5507557	5.00	clay	medium
9.2	L	0635913	5507588	6.00	clay/sand	hard
9.2	C	0635890	5507588	7.50	clay/mud	soft
9.2	R	0635879	5507647	4.50	clay	medium
9.3	L	0636057	5507563	5.50	clay	hard
9.3	C	0636056	5507574	6.00	clay	hard
9.3	R	0636062	5507549	5.00	clay/sand	hard
9.4	L	0636207	5507545	5.50	clay/sand	medium
9.4	C	0636243	5507479	5.50	clay/sand	hard
9.4	R	0636187	5507620	5.00	clay	medium

SEGMENT: 9 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; steep and grassy with slumps; trees on top bank; erosion throughout
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Left Bank	-mud; trees on top bank; some erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 10 Start UTM 0636666E 5507796N

End UTM 0636631E 5508663N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 03 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0637060E 5508239N

End UTM 0637017E 5508341N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.48	0.295	mud	hard
Center	5.50	0.412	mud	hard
Right	5.00	0.440	mud	hard

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
10.1	L	0636443	5507670	5.00	clay	hard
10.1	C	0636465	5507691	8.50	clay/sand	medium
10.1	R	0636447	5507720	6.50	clay	soft
10.2	L	0636754	5507867	5.00	clay	medium
10.2	C	0636693	5507882	5.50	clay	hard
10.2	R	0636647	5507828	5.00	clay	medium
10.3	L	0637038	5508135	5.00	clay/sand	medium
10.3	C	0637010	5508200	8.00	clay	medium
10.3	R	0636946	5508247	5.50	clay/sand	medium
10.4	L	0636939	5508667	4.50	clay	medium
10.4	C	0636839	5508580	6.00	clay	medium
10.4	R	0636870	5508524	5.00	clay/sand/gravel	hard

SEGMENT: 10 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; steep grassy/weedy bank; open cleared area; beaver cache; little erosion
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Left Bank	-steep mud bank; low grassy/bushy area eroding; some scrub and trees
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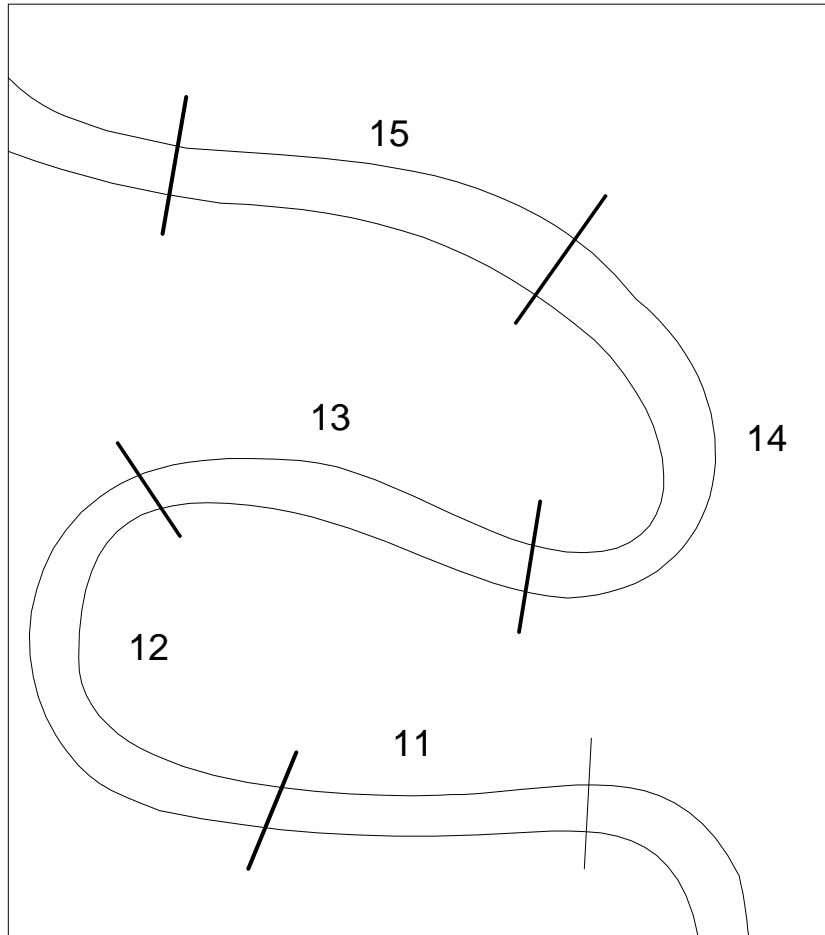


Figure 6. Red River segments 11 - 15.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 11 Start UTM 0636631E 5508663N

End UTM 0635758E 5508691N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636294E 5508661N

End UTM 0636342E 5508595N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.91	0.450	mud	medium
Center	4.27	0.507	mud/gravel	medium
Right	1.75	0.387	sand/gravel	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
11.1	L	0636671	5508658	5.50	clay	medium
11.1	C	0636752	5508580	7.00	clay	soft
11.1	R	0636773	5508560	5.00	clay	soft
11.2	L	0636566	5508750	5.00	clay	medium
11.2	C	0636589	5508734	7.00	clay	medium
11.2	R	0636637	5508692	4.50	clay/sand/cobble	hard
11.3	L	0636485	5508785	5.00	clay	medium
11.3	C	0636478	5508713	6.00	clay/sand	soft
11.3	R	0636470	5508656	4.50	clay/sand	medium
11.4	L	0636235	5508641	5.00	clay	medium
11.4	C	0636246	5508614	6.50	clay	medium
11.4	R	0636231	5508621	5.00	clay/sand/gravel	soft

SEGMENT: 11 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; some grass/willow; some erosion
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Left Bank	-mud; grassy; active erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 12 Start UTM 0635758E 5508691N

End UTM 0635772E 5509604N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635236E 5509260N

End UTM 0635214E 5509144N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.80	0.409	gravel	medium
Center	6.30	0.466	mud/gravel	medium
Right	2.77	0.265	mud	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
12.1	L	0636054	5508678	5.00	clay	hard
12.1	C	0636088	5508679	6.00	clay/sand	medium
12.1	R	0636047	5508603	4.50	clay/sand	medium
12.2	L	0635687	5508725	5.00	clay	hard
12.2	C	0635688	5508736	5.50	clay/sand	medium
12.2	R	0635678	5508652	5.00	clay/sand/gravel	medium
12.3	L	0635319	5508953	5.00	clay/sand/gravel	hard
12.3	C	0635274	5508899	7.50	clay	medium
12.3	R	0635219	5508897	4.50	clay/sand	hard
12.4	L	0635255	5509230	7.00	clay/sand	soft
12.4	C	0635247	5509337	7.50	clay	medium
12.4	R	0635258	5509203	4.50	clay/sand	medium

SEGMENT: 12 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; grass; willow; rip-rap; some erosion and slumping
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Left Bank	-mud; grass; beaver cache; erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 13 Start UTM 0635772E 5509604N

End UTM 0636326E 5509368N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636196E 5509393N

End UTM 0636214E 5509500N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.24	0.341	mud/sand	soft
Center	3.72	0.452	mud/gravel	hard
Right	1.91	0.382	mud	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
13.1	L	0635339	5509397	5.50	clay/sand	hard
13.1	C	0635274	5509402	6.00	clay	hard
13.1	R	0635251	5509399	4.00	clay/gravel	medium
13.2	L	0635561	5509490	6.50	clay	soft
13.2	C	0635479	5509551	7.50	clay	medium
13.2	R	0635480	5509578	5.50	clay/sand	medium
13.3	L	0635901	5509531	5.50	clay/sand	medium
13.3	C	0635915	5509469	7.50	clay	medium
13.3	R	0635874	5509645	5.00	clay	hard
13.4	L	0636240	5509394	5.25	clay/sand	hard
13.4	C	0636255	5509444	6.00	clay/sand	medium
13.4	R	0636307	5509624	5.00	clay	medium

SEGMENT: 13 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; steep; erosion
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Left Bank	-mud; grass; willow, some erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 14 Start UTM 0636326E 5509368N

End UTM 0636480E 5510225N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636960E 5509556N

End UTM 0636480E 5510225N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.66	0.498	mud	soft
Center	3.67	0.510	mud/gravel	medium
Right	3.01	0.364	mud/gravel	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
14.1	L	0636363	5509375	6.00	clay	soft
14.1	C	0636370	5509412	5.50	clay	hard
14.1	R	0636411	5509384	4.00	clay	hard
14.2	L	0637024	5509724	5.00	clay/sand/cobble	medium
14.2	C	0636950	5509716	5.50	clay	hard
14.2	R	0636908	5509699	5.00	clay/sand	medium
14.3	L	0636895	5509983	5.00	clay	medium
14.3	C	0636844	5509988	6.00	clay/sand	medium
14.3	R	0636837	5509859	4.50	clay/sand/cobble	medium
14.4	L	0636657	5510201	5.00	clay	medium
14.4	C	0636635	5510176	6.00	clay	hard
14.4	R	0636613	5510161	5.00	clay	medium

SEGMENT: 14 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; grass; weeds; erosion

Left Bank -mud; grass; weeds; trees; deadfall; scrub; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 15 Start UTM 0636480E 5510225N

End UTM 0635517E 5510460N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635911E 5510225N

End UTM 0635517E 5510460N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.44	0.421	mud/sand	medium
Center	3.87	0.477	mud/sand	medium
Right	2.48	0.283	mud/sand	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
15.1	L	0636389	5500279	5.00	clay	hard
15.1	C	0636406	5510272	7.00	clay/sand	medium
15.1	R	0636375	5510249	4.50	clay/sand/gravel	hard
15.2	L	0636206	5510366	5.00	clay/sand	medium
15.2	C	0636142	5510352	6.00	clay/gravel	hard
15.2	R	0636128	5510266	3.50	clay/sand/gravel	hard
15.3	L	0635959	5510403	4.50	clay	medium
15.3	C	0635945	5510370	7.50	clay/sand	soft
15.3	R	0635948	5510379	5.00	clay/sand	hard
15.4	L	0635661	5510396	5.00	clay/sand	medium
15.4	C	0635685	5510376	6.50	clay/sand	medium
15.4	R	0635660	5510409	5.00	clay/sand/gravel	hard

SEGMENT: 15 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; grass; willow; some erosion

Left Bank -mud; rip-rap; willow; scrub; erosion

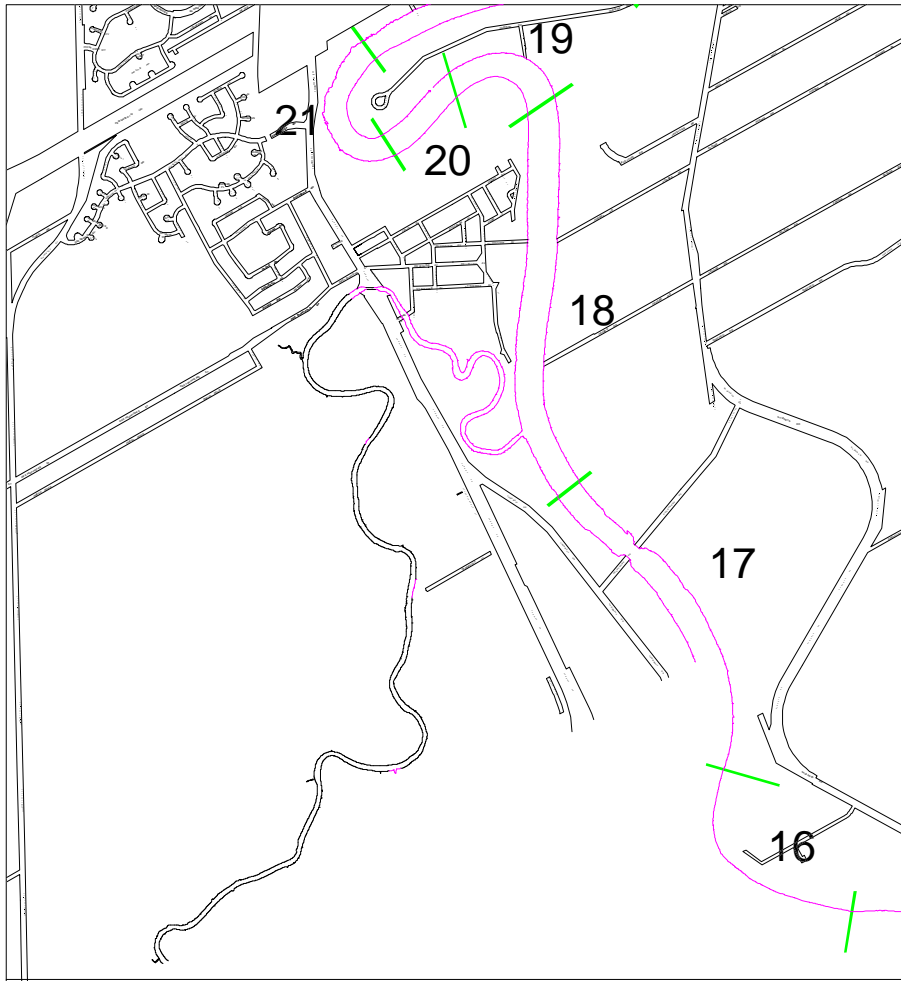


Figure 7. Red River segments 16-21.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 16 Start UTM 0635517E 5510460N

End UTM 0634879E 5511258N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634945E 5510769N

End UTM 0634864E 5510745N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.80	0.356	mud	medium
Center	3.36	0.388	cobble/gravel	medium
Right	2.40	0.172	mud/gravel	soft

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
16.1	L	0635475	5510409	5.00	clay	hard
16.1	C	0635455	5510424	6.00	clay/sand	hard
16.1	R	0635437	5510383	5.50	clay/sand/gravel	hard
16.2	L	0635169	5510563	5.00	clay	hard
16.2	C	0635143	5510459	5.50	clay/sand	hard
16.2	R	0635160	5510411	5.00	clay/sand	medium
16.3	L	0634989	5510672	4.50	clay/sand	hard
16.3	C	0634966	5510636	6.50	clay/sand	soft
16.3	R	0634914	5510664	4.00	clay	medium
16.4	L	0634891	5510935	5.50	clay/sand	medium
16.4	C	0634830	5510950	5.50	clay	medium
16.4	R	0634782	5510944	4.50	clay	soft

SEGMENT: 16 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	mud; rip-rap dyke; willow; scrub; road slumping; erosion where houses located
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Left Bank	-mud; steep; willow; scrub; erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 17 Start UTM 0634879E 5511258N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 04 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634952E 5511882N

End UTM 0634840E 5511775N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.91	0.342	mud	hard
Center	3.13	0.425	mud	hard
Right	2.95	0.316	mud/sand	medium

HABITAT SURVEY II

Date 28 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
17.1	L	0634947	5511232	6.00	clay/sand	hard
17.1	C	0634898	5511239	5.50	clay/sand	hard
17.1	R	0634915	5511262	5.50	clay	hard
17.2	L	0634940	5511730	4.50	clay/gravel	hard
17.2	C	0634890	5511776	5.50	clay/sand	medium
17.2	R	0634898	5511752	5.00	clay/sand/cobble	hard
17.3	L	0634816	5512117	4.00	clay	medium
17.3	C	0634723	5512047	6.00	clay/sand	medium
17.3	R	0634767	5511975	4.00	clay	soft
17.4	L	0634515	5512410	5.50	cobble/gravel	hard
17.4	C	0634464	5512406	6.00	cobble/boulder	hard
17.4	R	0634368	5512376	7.50	sand/cobble/boulder	hard

SEGMENT: 17 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-rip-rap; ice scoured trees; erosion
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Left Bank	-mud; willow; erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 18 Start UTM 0634472E 5512382N

End UTM 0634075E 5514523N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633981E 5513335N

End UTM 0633908E 5514523N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.75	0.250	sand	hard
Center	2.96	0.272	mud/clay	hard
Right	2.76	0.252	silt/clay	hard

HABITAT SURVEY II

Date 23 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
18.1	L	0634220	5512659	5.75	sand/gravel	hard
18.1	C	0634209	5512604	5.50	clay/sand/gravel	hard
18.1	R	0634234	5512533	5.50	clay/sand	hard
18.2	L	0633992	5513081	6.25	mud	soft
18.2	C	0633995	5512956	7.50	clay/sand	medium
18.2	R	0633963	5512775	7.00	mud	soft
18.3	L	0633937	5513507	5.50	clay/mud	medium
18.3	C	0633922	5513569	5.75	clay/sand	medium
18.3	R	0633888	5513548	5.50	clay	hard
18.4	L	0633975	5514091	5.75	clay	hard
18.4	C	0634006	5513985	5.50	clay/gravel	hard
18.4	R	0633964	5514038	5.50	clay/sand/gravel	medium

SEGMENT: 18 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634331	5512519	gravel/cobble
Right Bank	0634238	5512563	grass
Right Bank	0634115	5512704	mud/rip-rap
Right Bank	0634090	5512736	mud
Right Bank	0633941	5514611	
Left Bank	0634075	5514523	mud
Left Bank	0634127	5512697	lowland flood plain
Left Bank	0634248	5512503	sand/gravel
Left Bank	0634457	5512388	rip-rap

Right Bank -mud; rip-rap; grass; willow; shrubs

Left Bank -mud; rip-rap; sand/gravel; grass; willow; shrubs

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 19 Start UTM 0634052E 5514647N

End UTM 0633482E 5514901N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633890E 5514996N

End UTM 0633872E 5514974N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.98	0.197	silt/clay	hard
Center	3.97	0.255	silt/clay	hard
Right	3.07	0.263	silt/clay	hard

HABITAT SURVEY II

Date 23 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
19.1	L	0634052	5514682	6.75	mud	soft
19.1	C	0633973	5514657	5.75	clay/sand	hard
19.1	R	0633981	5514737	5.00	clay/gravel	hard
19.2	L	0633918	5514953	5.50	clay	hard
19.2	C	0633946	5514845	5.50	clay/sand	hard
19.2	R	0633916	5514821	6.00	sand/gravel	hard
19.3	L	0633755	5514956	5.50	clay/mud	hard
19.3	C	0633760	5514956	6.50	clay/mud	hard
19.3	R	0633802	5514950	6.75	clay/mud	hard
19.4	L	0633597	5514954	5.75	clay/mud	hard
19.4	C	0633607	5514973	5.75	clay/mud	hard
19.4	R	0633650	5514930	6.25	sand/mud	hard

SEGMENT: 19 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0634052	5514047	mud
Left Bank	0633839	5514985	rip-rap
Left Bank	0633774	5514999	mud
Right Bank	-mud; grassy high bank		
Left Bank	-mud; rip-rap; willow		

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 20 Start UTM 0633482E 5514901N
 End UTM 0633242E 5514619N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 08 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633372E 5514662N
 End UTM 0633395E 5514619N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.32	0.257	silt/mud	hard
Center	3.14	0.337	silt/mud	hard
Right	3.23		silt/mud	medium

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
20.1	L	633568	5515006	5.00	clay/mud	hard
20.1	C	633582	5514973	5.50	clay/sand/mud	hard
20.1	R	633634	5514903	6.50	clay/sand/mud	hard
20.2	L	633462	5514887	5.25	clay/sand	hard
20.2	C	633461	5514859	5.50	clay/sand	hard
20.2	R	633540	5514808	6.00	clay/sand	medium
20.3	L	633352	5514826	5.25	clay/mud	hard
20.3	C	633403	5514734	5.75	clay	medium
20.3	R	633412	5514721	5.25	clay/sand	soft
20.4	L	633308	5514734	5.25	clay	medium
20.4	C	633392	5514698	5.75	clay	medium
20.4	R	633395	5514730	5.50	clay/sand	soft

SEGMENT: 20 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; grass; willow;shrubs
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Left Bank	-mud; willow; some erosion
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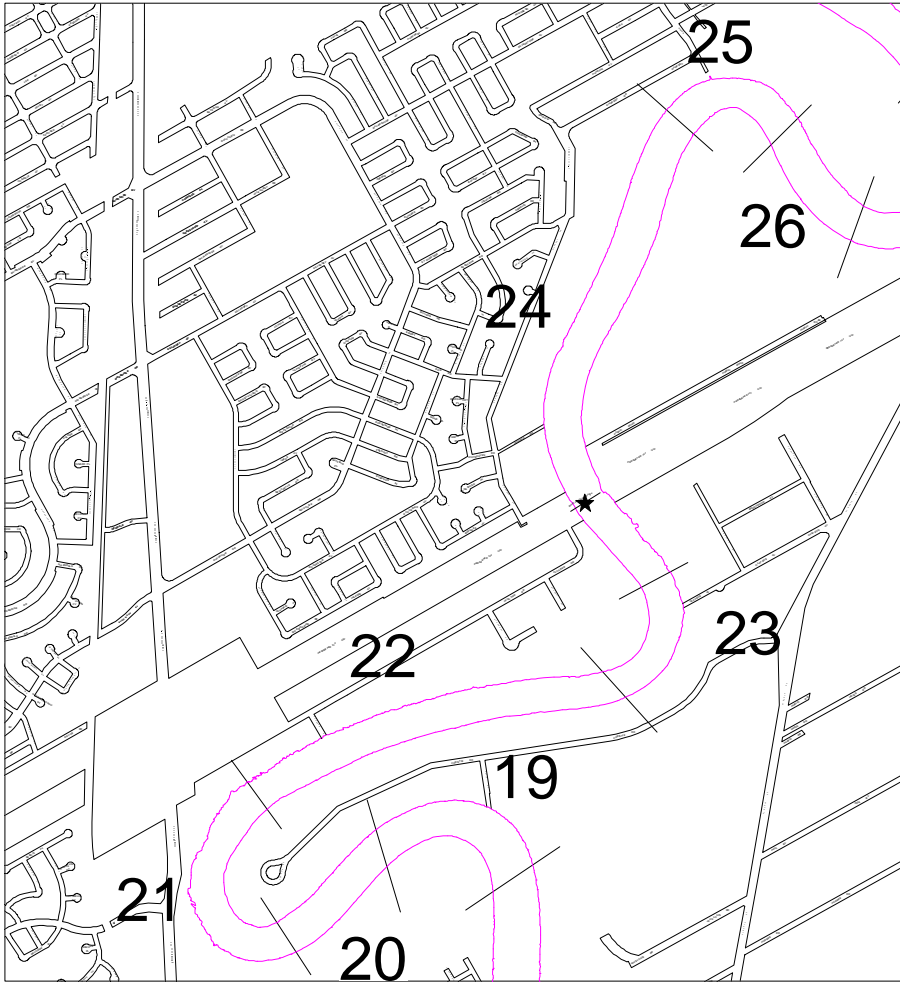


Figure 8. Red River segments 19-26.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 21 Start UTM 0633242E 5514550N

End UTM 0633010E 5515007N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633104E 5514572N

End UTM 0633103E 5514476N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	5.20	0.120	cobble/silt	medium
Center	5.10	0.220	cobble/silt	medium
Right	3.85	0.145	silt	soft

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
21.1	L	0633222	5514624	5.50	clay/sand	hard
21.1	C	0633264	5514627	6.00	clay/mud	hard
21.1	R	0633243	5514581	5.50	mud	soft
21.2	L	0633052	5514574	7.00	clay/sand	hard
21.2	C	0633055	5514562	7.50	clay/sand	hard
21.2	R	0633070	5514507	6.00	clay	medium
21.3	L	0632921	5514672	7.00	clay/sand	hard
21.3	C	0632845	5514671	6.50	clay/sand	medium
21.3	R	0632883	5514684	5.50	clay/sand/gravel	medium
21.4	L	0632985	5514816	6.00	clay/sand	soft
21.4	C	0632986	5514819	7.00	clay/sand	soft
21.4	R	0632944	5514803	5.00	clay/sand/gravel	soft

SEGMENT: 21 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; rip-rap; grass; willow
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Left Bank	-mud; willow
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 22 Start UTM 0633010E 5515007N
 End UTM 0634370E 5515510N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633969E 5515371N
 End UTM 0633936E 5515437N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.05	0.145	mud/sand/gravel	hard
Center	5.25	0.243	mud/clay	hard
Right	3.00	0.202	mud/clay	hard

HABITAT SURVEY II

Date 42 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
22.1	L	0633032	5515037	5.50	clay/sand	medium
22.1	C	0633050	5515001	6.50	clay/sand	medium
22.1	R	0633008	5514482	5.50	clay/cobble/gravel	medium
22.2	L	0633253	5515245	5.50	clay/sand	soft
22.2	C	0633329	5515214	7.25	clay/sand	soft
22.2	R	0633296	5515216	5.25	clay/sand	medium
22.3	L	0633705	5515399	5.50	clay/sand	medium
22.3	C	0633699	5515355	6.25	clay	medium
22.3	R	0633661	5515450	5.50	clay	medium
22.4	L	0634016	5515337	4.00	cobble/gravel	medium
22.4	C	0634050	5515371	7.50	clay/sand/gravel	medium
22.4	R	0634003	5515445	5.50	clay/sand	hard

SEGMENT: 22 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; deadfall; grass; cobble

Left Bank -mud; steep; grass; trees

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 23 Start UTM 0634370E 5515510N
 End UTM 0634550E 5515720N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634633E 5515678N
 End UTM 0634505E 5515702N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.49	0.145	mud/sand/gravel	hard
Center	5.00	0.243	mud/clay	hard
Right	5.40	0.202	mud/clay	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
23.1	L	0634320	5515391	6.00	clay/mud	soft
23.1	C	0634323	5515433	6.50	clay/mud	medium
23.1	R	0634295	5515407	5.00	clay	medium
23.2	L	0634375	5515469	8.50	clay/sand	medium
23.2	C	0634442	5515501	8.50	clay/sand/gravel	hard
23.2	R	0634419	5515551	5.50	clay	medium
23.3	L	0634552	5515682	4.50	clay/gravel	hard
23.3	C	0634528	5515675	8.00	clay/sand/gravel	hard
23.3	R	0634594	5515680	6.25	clay/sand	medium
23.4	L	0634592	5515830	3.00	cobble/gravel	hard
23.4	C	0634570	5515814	6.50	clay/sand	medium
23.4	R	0634500	5515805	6.50	clay/mud	soft

SEGMENT: 23 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; steep; trees on top bank; grass; erosion

Left Bank -mud; grass; willow; macrophytes; cobble; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 24 Start UTM 0634550E 5515720N

End UTM 0634476E 5517170N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634389E 5516871N

End UTM 0634346E 5516815N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.84	0.199	mud/silt	medium
Center	3.91	0.278	sand/gravel	hard
Right	3.60	0.265	mud/silt/gravel	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
24.1	L	0634466	5515956	3.75	cobble/gravel	hard
24.1	C	0634452	5515926	5.75	clay	medium
24.1	R	0634441	5515903	5.35	clay/sand/mud	soft
24.2	L	0634323	5516273	5.00	sand/gravel	hard
24.2	C	0634224	5516225	6.50	clay/sand	medium
24.2	R	0634204	5516203	7.25	clay/sand	soft
24.3	L	0634263	5516681	6.25	clay	medium
24.3	C	0634184	5516730	7.75	clay/sand	hard
24.3	R	0634076	5516708	5.25	clay	medium
24.4	L	0634484	5516953	4.75	clay/mud	soft
24.4	C	0634385	5516973	6.75	clay/sand	medium
24.4	R	0634320	5517017	5.25	clay/sand	hard

SEGMENT: 24 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634185	5516726	storm drain

Right Bank -mud; grass; trees; storm drain; erosion

Left Bank -mud; steep; willow; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 25 Start UTM 0634476E 5517170N

End UTM 0634960E 5517446N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 21 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634774E 5517564N

End UTM 0634725E 5517446N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.03	0.171	mud/silt/gravel	medium
Center	8.00	0.188	mud/silt	hard
Right	2.40	0.162	mud/gravel	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
25.1	L	0634613	5517292	5.50	clay/sand	medium
25.1	C	0634571	5517373	6.50	clay/mud	soft
25.1	R	0634470	5517415	4.75	clay	medium
25.2	L	0634674	5517436	4.75	clay	hard
25.2	C	0634672	5517538	6.50	clay/sand	hard
25.2	R	0634605	5517568	5.50	clay/sand	medium
25.3	L	0634827	5517310	7.75	clay/sand/gravel	hard
25.3	C	0634868	5517506	8.00	sand/gravel	hard
25.3	R	0634800	5517528	5.00	clay/mud	medium
25.4	L	0634912	5517520	6.00	clay/mud	soft
25.4	C	0634949	5517555	6.00	clay	medium
25.4	R	0634955	5517591	4.00	clay	hard

SEGMENT: 25 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; grass; trees; cobble; storm drain;

Left Bank -mud; slumping; willow

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 26 Start UTM 0634960E 5517446N

End UTM 0635255E 5517011N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635109E 5517218N

End UTM 0635167E 5517219N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.05	0.290	mud/clay	soft
Center	3.36	0.361	mud/clay	medium
Right	2.72	0.340	mud/clay/cobble	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
26.1	L	0634922	5517370	5.50	clay/sand/mud	soft
26.1	C	0634934	5517422	5.50	clay	medium
26.1	R	0635068	5517421	4.75	clay/sand	medium
26.2	L	0635031	5517227	5.00	clay/sand/mud	soft
26.2	C	0635075	5517277	5.50	clay/sand	medium
26.2	R	0635119	5517291	4.50	clay	hard
26.3	L	0635066	5517173	5.00	clay	soft
26.3	C	0635150	5517177	5.75	clay/mud	medium
26.3	R	0635197	5517222	5.75	clay	hard
26.4	L	0635201	5517073	5.00	clay/mud	soft
26.4	C	0635228	5517095	6.25	clay/sand	medium
26.4	R	0635305	5517151	5.00	clay/sand	medium

SEGMENT: 26 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634995	5517460	King's Park drainage ditch

Right Bank -mud; storm drain; cobble; deadfall; erosion

Left Bank -mud; boat launch; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 27 Start UTM 0635255E 5517011N

End UTM 0635576E 5517561N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635637E 5517322N

End UTM 0635573E 5517331N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.35	0.242	mud/clay/cobble	medium
Center	3.62	0.295	mud/cobble	medium
Right	4.50	0.324	mud/silt	medium

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
27.1	L	0635279	5517119	5.50	clay/sand	medium
27.1	C	0635300	5517144	6.50	clay/mud	medium
27.1	R	0635272	5517093	5.00	clay	hard
27.2	L	0635505	5517125	5.25	clay/sand/mud	medium
27.2	C	0635521	5517150	9.00	clay/sand	hard
27.2	R	0635477	5517179	6.50	clay/sand	soft
27.3	L	0635631	5517276	5.00	clay/sand	medium
27.3	C	0635585	5517311	5.75	clay	medium
27.3	R	0635541	5517338	5.25	clay/sand	hard
27.4	L	0635655	5517513	5.25	clay/sand	medium
27.4	C	0635563	5517573	5.50	clay/sand	hard
27.4	R	0635494	5517600	5.75	clay/sand	medium

SEGMENT: 27 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0635373	5517090	cobble
Left Bank	0635622	5517405	beaver store

Right Bank -mud; grass; macrophytes; no erosion

Left Bank -mud; grass; willow; deadfall; beaver store; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 28 Start UTM 0635576E 5517561N

End UTM 0634827E 5518185N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635117E 5517561N

End UTM 0634827E 5517971N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.76	0.151	gravel/cobble	medium
Center	3.43	0.366	mud	hard
Right	2.84	0.273	mud	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
28.1	L	0635476	5517770	3.00	clay	soft
28.1	C	0635468	5517742	5.75	clay/sand	medium
28.1	R	0635438	5517719	6.25	clay	medium
28.2	L	0635284	5517896	3.75	clay/gravel	medium
28.2	C	0635258	5517870	5.75	clay/sand	soft
28.2	R	0635221	5517849	5.50	clay/sand	medium
28.3	L	0635087	5518028	2.75	clay	medium
28.3	C	0635100	5518038	5.50	clay/sand	medium
28.3	R	0635052	5518001	5.00	clay/sand	hard
28.4	L	0634899	5518110	4.75	clay/sand	medium
28.4	C	0634855	5518105	6.00	clay/sand	medium
28.4	R	0634857	5517873	5.25	clay/sand	soft

SEGMENT: 28 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0635255	5517849	dump drain pipe

Right Bank mud; dump drain pipe; no erosion

Left Bank -mud; grass; willow; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 29 Start UTM 0634827E 5518185N

End UTM 0634652E 5518706N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634624E 5518428N

End UTM 0634595E 5518460N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.90	0.155	mud	soft
Center	6.30	0.278	mud	soft
Right	3.42	0.276	mud	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
29.1	L	0634767	5518282	5.00	sand/gravel	hard
29.1	C	0634687	5518112	6.00	clay/sand	hard
29.1	R	0634660	5518188	6.50	clay/sand	soft
29.2	L	0634580	5518534	5.00	mud	soft
29.2	C	0634546	5518435	7.50	clay/sand	hard
29.2	R	0634568	5518482	5.25	clay	hard
29.3	L	0634665	5518483	7.00	clay/mud	soft
29.3	C	0634624	5518528	7.50	clay/sand	hard
29.3	R	0634620	5518628	5.00	clay	medium
29.4	L	0634763	5518634	6.75	clay/sand/mud	soft
29.4	C	0634683	5518621	7.00	clay/sand	medium
29.4	R	0634700	5518709	5.00	clay/sand	medium

SEGMENT: 29 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634507	5518576	drain pipe

Right Bank -mud; drain pipe; shrubs; grass; some erosion

Left Bank -mud; deadfall; macrophytes; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 30 Start UTM 0634652E 5518706N

End UTM 0635424E 5518920N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635052E 5518706N

End UTM 0635424E 5518920N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.50	0.257	mud	soft
Center	3.41	0.293	mud/gravel	hard
Right	3.29	0.269	gravel/mud	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
30.1	L	0634800	5518769	7.00	clay/sand	medium
30.1	C	0634792	5518735	5.50	clay	medium
30.1	R	0634832	5518680	5.75	clay/sand	medium
30.2	L	0635004	5518706	5.75	clay/sand	medium
30.2	C	0634949	5518823	6.00	clay/sand	soft
30.2	R	0634923	5518876	5.00	clay	hard
30.3	L	0635064	5518825	6.50	clay	medium
30.3	C	0635031	5518832	6.00	clay/sand	hard
30.3	R	0635029	5518906	5.50	clay/sand	hard
30.4	L	0635307	5518949	5.75	clay/sand	hard
30.4	C	0635284	5518969	5.75	clay/sand	hard
30.4	R	0635266	5519006	5.00	clay/sand/gravel	hard

SEGMENT: 30 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634718	5518858	old dock pillars
Right Bank	0634830	5518846	drain

Right Bank -mud; deadfall; dock pillars; drain; over-hanging tree; erosion

Left Bank -mud; scrub; little erosion

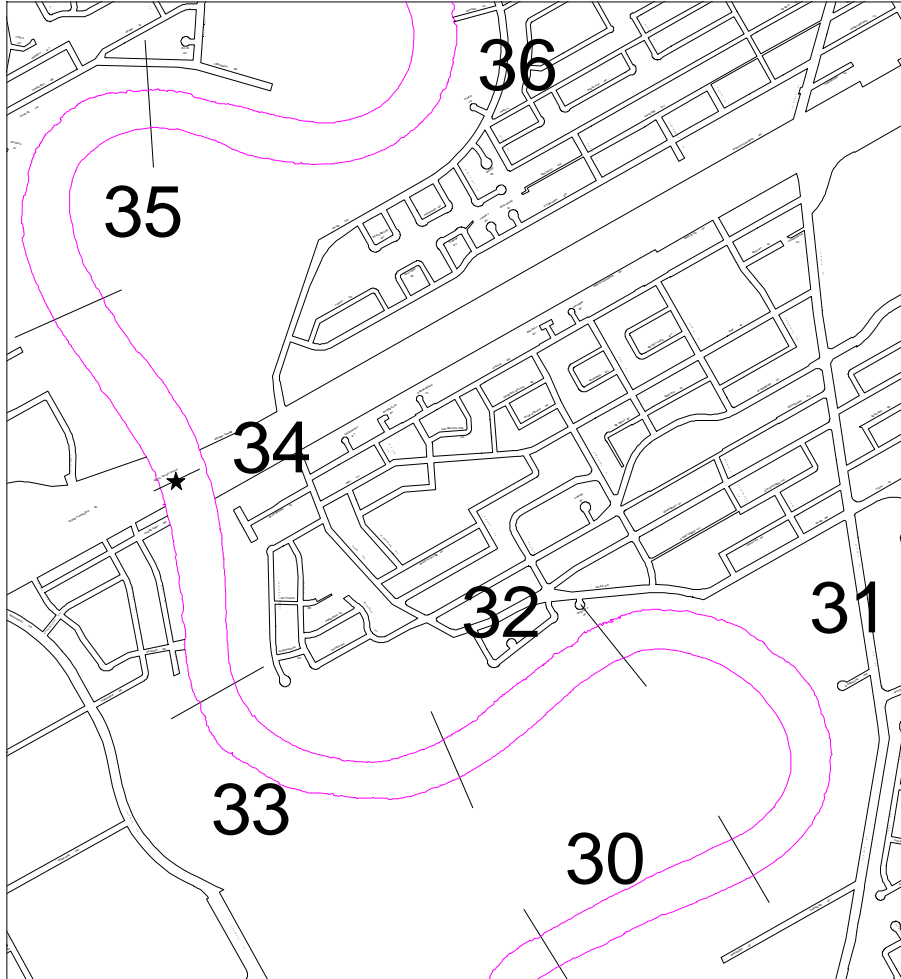


Figure 10. Red River segments 30-35.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 31 Start UTM 0635424E 5518920N

End UTM 0635013E 5519752N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635454E 5519695N

End UTM 0635455E 5519561N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.60	0.231	mud/gravel	hard
Center	5.30	0.280	mud/gravel	hard
Right	5.30	0.258	silt/mud	soft

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
31.1	L	0635531	5519017	7.50	clay/sand/mud	soft
31.1	C	0635467	5519041	6.00	clay/sand	medium
31.1	R	0635392	5519097	5.00	clay/sand	medium
31.2	L	0635593	5519155	4.00	clay	hard
31.2	C	0635581	5519224	8.00	clay/sand	hard
31.2	R	0635506	5519160	5.25	clay/sand	soft
31.3	L	0635606	5519505	4.00	clay/gravel	medium
31.3	C	0635573	5519522	5.75	clay/sand	medium
31.3	R	0635560	5519591	6.50	clay/sand	soft
31.4	L	0635209	5519795	5.00	clay	medium
31.4	C	0635196	5519736	8.00	clay/sand	hard
31.4	R	0635251	5519727	5.50	clay/mud	soft

SEGMENT: 31 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
	0635640	5519464	storm drain
	0635617	5519548	storm drain
	0635110	5519754	storm drain
Left Bank	0635665	5519336	beginning of cobble/rip-rap bank
Left Bank	0635062	5519770	end of cobble/rip-rap bank

Right Bank -mud; willow; trees at top bank; little erosion

Left Bank -mud; willow; cobble/rip-rap; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 32 Start UTM 0635013E 5519752N

End UTM 0634548E 5519436N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634619E 5519463N

End UTM 0634674E 5519429N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.24	0.205	gravel/mud	hard
Center	4.04	0.329	mud	medium
Right	3.35	0.232	mud	soft

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
32.1	L	0634905	5519710	4.50	clay/gravel	hard
32.1	C	0634952	5519706	6.50	sand/gravel	hard
32.1	R	0635153	5519478	5.50	clay/sand	hard
32.2	L	0634836	5519629	4.50	clay/sand/gravel	hard
32.2	C	0634835	5519643	6.00	clay/sand	hard
32.2	R	0634892	5519605	6.00	clay/sand	medium
32.3	L	0634709	5519528	5.00	clay/sand	medium
32.3	C	0634712	5519512	5.50	clay/sand	medium
32.3	R	0634709	5519505	5.25	clay/sand/mud	soft
32.4	L	0634607	5519364	4.50	clay/sand/gravel	hard
32.4	C	0634562	5519426	6.75	clay/sand	soft
32.4	R	0634635	5519347	5.50	clay	soft

SEGMENT: 32 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; some overhanging trees; some erosion
-------------------	--

Left Bank	-mud; low bank; grass; willow; dock
------------------	-------------------------------------

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 33 Start UTM 0634548E 5519436N

End UTM 0633760E 5519556N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634019E 5519320N

End UTM 0633950E 5519285N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.98	0.315	mud	soft
Center	5.00	0.313	mud	soft
Right	3.37	0.162	mud/gravel	hard

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
33.1	L	634426	5519330	4.75	clay	hard
33.1	C	634464	5519351	7.50	clay/sand	medium
33.1	R	634470	5519325	4.75	clay/sand	hard
33.2	L	634337	5519305	5.25	clay/sand	soft
33.2	C	634336	5519288	8.50	clay/sand	medium
33.2	R	634296	5519310	4.50	clay	hard
33.3	L	634204	5519341	7.25	clay/sand	hard
33.3	C	634156	5519271	7.75	clay/sand	hard
33.3	R	634157	5519197	5.00	clay/gravel	hard
33.4	L	633940	5519422	5.75	clay	soft
33.4	C	634000	5519250	7.50	clay	soft
33.4	R	634009	5519230	5.00	clay/sand/gravel	medium

SEGMENT: 33 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634389	5519295	storm drain
Right Bank	0634119	5519292	storm drain
Right Bank	0634279	5519257	cobble/rip-rap on bank begins
Right Bank	0634069	551904	cobble/rip-rap on bank ends
Left Bank	0633801	5519451	storm drain

Right Bank -mud; storm drains; cobble/rip-rap; willow; grass

Left Bank -mud; steep; willow; grass; deadfall; ; some cobble; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 34 Start UTM 0633760E 5519556N

End UTM 0633302E 5520859N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 22 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633703E 5520147N

End UTM 0633621E 5520208N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.00	0.183	mud/gravel	hard
Center	3.54	0.312	mud	medium
Right	3.43	0.272	mud	soft

HABITAT SURVEY II

Date 24 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
34.1	L	0633700	5519612	5.50	clay	soft
34.1	C	0633715	5519549	5.50	clay/sand	hard
34.1	R	0633701	5519613	3.75	cobble/gravel/rip-rap	hard
34.2	L	0633763	5519826	5.50	clay/sand	medium
34.2	C	0633685	5519792	5.50	clay/sand	had
34.2	R	0633613	5519892	4.75	clay/gravel	medium
34.3	L	0633655	5520241	4.75	clay/sand	soft
34.3	C	0633616	5520260	5.50	clay/sand	hard
34.3	R	0633578	5520246	4.75	clay/sand/gravel	hard
34.4	L	0633438	5520669	5.00	clay	hard
34.4	C	0633441	5520613	5.50	clay/sand	hard
34.4	R	0633369	5520492	4.00	clay/sand	soft

SEGMENT: 34 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0633624	5520217	drain pipe
Right Bank	0633451	5520605	drain pipe
Left Bank	0633634	5520284	storm drain
Left Bank	0633451	5520605	rip-rap
Left Bank	0633357	5520773	rip-rap
Left Bank	0633339	552089	rip-rap
Left Bank			shallow under bridge

Right Bank -mud; rip-rap; shrubs; grass; drain pipe; little erosion

Left Bank -mud; shrubs/trees; terraced bank; storm drain; rip-rap; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 35 Start UTM 0633302E 5520859N

End UTM 0633601E 5521409N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633387E 5520859N

End UTM 0633601E 5521409N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.69	0.505	gravel/mud	medium
Center	2.89	0.539	cobble/mud	hard
Right	3.10	0.480	gravel/mud/cobble	medium

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
35.1	L	0633323	5520949	4.00	clay	medium
35.1	C	0633226	5520855	6.00	clay	medium
35.1	R	0633202	5520782	4.50	clay	soft
35.2	L	0633264	5521075	5.50	clay/sand	medium
35.2	C	0633219	5521115	9.50	clay/sand	soft
35.2	R	0633137	5521060	4.50	clay/sand	medium
35.3	L	0633252	5521236	7.50	clay/sand	medium
35.3	C	0633210	5521288	6.50	clay	soft
35.3	R	0633146	5521268	5.00	clay	hard
35.4	L	0633353	5521276	5.50	clay/sand	hard
35.4	C	0633407	5521334	5.50	clay/sand/cobble	medium
35.4	R	0633315	5521356	5.00	clay/sand/gravel	hard

SEGMENT: 35 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0633213	5520975	drain
Right Bank	0633183	5521209	drain

Right Bank -mud; rip-rap; drains; grass; beaver store; erosion

Left Bank -mud; overhanging trees

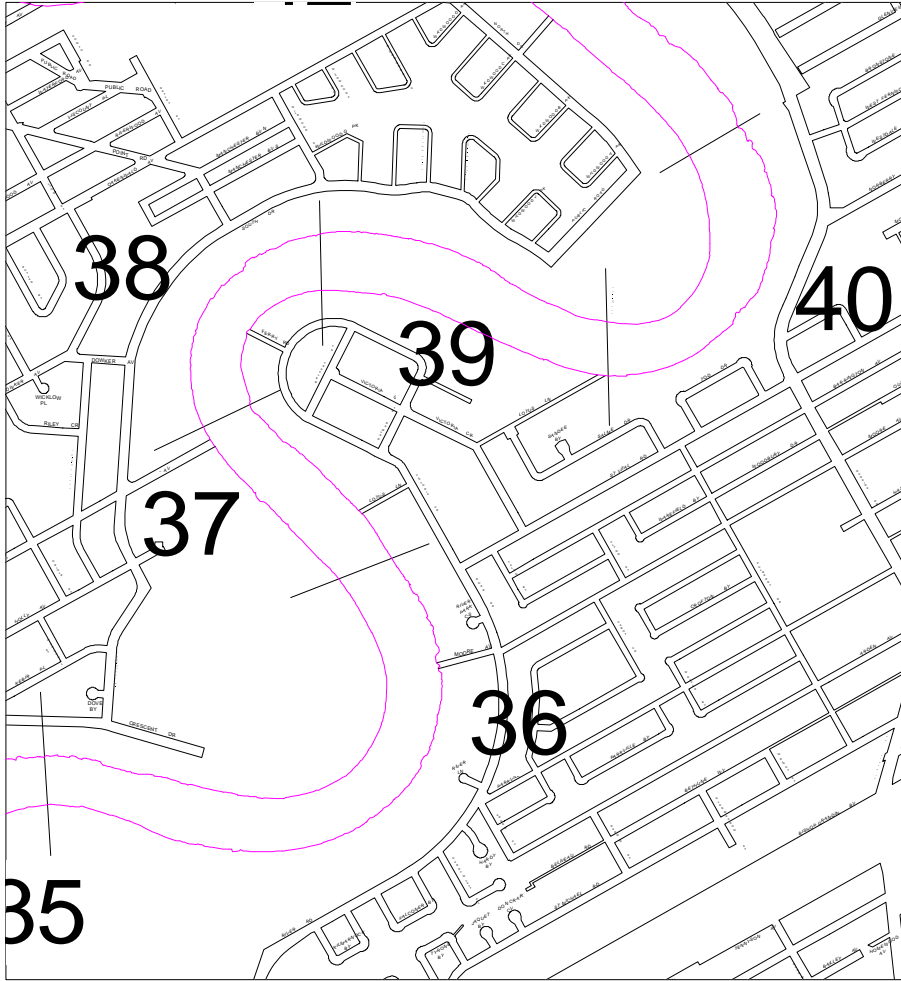


Figure 11. Red River segments 36-40.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 36 Start UTM 0633601E 5521409N

End UTM 0634443E 5521738N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634365E 5521479N

End UTM 0634350E 5521489N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.89	0.251	mud	hard
Center	4.84	0.435	mud	hard
Right	6.50	0.352	silt/mud	medium

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
36.1	L	0633502	5521396	6.00	clay/sand	hard
36.1	C	0633551	5521430	7.00	clay/sand	hard
36.1	R	0633485	5521474	5.00	clay/sand	medium
36.2	L	0633792	5521287	5.00	clay/sand	hard
36.2	C	0633810	5521365	5.00	clay/sand/gravel	hard
36.2	R	0633838	5521364	5.00	clay/sand/gravel	medium
36.3	L	0634318	5521315	5.00	clay	soft
36.3	C	0634243	5521358	8.00	clay/sand	medium
36.3	R	0634258	5521462	5.00	clay	medium
36.4	L	0634465	5521713	5.00	clay	medium
36.4	C	0634436	5521690	7.50	clay/sand	medium
36.4	R	0634379	5521669	6.50	clay	soft

SEGMENT: 36 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0633923	5521284	Crescent Park drainage (cobble)
Left Bank	0634296	5521313	storm drain
Left Bank	0634342	5521294	cobble begins
Left Bank	0634440	5521617	cobble ends
Right Bank	-rip-rap; mud; gravel; bank steep at park; few trees; some erosion		
Left Bank	-mud; steep; cobble; rip-rap; drains; boat launch; no erosion		

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 37 Start UTM 0634443E 5521738N

End UTM 0634132E 5522204N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634284E 5522050N

End UTM 0634196E 5521947N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.69	0.323	mud/gravel	hard
Center	3.11	0.500	gravel/mud	hard
Right	3.10	0.518	gravel/mud	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
37.1	L	0634369	5521878	5.50	clay/sand	medium
37.1	C	0634293	5521864	5.50	clay/sand	medium
37.1	R	0634265	5521866	5.00	clay/sand	hard
37.2	L	0634237	5522149	5.00	clay/sand	medium
37.2	C	0634157	5522095	5.00	clay/sand	hard
37.2	R	0634136	5521994	5.00	clay/sand/gravel	hard
37.3	L	0634163	5522187	5.00	clay/sand/gravel	medium
37.3	C	0634132	5522150	5.50	clay/sand/gravel	medium
37.3	R	0634123	5522077	5.50	clay	medium
37.4	L	0634086	5522220	5.50	clay	hard
37.4	C	0634019	5522324	5.50	clay/sand	medium
37.4	R	0634009	5522309	5.50	clay/sand	medium

SEGMENT: 37 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0634197	5522123	cobble/rip-rap

Right Bank -mud; scrub/willow; no erosion

Left Bank -rip-rap; cobble; mud; drain; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 38 Start UTM 0634132E 5522204N

End UTM 0634266E 5522673N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633955E 5522485N

End UTM 0633896E 5522432N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.71	0.212	mud	hard
Center	6.00	0.373	silt/mud	hard
Right	5.10	0.354	mud/silt	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
38.1	L	0634028	5522324	5.00	clay/sand	medium
38.1	C	0633997	5522309	6.00	clay	hard
38.1	R	0633959	5522295	6.00	clay/sand	hard
38.2	L	0634036	5522295	5.00	clay/sand	medium
38.2	C	0633913	5522393	8.00	clay/sand	hard
38.2	R	0633906	5522304	7.00	clay	soft
38.3	L	0634019	5522464	5.00	clay	hard
38.3	C	0633905	5522504	8.00	clay/sand	hard
38.3	R	0633880	5522452	5.50	clay	medium
38.4	L	0634015	5522587	8.00	clay/sand	hard
38.4	C	0633973	5522688	8.00	clay/sand	hard
38.4	R	0633933	5522724	5.00	clay	hard

SEGMENT: 38 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0633988	5522341	drain
Right Bank	0634031	5522516	rip-rap

Right Bank -mud; drainage ditch; rip-rap; cement dock; little eosion

Left Bank -cobble/rip-rap; mud; grass; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 39 Start UTM 0634266E 5522673N

End UTM 0634670E 5522579N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634515E 5522598N

End UTM 0634610E 5522570N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.92	0.506	gravel/mud	hard
Center	3.06	0.484	cobble/gravel	hard
Right	2.94	0.379	gravel/mud	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
39.1	L	06341332	5522690	6.50	clay	soft
39.1	C	0634104	5522652	7.00	clay/sand	hard
39.1	R	0634115	5522756	5.00	clay/sand	medium
39.2	L	0634215	5522598	5.00	clay	medium
39.2	C	0634200	5522669	5.00	clay/sand/gravel	hard
39.2	R	0634263	5522739	4.00	clay/sand/coble	hard
39.3	L	0634474	5522644	5.00	clay	medium
39.3	C	0634533	5522673	5.00	clay/sand/gravel	hard
39.3	R	0634472	5522743	5.00	clay/sand/cobble	medium
39.4	L	0634667	5522557	4.50	clay	soft
39.4	C	0634647	5522601	5.50	clay/sand	hard
39.4	R	0634715	5522659	5.00	clay/sand	hard

SEGMENT: 39 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634464	5522086	rip-rap

Right Bank -mud; rip-rap; deadfall; some erosion

Left Bank -mud; deadfall; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 40 Start UTM 0634670E 5522579N

End UTM 0635273E 5522844N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635155E 5522517N

End UTM 0635130E 5522591N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.69	0.320	mud/gravel	medium
Center	5.50	0.367	cobble/mud	medium
Right	6.80	0.350	gravel/mud	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
40.1	L	0634723	5522444	6.00	clay/mud	soft
40.1	C	0634763	5522541	6.50	clay/sand	medium
40.1	R	0634752	5522590	5.00	clay	hard
40.2	L	0634901	5522440	5.00	clay	medium
40.2	C	0634897	5522463	7.00	clay/sand	hard
40.2	R	0634944	5522514	5.00	clay	hard
40.3	L	0635279	5522571	5.00	clay/sand/gravel	medium
40.3	C	0635260	5522592	7.50	clay/sand	hard
40.3	R	0635236	5522695	6.50	clay/sand	soft
40.4	L	0635329	5522852	4.50	clay/sand	medium
40.4	C	0635246	5522896	5.50	clay/sand	hard
40.4	R	0635215	5522876	5.00	clay/sand	hard

SEGMENT: 40 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0634759	5522555	cobbled drain
Left Bank	0635190	5522586	drain

Right Bank -mud; rip-rap; no erosion

Left Bank -mud; cobble; 2 drains; rip-rap; grass; trees; some erosion

Segment: 40 (Bend) (Continued)

C) Velocity Cross Sections

UTM (14U), NAD 83		Bend	Location	Depth	Velocity (m/s)
N	E				
0635033	5522864	Inside	5 m off Right Bank	2.25	
			@ 0.2	0.45	0.123
			@ 0.8	1.80	0.138
			10 m off Right Bank	4.75	
			@ 0.2	0.95	0.145
			@ 0.8	3.80	0.156
			15 m off Right Bank	6.75	
			@ 0.2	1.35	0.191
			@ 0.8	5.40	0.177
			30 m off Right Bank	7.50	
			@ 0.2	1.50	0.214
			@ 0.8	6.00	0.215
			40 m off Right Bank	7.50	
			@ 0.2	1.50	0.234
			@ 0.8	6.00	0.250
			0635099	5522742	Outside
@ 0.2	0.35	0.220			
@ 0.8	1.40	0.205			
10m off Left Bank	2.25				
@ 0.2	0.45	0.254			
@ 0.8	1.80	0.183			
15m off Left Bank	3.00				
@ 0.2	0.60	0.225			
@ 0.8	2.40	0.189			
30m off Left Bank	5.00				
@ 0.2	1.00	0.286			
@ 0.8	4.00	0.273			
40m off Left Bank	5.75				
@ 0.2	1.15	0.317			
@ 0.8	4.60	0.292			

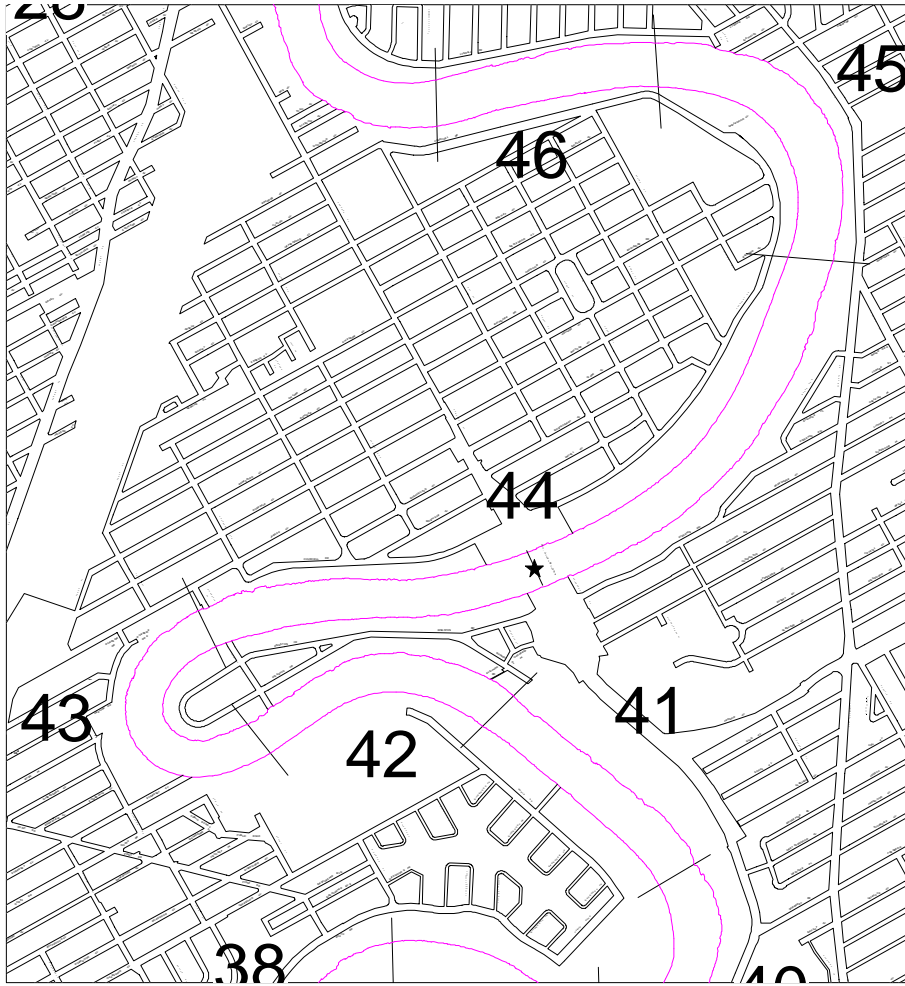


Figure 12. Red River segments 41-46.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 41 Start UTM 0635273E 5522844N

End UTM 0634660E 5523491N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634833E 5523393N

End UTM 0634769E 5523294N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.05	0.262	mud/gravel	hard
Center	4.19	0.387	mud/gravel	hard
Right	5.40	0.262	mud	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
41.1	L	0635147	5523036	5.00	clay/sand/gravel	hard
41.1	C	0635134	5523049	5.50	clay/sand	hard
41.1	R	0635116	5523016	5.00	clay/sand	hard
41.2	L	0635107	5523179	3.50	clay/sand/gravel	medium
41.2	C	0635020	5523169	6.00	clay/sand	medium
41.2	R	0634995	5523141	5.50	clay/sand	medium
41.3	L	0634908	5523332	5.00	clay/sand	medium
41.3	C	0634827	5523400	6.50	clay/sand	hard
41.3	R	0634871	5523258	6.00	clay/sand	soft
41.4	L	0634697	5523487	5.00	clay	medium
41.4	C	0634644	5523459	7.50	clay	soft
41.4	R	0634613	5523389	5.00	clay	hard

SEGMENT: 41 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0635235	5522908	section of rip-rap begins
Left Bank	0635203	5522992	section of rip-rap ends
Left Bank	0635136	5523097	beaver lodge
Left Bank	0635031	5523233	section of rip-rap begins
Left Bank	0634941	5523294	section of rip-rap ends
Left Bank	0634771	5523405	cobble (broken limestone)

Right Bank -mud; old dock piles; no erosion

Left Bank -mud; rip-rap; cobble; beaver lodge; grass; shrubs; deadfall; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 42 Start UTM 0634660E 5523491N

End UTM 0633876E 5523558N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634242E 5523739N

End UTM 0634236E 5523673N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.01	0.317	mud/gravel	hard
Center	4.51	0.455	gravel/mud	hard
Right	5.70	0.454	gravel/mud	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
42.1	L	0634559	5523593	5.00	clay/sand	hard
42.1	C	0634536	5523640	6.00	clay/sand	hard
42.1	R	0634500	5523585	5.00	clay	medium
42.2	L	0634358	5523657	4.50	clay	hard
42.2	C	0634376	5523629	6.50	clay/sand	medium
42.2	R	0634344	5523611	5.50	clay	hard
42.3	L	0634254	5523636	4.50	clay/sand/gravel	hard
42.3	C	0634265	5523631	6.00	clay/sand	medium
42.3	R	0634230	5523597	5.50	clay/sand	medium
42.4	L	0634021	5523671	5.00	clay	hard
42.4	C	0634051	5523652	5.50	clay/sand	hard
42.4	R	0633923	5523546	6.00	clay/sand	hard

SEGMENT: 42 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; steep; overhanging trees; some erosion

Left Bank -mud/cobble; low grassy slumps; rip-rap; some willow; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 43 Start UTM 0633876E 5523558N

End UTM 0633580E 5523864N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 23 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633419E 5523495N

End UTM 0633324E 5523469N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.73	0.362	gravel/cobble	hard
Center	5.50	0.431	gravel/cobble	hard
Right	3.52	0.385	mud/gravel	medium

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
43.1	L	0633886	5523757	4.50	clay/sand/gravel	medium
43.1	C	0633921	5523709	7.00	clay/sand	hard
43.1	R	0633927	5523693	6.00	clay/sand	hard
43.2	L	0633622	5523368	6.50	clay/sand	hard
43.2	C	0633576	5523138	6.50	clay/sand	hard
43.2	R	0633602	5523414	6.50	clay/sand	soft
43.3	L	0633419	5523483	4.00	clay/sand	hard
43.3	C	0633413	5523445	8.00	clay/sand	hard
43.3	R	0633384	5523454	5.00	clay	medium
43.4	L	0633414	5523703	5.50	clay/sand	hard
43.4	C	0633382	5523706	7.00	clay/sand	hard
43.4	R	0633401	5523747	4.50	clay/cobble/gravel	hard

SEGMENT: 43 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0633535	5523413	storm drain
Right Bank	0633444	5523449	beaver cache

Right Bank - mud; cobble; storm drain; beaver cache; deadfall; erosion

Left Bank -cobble/rip-rap; mud; some erosion

Segment: 43 (Bend) (Continued)

C) Velocity Cross Sections

UTM (14U), NAD 83		Bend	Location	Depth	Velocity (m/s)
N	E				
0633272	5523776	Outside	5 m off Right Bank	2.12	
			@ 0.2	0.43	0.218
			@ 0.8	1.50	0.173
			10 m off Right Bank	3.00	
			@ 0.2	0.60	0.219
			@ 0.8	2.40	0.153
			15 m off Right Bank	3.50	
			@ 0.2	0.70	0.242
			@ 0.8	2.80	0.213
			30 m off Right Bank	4.75	
			@ 0.2	0.95	0.226
			@ 0.8	3.80	0.201
			40 m off Right Bank	6.60	
			@ 0.2	1.32	0.285
@ 0.8	5.28	0.255			
0633369	5523807	Inside	5m off Left Bank	1.25	
			@ 0.6	0.75	0.046
			10m off Left Bank	3.25	
			@ 0.2	0.65	0.170
			@ 0.8	2.60	0.196
			15m off Left Bank	5.75	
			@ 0.2	1.15	0.209
			@ 0.8	4.60	0.214
			30m off Left Bank	6.25	
			@ 0.2	1.25	0.239
			@ 0.8	5.00	0.195
			40m off Left Bank	6.50	
			@ 0.2	1.30	0.246
			@ 0.8	5.20	0.220

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 44 Start UTM 0633580E 5523864N

End UTM 0635648E 5525088N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634872E 5524158N

End UTM 0634914E 5524201N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.33	0.425	sand/gravel	medium
Center	6.00	0.489	mud/sand	hard
Right	5.30	0.398	mud	soft

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
44.1	L	0633629	5523892	5.00	clay/sand	medium
44.1	C	0633627	5523830	6.50	clay/sand	hard
44.1	R	0633549	5523849	5.00	clay	medium
44.2	L	0634315	5524026	4.50	clay	hard
44.2	C	0634344	5523955	7.50	clay	soft
44.2	R	0634362	5524024	5.00	clay/sand/gravel	hard
44.3	L	0634900	5524136	4.50	clay/sand	medium
44.3	C	0634899	5524208	7.50	clay/sand	hard
44.3	R	0634873	5524172	4.50	clay	hard
44.4	L	0635484	5524682	4.50	clay	medium
44.4	C	0635454	5524714	6.00	clay	hard
44.4	R	0635339	5524659	5.00	clay	soft

SEGMENT: 44 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0633728	5523917	storm drain surrounded by cobble
Right Bank	0634679	5524019	storm drain
Right Bank	0635482	5524679	rip-rap stabilized bank
Right Bank	0635648	5525088	rip-rap stabilized bank
Right Bank	0634238	5523902	deadfall
Left Bank	0635047	5524218	drain

Right Bank -mud; rip-rap; storm drains/cobble; deadfall; erosion

Left Bank -mud; cobble; gravel; drain; trees; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 45 Start UTM 0635648E 5525088N

End UTM 0635206E 5525773N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635448E 5525767N

End UTM 0635387E 5525647N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.63	0.461	gravel/cobble	hard
Center	3.17	0.468	sand/gravel	medium
Right	4.26	0.552	gravel	medium

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
45.1	L	0635704	5525075	5.00	clay	hard
45.1	C	0635623	5525044	7.50	clay/sand	medium
45.1	R	0635608	5525178	5.00	clay	hard
45.2	L	0635710	5525405	5.00	clay/sand	medium
45.2	C	0635651	5525447	5.50	clay/sand	hard
45.2	R	0635594	5525318	5.00	clay/sand	soft
45.3	L	0635576	5525622	4.50	clay/sand/gravel	medium
45.3	C	0635544	5525624	5.00	clay/sand/grave	medium
45.3	R	0635500	5525646	5.50	clay/sand	hard
45.4	L	0635356	5525800	4.50	clay/sand/gravel	medium
45.4	C	0635331	5525785	5.50	clay/sand	medium
45.4	R	0635288	5525689	5.00	clay	soft

SEGMENT: 45 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0635653	5525446	storm drain
Left Bank	0635690	5525363	cobble boat launch
Left Bank	0635424	5525772	rip-rap
Left Bank	0635376	5525767	culvert

Right Bank -mud; trees; storm drain; some erosion

Left Bank -cobble; mud; rip-rap; culvert; grass; shrubs; boat launch; some erosion

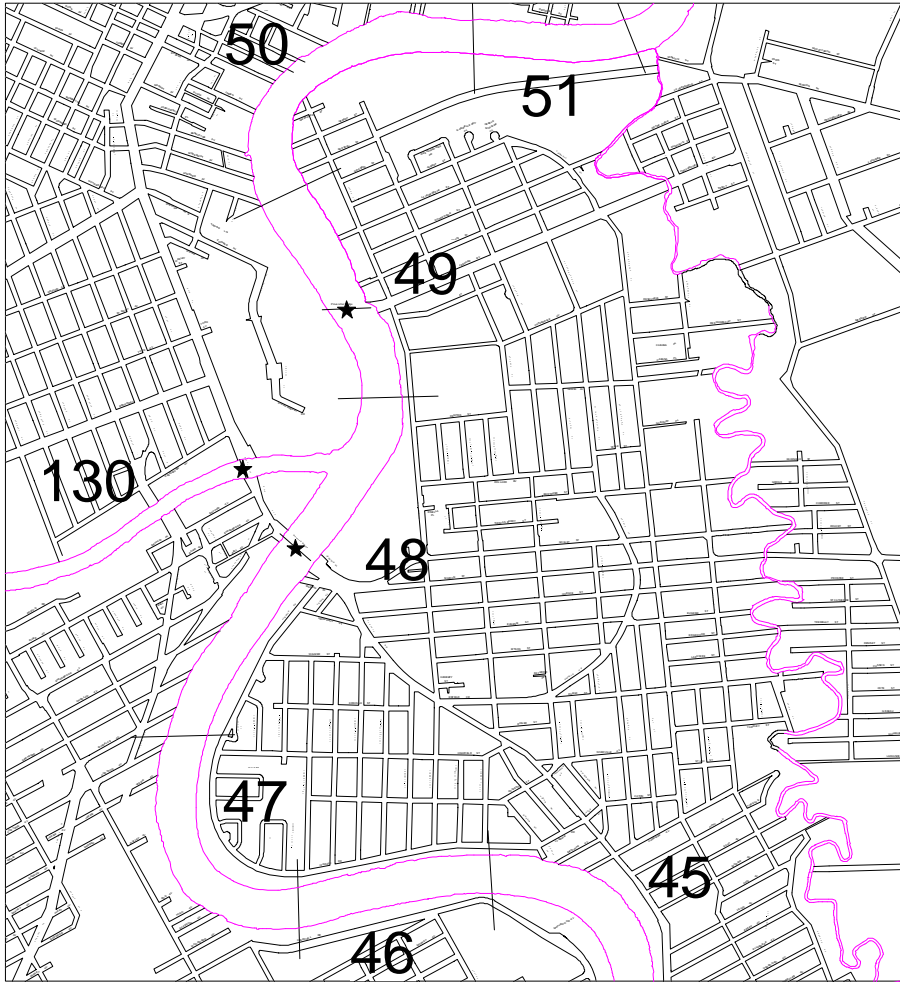


Figure 13. Red River segments 46-51.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 46 Start UTM 0635206E 5525773N

End UTM 0634315E 5525589N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634482E 5525744N

End UTM 0634491E 5525661N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.57	0.344	gravel/cobble	hard
Center	4.67	0.541	mud/gravel	medium
Right	4.86	0.487	mud/gravel	soft

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
46.1	L	0635218	5525833	4.50	clay/sand/cobble	medium
46.1	C	0635191	5525759	5.00	clay/sand/gravel	medium
46.1	R	0635177	5525775	5.50	clay	soft
46.2	L	0635145	5525859	4.00	clay/sand/cobble/gravel	medium
46.2	C	0635103	5525788	6.00	clay	soft
46.2	R	0635101	5525766	6.00	clay	soft
46.3	L	0634818	5525800	4.50	clay/sand/gravel	medium
46.3	C	0634869	5525709	6.00	clay	hard
46.3	R	0634881	5525658	5.00	clay/sand/gravel	medium
46.4	L	0634641	5525770	5.00	clay/sand/gravel	hard
46.4	C	0634667	5525727	7.00	clay	soft
46.4	R	0634681	5525684	5.00	clay	medium

SEGMENT: 46 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0634745	5525693	rip-rap, grass and shrubs

Right Bank -mud; Redboine Canoe Club dock; rip-rap; shrubs; grass; little erosion

Left Bank -mud; rip-rap; grass; shrubs; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 47 Start UTM 0634315E 5525589N

End UTM 0633904E 5526392N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633954E 5525963N

End UTM 0633856E 5525905N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.52	0.443	mud	soft
Center	5.10	0.466	cobble/boulders	hard
Right	4.32	0.500	cobble	medium

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
47.1	L	0634361	5525639	4.50	clay/sand	hard
47.1	C	0634351	5525664	5.50	clay/sand	hard
47.1	R	0634335	5525585	5.50	clay	soft
47.2	L	0634207	5525728	4.50	clay/sand	hard
47.2	C	0634198	5525652	6.50	clay/sand/gravel	hard
47.2	R	0634181	5525560	5.00	clay	hard
47.3	L	0634004	5525816	3.50	clay/sand/cobble	medium
47.3	C	0633941	5525778	7.50	clay/sand	hard
47.3	R	0633869	5525706	5.00	clay/sand	medium
47.4	L	0633938	5526021	5.50	clay/sand	hard
47.4	C	0633912	5526002	5.50	clay/sand	hard
47.4	R	0633871	5525992	5.00	clay/sand/gravel	hard

SEGMENT: 47 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634050	5525667	drain
Right Bank	0633828	5526152	drain
Right Bank	0633854	5526342	narrow strip of gravel
Right Bank	0633852	5525975	bank erosion

Right Bank -mud; gravel; grass; cobble/rip-rap; Yacht Club dock; undercut bank erosion

Left Bank -mud; exposed tree roots from top bank; erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 48 Start UTM 0633904E 5526392N

End UTM 0634716E 5527720N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634507E 5527176N

End UTM 0634444E 5527249N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	5.00	0.452	gravel	hard
Center	4.60	0.499	gravel	hard
Right	3.94	0.483	gravel/cobble	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
48.1	L	0633924	5526202	5.00	clay/sand	soft
48.1	C	0633836	5526216	5.50	clay/sand	hard
48.1	R	0633880	5526251	4.00	clay/sand/gravel	medium
48.2	L	0634058	5526607	6.00	clay	soft
48.2	C	0634015	5526635	6.00	clay/sand	medium
48.2	R	0633989	5526656	4.50	clay/sand	hard
48.3	L	0634273	5526866	5.50	clay	soft
48.3	C	0634213	5526916	6.50	clay	soft
48.3	R	0634127	5526874	5.50	clay	hard
48.4	L	0634523	5527280	4.50	clay/sand/gravel	medium
48.4	C	0634552	5527289	6.00	clay	soft
48.4	R	0634463	5527332	4.50	clay	medium

SEGMENT: 48 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634151	5526889	gravel then grass and shrubs
Right Bank	0634189	5526866	cobble
Right Bank	0634692	5527573	storm drain and rip-rap
Left Bank	0634100	5526729	storm drain and rip-rap
Left Bank	0634340	5526964	storm drain

Right Bank -gravel; grass/shrubs; cobble; storm drain; trees; little erosion

Left Bank -mud; trees with exposed roots; storm drain; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 49 Start UTM 0634716E 5527720N

End UTM 0634306E 5528540N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634468E 5528169N

End UTM 0634422E 5528230N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.73	0.513	sand/gravel	hard
Center	3.41	0.508	sand	hard
Right	3.29	0.608	sand	hard

HABITAT SURVEY II

Date 29 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
49.1	L	0634717	5527583	5.00	clay/gravel	hard
49.1	C	0634650	5527661	5.50	clay/sand/gravel	hard
49.1	R	0634560	5527705	5.00	clay	medium
49.2	L	0634703	5527857	4.50	clay/sand/gravel	medium
49.2	C	0634663	5527795	5.00	clay/sand	medium
49.2	R	0634584	5527800	5.50	clay/sand	hard
49.3	L	0634536	5528042	5.00	clay/sand/gravel	hard
49.3	C	0634482	5528060	5.50	clay/sand	medium
49.3	R	0634439	5528098	6.00	clay/sand	hard
49.4	L	0634362	5528338	4.50	clay	hard
49.4	C	0634278	5528363	5.00	clay/sand/gravel	hard
49.4	R	0634258	5528331	4.50	clay/sand	hard

SEGMENT: 49 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634305	5528302	storm drain and rip-rap
Left Bank	0634492	5527982	storm drain
Left Bank	0634387	5528233	storm drain
Left Bank	0634365	5528302	cobble

Right Bank -mud; rip-rap; pillars between bridges; trees

Left Bank -mud; rip-rap; sparse grass/willow; two storm drains; cobble

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 50 Start UTM 0634306E 5528540N

End UTM 0634758E N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 26 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634490E 5528981N

End UTM 0634503E 5529080N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.41	0.628	cobble	hard
Center	4.90	0.700	cobble	hard
Right	4.98	0.678	gravel/cobble	hard

HABITAT SURVEY II

Date 30 June 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
50.1	L	0634358	5528504	5.00	clay/sand/gravel	hard
50.1	C	0634323	5528451	5.50	clay/sand	medium
50.1	R	0634269	5528386	5.00	clay	medium
50.2	L	0634287	5528754	7.50	clay/sand	hard
50.2	C	0634286	5528792	7.00	clay/sand	hard
50.2	R	0634219	5528776	5.50	clay/sand	soft
50.3	L	0634447	5528870	5.50	clay/sand	hard
50.3	C	0634436	5528922	6.50	clay/sand	hard
50.3	R	0634437	5529007	5.55	clay/cobble/gravel	soft
50.4	L	0634794	5529006	5.00	clay/sand	hard
50.4	C	0634805	5529085	6.50	clay/sand	hard
50.4	R	0634770	5529184	5.00	clay/sand/gravel	hard

SEGMENT: 50 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634241	5528629	storm drain

Right Bank -mud; deadfall; storm drain; cobble; Harbour Patrol dock; some erosion

Left Bank -mud; deadfall; rip-rap; boulders; trees; some erosion

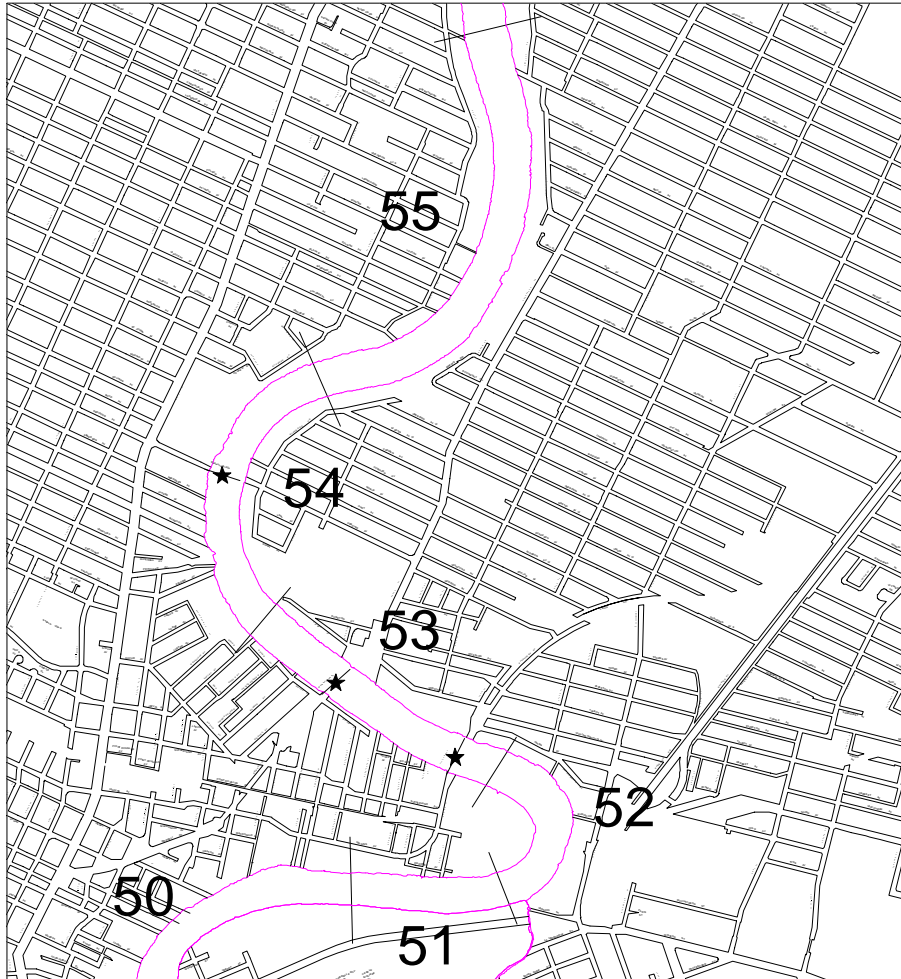


Figure 14. Red River segments 51-55.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 51 Start UTM 0634758E 5529011N

End UTM 0635384E 5522077N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635156E 5529016N

End UTM 0635204E 5529068N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.41	0.287	mud	medium
Center	5.80	0.444	mud	medium
Right	4.90	0.368	mud/sand	medium

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
51.1	L	0634918	5529062	6.00	clay	soft
51.1	C	0635052	5529053	7.50	clay/sand	hard
51.1	R	0635032	5529165	7.00	clay/sand	hard
51.2	L	0635182	5529004	3.00	clay/sand	medium
51.2	C	0635200	5529077	8.00	clay/sand	hard
51.2	R	0635198	5529178	6.50	clay/sand/gravel	hard
51.3	L	0635272	5529031	4.00	clay/sand	medium
51.3	C	0635270	5529001	8.00	clay/sand	hard
51.3	R	0635231	5529059	5.00	clay/sand	hard
51.4	L	0635398	5528973	4.00	clay/sand/gravel	soft
51.4	C	0635431	5529053	6.50	clay/sand	hard
51.4	R	0635423	5529132	5.50	clay/sand/gravel	hard

SEGMENT: 51 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-cobble; mud; rip-rap; some erosion
-------------------	-------------------------------------

Left Bank	-mud; some erosion
------------------	--------------------

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 52 Start UTM 0635384E 5522077N
 End UTM 0635578E 5529592N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635863E 5522077N
 End UTM 0635854E 5529239N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	6.00	0.443	mud/boulders	medium
Center	9.10	0.435	sand	medium
Right	6.00	0.386	mud	soft

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
52.1	L	635615	5529046	4.50	clay/sand/gravel	hard
52.1	C	635587	5529007	7.50	clay/sand	hard
52.1	R	635593	5529100	5.00	clay	soft
52.2	L	635774	5529019	6.50	clay/sand	medium
52.2	C	635757	5529070	9.00	clay/sand	medium
52.2	R	635734	5529174	5.50	clay/sand	hard
52.3	L	635911	5529310	4.50	clay/sand/gravel	medium
52.3	C	635825	5529336	9.00	clay/sand/gravel	hard
52.3	R	635772	5529299	9.50	clay/sand	medium
52.4	L	635769	5529516	4.00	clay/sand/gravel	medium
52.4	C	635786	5529483	5.50	clay/sand	medium
52.4	R	635615	5529498	5.50	clay/sand	hard

SEGMENT: 52 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0635878	5529382	storm drain (8' diameter)
Left Bank	0635835	5529428	old dock moorings

Right Bank -sand/mud; some erosion

Left Bank -sand/mud; storm drain; dock moorings; rip-rap; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 53 Start UTM 0635854E 5529239N

End UTM 0634828E 5530142N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635089E 5529862N

End UTM 0635052E 5530142N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.53	0.355	sand	medium
Center	5.10	0.184	mud/sand	medium
Right	4.73	0.407	sand/boulders	hard

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
53.1	L	0635654	5529612	5.00	clay/sand	hard
53.1	C	0635576	5529553	6.50	clay/sand	soft
53.1	R	0635564	5529518	4.00	clay	medium
53.2	L	0635385	5529708	4.50	clay/sand/gravel	hard
53.2	C	0635391	5529664	8.00	clay/sand	medium
53.2	R	0635349	5529602	5.50	clay	soft
53.3	L	0635030	5529920	5.50	clay	hard
53.3	C	0635059	5529921	6.50	clay	soft
53.3	R	0635017	5529865	5.00	clay	medium
53.4	L	0634841	5530104	5.50	clay/cobble	hard
53.4	C	0634758	5530032	6.00	clay/sand	hard
53.4	R	0634736	5529997	6.00	clay	soft

SEGMENT: 53 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634929	5530031	storm drain (5' diameter)
Left Bank	0635210	5529706	rip-rap and cement sidewalk

Right Bank -mud; sand; storm drain; boat launch; little erosion

Left Bank -sand; grass; rip-rap; few trees; little erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 54 Start UTM 0634828E 5530142N

End UTM 0634769E 5531147N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 28 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0634557E 5530396N

End UTM 0634480E 5530350N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	6.20	0.334	mud	medium
Center	7.30	0.453	cobble/boulders	hard
Right	5.40	0.317	mud/gravel	medium

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
54.1	L	0634608	5530467	6.00	clay	soft
54.1	C	0634582	5530427	4.00	clay	soft
54.1	R	0634485	5530458	8.50	clay/sand	hard
54.2	L	0634540	5530607	5.50	clay	medium
54.2	C	0634447	5530610	8.50	clay/sand	hard
54.2	R	0634419	5530564	4.50	clay/sand	hard
54.3	L	0634508	5530750	5.00	clay	medium
54.3	C	0634472	5530865	9.50	clay/sand	hard
54.3	R	0634373	5531021	6.50	clay/sand	hard
54.4	L	0634749	5531127	6.00	clay	soft
54.4	C	0634755	5531085	10.00	clay	medium
54.4	R	0634673	5531222	4.00	clay/sand/gravel	medium

SEGMENT: 54 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0634533	5530411	storm drain and old dock
Right Bank	0634464	5530501	storm drain (8' diameter)
Right Bank	0634757	5531085	culvert
Left Bank	0634544	5530868	culvert (5' diameter)

Right Bank -mud; two storm drains; culvert; dock; no erosion

Left Bank -mud; cobble; culvert; little erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 55 Start UTM 0634769E 5531147N

End UTM 0635684E 5531961N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 28 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635369E 5531219N

End UTM 0635356E 5531360N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.87	0.345	mud	soft
Center	4.77	0.414	sand/mud	medium
Right	5.00	0.255	mud	medium

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
55.1	L	0634894	5531165	6.00	clay	soft
55.1	C	0634887	5531155	8.00	clay/sand	hard
55.1	R	0634853	5531138	5.00	clay/sand/gravel	medium
55.2	L	0635254	5531254	5.00	clay	soft
55.2	C	0635224	5531301	5.50	clay	medium
55.2	R	0635240	5531271	5.00	clay/sand	hard
55.3	L	0635688	5531568	4.00	clay/sand/gravel	medium
55.3	C	0635622	5531542	7.00	clay/sand	hard
55.3	R	0635569	5531615	5.00	clay	medium
55.4	L	0635767	5532000	4.50	clay/sand/cobble/gravel	medium
55.4	C	0635718	5531971	8.50	clay	medium
55.4	R	0635653	5531996	4.00	clay	soft

SEGMENT: 55 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0635528	5531429	storm drain (5' diameter)
Right Bank	0635582	5531645	storm drain (4' diameter)
Left Bank	0635488	5531357	rip-rap and boulders
Left Bank	0635582	5531503	storm drain (7' diameter)
Left Bank	0635194	5531279	culvert storm (2' diameter)

Right Bank mud; cobble/rip-rap; some sand/silt/ 2 storm drains; some erosion

Left Bank -mud; some cobble/rip-rap; boulders; storm drain; culvert; little erosion

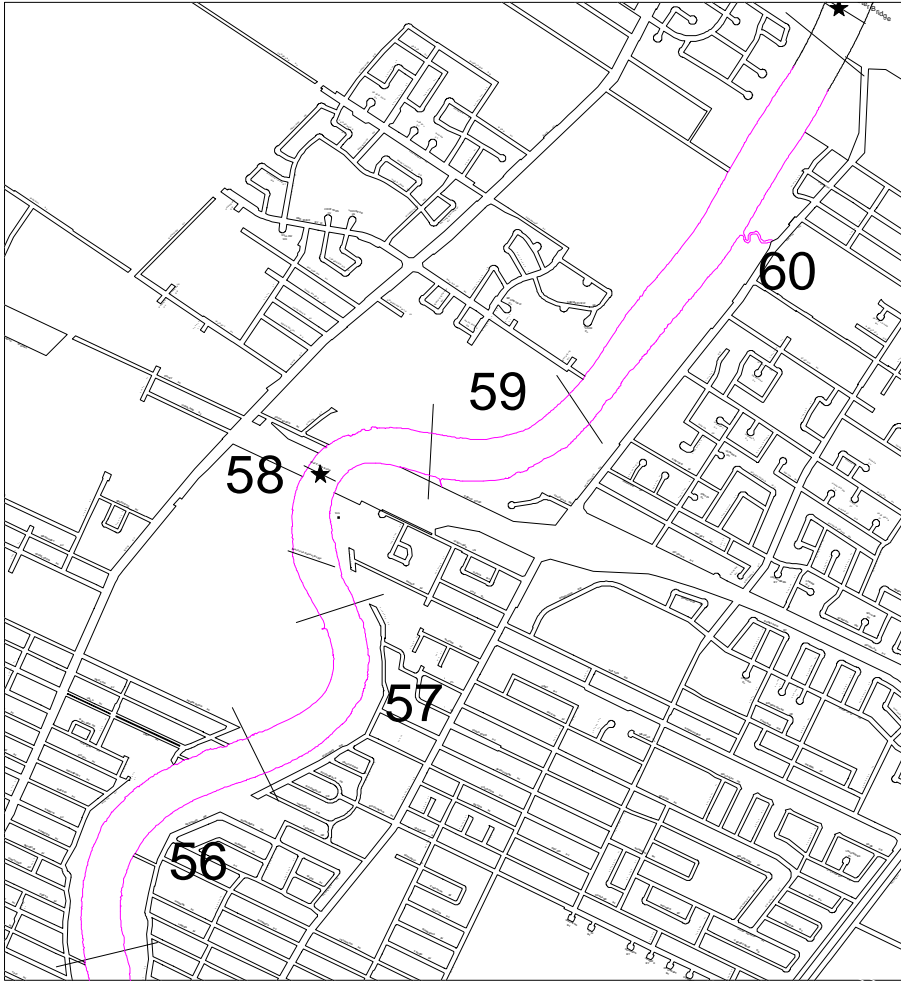


Figure 15. Red River segments 56-60.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 56 Start UTM 0635684E 5531961N
 End UTM 0635914E 5532761N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 28 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0635579E 5532760N
 End UTM 0635509E 5532761N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.78	0.314	mud/sand	medium
Center	4.49	0.402	sand	hard
Right	4.13	0.389	sand	hard

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
56.1	L	0635657	5532644	5.00	clay/sand/gravel	hard
56.1	C	0635617	5532646	5.50	clay/sand/gravel	hard
56.1	R	0635544	5532623	5.00	clay	soft
56.2	L	0635702	5533020	4.50	clay	soft
56.2	C	0635627	5533013	7.00	clay	soft
56.2	R	0635511	5533017	5.00	clay/cobble	hard
56.3	L	0635809	5533230	3.00	clay/sand	hard
56.3	C	0635763	5533288	7.00	clay	hard
56.3	R	0635747	5533331	4.50	clay/sand	medium
56.4	L	0636048	5533300	3.50	clay/sand	medium
56.4	C	0635954	5533355	6.00	clay	hard
56.4	R	0635908	5533415	5.00	clay/cobble	hard

SEGMENT: 56 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0635562	5532565	sewer drain (10' diameter)
Right Bank	0635580	5533058	old sewer drain (1' diameter)
Left Bank	0635875	5533227	submerged drain
Left Bank	0635691	5532080	old drain
Left Bank	0635534	5532853	sewer drain

Right Bank -mud; cobble/rip-rap; 2 sewer drains; little erosion

Left Bank -cobble; some mud; 3 drains; old culvert; metal drain; 2 pockets of erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 57 Start UTM 0635914E 5533336N

End UTM 0636570E 5534037N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636444E 5533531N

End UTM 0636432E 5533557N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	5.50	0.312	mud/sand	soft
Center	5.50	0.352	mud/sand	medium
Right	3.70	0.233	mud	soft

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
57.1	L	0636362	5533400	3.00	clay	soft
57.1	C	0636266	5533470	6.00	clay	medium
57.1	R	0636486	5533514	7.00	clay/sand	hard
57.2	L	0636457	5533580	3.50	clay	medium
57.2	C	0636494	5533514	7.00	clay	soft
57.2	R	0636431	5533615	5.50	clay	hard
57.3	L	0636640	5533708	4.50	clay	medium
57.3	C	0636594	5533763	8.00	clay/sand	hard
57.3	R	0636598	5533840	7.00	clay	soft
57.4	L	0636767	5533960	5.00	clay/cobble	hard
57.4	C	0636667	5533846	8.00	clay/sand	medium
57.4	R	0636542	5533872	5.00	clay	medium

SEGMENT: 57 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0636119	5533446	sewer (5' diameter)
Right Bank	0636211	5533500	sewer (6' diameter)
Right Bank	0636605	5533704	rip-rap
Left Bank	0636367	5533530	old sewer
Left Bank	0636584	5533924	pocket of extensive erosion

Right Bank -limestone rip-rap; tires; 2 sewers; boat launch; no erosion

Left Bank -mud; rip-rap; sewer; some erosion (extensive erosion in one location only)

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 58 Start UTM 0636570E 5534037N

End UTM 0636831E 5534777N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0636541E 5534402N

End UTM 0636432E 5534399N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	6.40	0.264	mud	soft
Center	5.60	0.276	mud/sand	medium
Right	3.31	0.263	mud	soft

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
58.1	L	0636672	5534121	4.00	clay/sand/gravel	hard
58.1	C	0636611	5534109	5.50	clay	hard
58.1	R	0636543	5534069	5.00	clay	hard
58.2	L	0636497	5534320	5.00	clay	hard
58.2	C	0636506	5534345	8.00	clay	soft
58.2	R	0636451	5534275	5.00	clay	medium
58.3	L	0636616	5534736	6.50	clay	soft
58.3	C	0636561	5534755	12.00	clay/sand	hard
58.3	R	0636552	5534478	4.50	clay	medium
58.4	L	0636629	5534700	6.50	clay	medium
58.4	C	0636626	5534755	9.50	clay/sand	medium
58.4	R	0636707	5534823	4.00	clay/gravel	medium

SEGMENT: 58 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0636416	5534493	steaming effluent warm water
Right Bank	0636604	5534728	sewer (3' diameter)
Left Bank	0636416	5534493	old culvert

Right Bank -mud/sand; deadfall; boat launch; sewer; golf course intake; erosion

Left Bank -cobble/rip-rap; sand bags; deadfall; log jam; culvert; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 59 Start UTM 0636831E 5534777N

End UTM 0637628E 5534893N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0637336E 5534731N

End UTM 0637292E 5534732N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.94	0.340	cobble/boulders	hard
Center	5.00	0.447	mud/sand	medium
Right	4.17	0.400	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
59.1	L	0637044	5534716	3.00	clay	medium
59.1	C	0637057	5534777	4.25	clay/sand/gravel	hard
59.1	R	0637010	5534781	4.00	clay	soft
59.2	L	0637200	5534693	4.25	clay	medium
59.2	C	0637223	5534775	5.25	clay	medium
59.2	R	0637229	5534829	5.75	clay	soft
59.3	L	0637346	5534660	3.50	clay	medium
59.3	C	0637360	5534704	7.25	clay	medium
59.3	R	0637304	5534770	5.00	clay/boulders	hard
59.4	L	0637416	5534689	3.50	clay/cobble	hard
59.4	C	0637441	5534778	8.00	clay	soft
59.4	R	0637403	5534856	5.00	clay	hard

SEGMENT: 59 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0637030	5534661	drainage run (no culvert)
Left Bank	0637228	5534660	sewer drain (2' diameter)

Right Bank -mud/sand/silt; scrub; deadfall; erosion

Left Bank -mud; some sand; some cobble; scrub; deadfall; sewer drain; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 60 Start UTM 0637628E 5534893N
 End UTM 0638745E 5536472N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 29 Oct 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0638287E 5535611N
 End UTM 0638178E 5535708N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.50	0.368	mud/sand	hard
Center	4.16	0.478	mud/gravel	hard
Right	4.43	0.369	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
60.1	L	637517	5534822	3.50	clay	medium
60.1	C	637531	5534817	6.00	clay	medium
60.1	R	637480	5534839	5.50	clay	hard
60.2	L	638031	5535281	3.75	clay	medium
60.2	C	637984	5535317	7.25	clay	hard
60.2	R	637846	5535363	4.00	clay/cobble	hard
60.3	L	638290	5535667	3.50	clay	medium
60.3	C	638272	5535728	5.50	clay	hard
60.3	R	638234	5535782	4.00	clay/sand	hard
60.4	L	638630	5536165	3.75	clay	medium
60.4	C	638544	5536204	6.00	clay	medium
60.4	R	638450	5536255	4.50	clay	medium

SEGMENT: 60 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0637967	5535302	storm drain (5' diameter)
Right Bank	0638588	5536308	sewer drain (2' diameter)
Left Bank	0638745	5536472	culvert

Right Bank -mud; 2 drains; deadfall; boat launch; some erosion

Left Bank -mud; cobble/rip-rap; culvert; deadfall; dock; some erosion

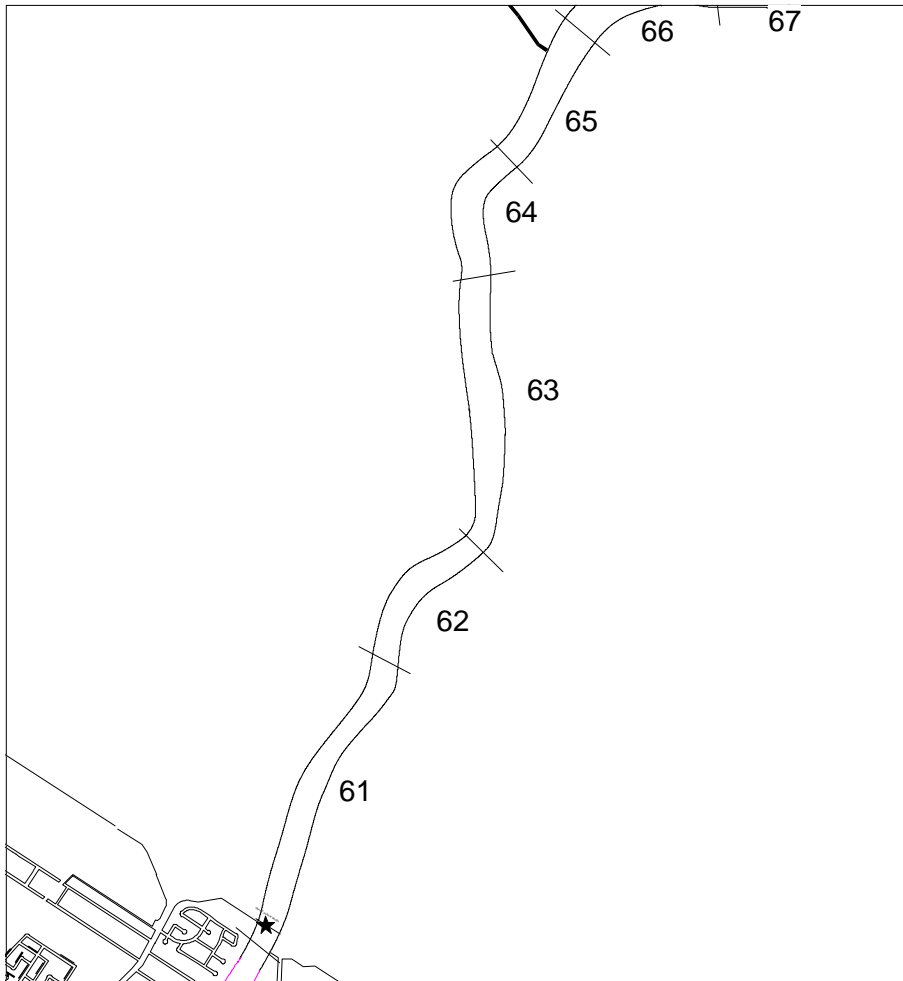


Figure 16. Red River segments 61-65.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 61 Start UTM 0638745E 5536472N

End UTM 0639740E 5538787N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0639187E 5537852N

End UTM 0639068E 5537867N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.14	0.273	mud	soft
Center	5.50	0.328	mud/sand	medium
Right	5.20	0.280	mud	soft

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
61.1	L	0638790	5536531	3.00	clay/sand	medium
61.1	C	0638746	5536619	7.25	clay	medium
61.1	R	0638677	5536686	5.00	clay	medium
61.2	L	0638881	5537038	4.25	clay	medium
61.2	C	0638847	5537069	7.00	clay	medium
61.2	R	0638784	5537103	5.25	clay	medium
61.3	L	0639179	5537762	4.00	clay	medium
61.3	C	0639153	5537772	7.00	clay	medium
61.3	R	0639056	5537780	5.50	clay/sand	medium
61.4	L	0639435	5538113	4.75	sand	hard
61.4	C	0639417	5538182	4.75	sand/cobble/gravel	hard
61.4	R	0639423	5538227	4.25	cobble/gravel	hard

SEGMENT: 61 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	639071	5537732	drain pipe
Right Bank	639113	5537716	drain pipe
Right Bank	639271	5538062	drain pipe with gate
Right Bank	639155	5537919	drain pipe with gate
Right Bank	639377	5538119	drain pipe with gate
Right Bank	639662	5538545	drain pipe with gate
Left Bank	638693	5536611	culvert
Left Bank	638866	5537090	mud, cobble/rip-rap at bridge
Left Bank	638733	5536813	culvert
Left Bank	639193	5537983	pipe

Right Bank -mud; some cobble; 6 drain pipes; deadfall; trees; Yacht Club dock; no erosion

Left Bank -mud; cobble/rip-rap; deadfall; boat launch; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 62 Start UTM 0639740E 5538787N

End UTM 0640340E 5539436N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0639937E 5539130N

End UTM 0639778E 5539221N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.84	0.366	boulders/rip-rap	hard
Center	3.08	0.330	sand/boulders	hard
Right	2.39	0.369	sand/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
62.1	L	0639746	5538541	4.00	sand/gravel	medium
62.1	C	0639703	5538514	5.50	clay	hard
62.1	R	0639633	5538513	4.00	sand/cobble/gravel	hard
62.2	L	0639784	5538887	3.50	cobble/gravel	hard
62.2	C	0639752	5538896	5.25	clay/sand	hard
62.2	R	0639673	5538906	6.25	clay	soft
62.3	L	0639946	5539150	3.00	gravel	hard
62.3	C	0639929	5539201	3.75	sand/boulders	hard
62.3	R	0639821	5539182	2.50	cobble	hard
62.4	L	0640269	5539372	3.00	clay	soft
62.4	C	0640232	5539460	4.00	clay	medium
62.4	R	0640227	5539545	2.50	cobble/gravel	hard

SEGMENT: 62 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0669967	5539280	rip-rap
Left Bank	0640156	5539525	drain ditch

Right Bank -mud; cobble; sparsely treed; little erosion

Left Bank -mud; rip-rap; cobble; drain ditch; some trees; dock; log jam; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 63 Start UTM 0640340E 5539436N

End UTM 0640351E 5541754N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0640516E 5540494N

End UTM 0640397E 5540515N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.04	0.360	cobble/boulders	hard
Center	3.61	0.304	cobble/boulders	hard
Right	3.14	0.417	sand	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
63.1	L	0640519	5539522	3.25	cobble/gravel	hard
63.1	C	0640426	5539467	3.50	cobble/gravel	hard
63.1	R	0640336	5539529	3.00	cobble/gravel	hard
63.2	L	0640552	5540226	3.00	cobble/gravel	hard
63.2	C	0640493	5540235	4.75	sand/gravel	hard
63.2	R	0640466	5540245	3.00	clay/sand	medium
63.3	L	0640492	5540906	2.50	cobble/gravel	hard
63.3	C	0640406	5540972	3.25	gravel	hard
63.3	R	0640316	5540979	4.00	cobble/gravel	hard
63.4	L	0640406	5541355	3.25	cobble/boulders	hard
63.4	C	0640318	5541378	3.50	sand	hard
63.4	R	0640231	5541350	3.00	clay/gravel	medium

SEGMENT: 63 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0640609	5539970	culvert (rip-rap)
Left Bank	0640561	5540243	culvert (rip-rap)
Left Bank	0640592	5540040	rip-rap bank begins
Left Bank	0640586	5540175	rip-rap bank ends

Right Bank -mud; scrub; cobble; dock; no erosion

Left Bank -mud; rip-rap; gravel; 2 culverts; deadfall; tire pile; little erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 64 Start UTM 0640351E 5541754N

End UTM 0640587E 5542657N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0640273E 5542363N

End UTM 0640171E 5542344N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.50	0.675	boulders/rip-rap	hard
Center	2.76	0.524	boulders/rip-rap	hard
Right	2.03	0.509	boulders/rip-rap	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
64.1	L	0640431	5541642	1.75	clay/gravel/boulders	hard
64.1	C	0640335	5541654	4.00	sand/boulders	hard
64.1	R	0640264	5541649	1.75	clay	hard
64.2	L	0640360	5542082	2.75	clay/cobble	hard
64.2	C	0640314	5542000	4.00	cobble/boulders	hard
64.2	R	0640194	5542059	3.00	sand/gravel	hard
64.3	L	0640333	5542445	3.25	cobble	hard
64.3	C	0640293	5542486	3.50	cobble	hard
64.3	R	0640287	5542607	3.00	cobble/gravel	hard
64.4	L	0640543	5542468	3.00	cobble/gravel	hard
64.4	C	0640497	554276	3.50	boulders	hard
64.4	R	0640428	5542790	1.50	cobble/boulders	hard

SEGMENT: 64 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; cobble/boulders; some trees; little erosion
-------------------	---

Left Bank	-gravel; boulders; trees; little erosion
------------------	--

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 65 Start UTM 0640587E 5542657N
 End UTM 0641089E 5543681N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0641015E 5543337N
 End UTM 0640855E 5543405N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.60	0.596	boulders/cobble	hard
Center	1.87	0.502	sand/cobble/boulders	hard
Right	1.56	0.547	sand/cobble	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
65.1	L	0640684	5542790	3.00	cobble/gravel	hard
65.1	C	0640678	5542781	3.00	cobble/gravel	hard
65.1	R	0640600	5542836	1.50	gravel	hard
65.2	L	0640803	5542896	1.50	cobble/gravel	hard
65.2	C	0640740	5542886	3.25	cobble	hard
65.2	R	0640677	5542925	1.75	cobble	hard
65.3	L	0640940	5543113	2.00	cobble/gravel	hard
65.3	C	0640878	5543152	3.00	cobble/boulders	hard
65.3	R	0640826	5543196	2.50	gravel	hard
65.4	L	0641113	5543476	3.00	clay/gravel	hard
65.4	C	0641034	5543519	3.50	sand/gravel	hard
65.4	R	0640918	5543604	3.00	clay/gravel	medium

SEGMENT: 65 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-cobble/shale/boulders; mud; rip-rap; no erosion
-------------------	--

Left Bank	-cobble/boulders; gravel/mud; boat launch; little erosion
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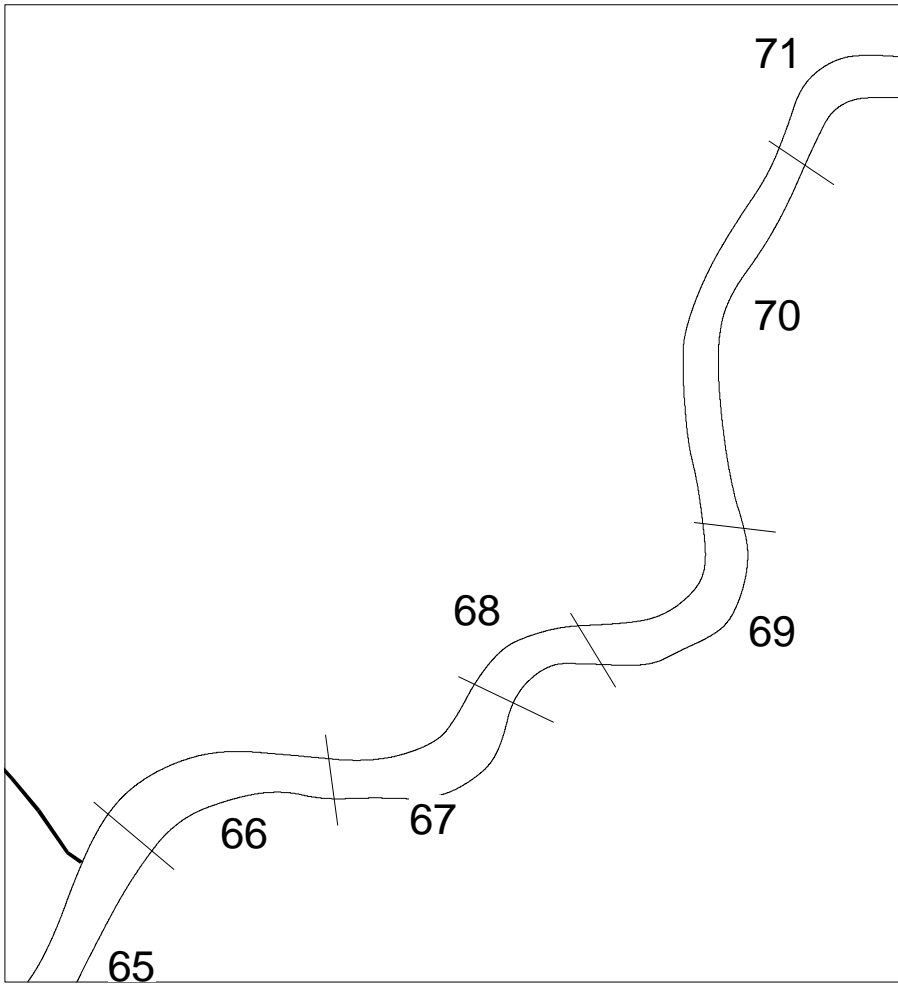


Figure 17. Red River segments 66-70.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 66 Start UTM 0641089E
 End UTM 0641977E 5543930N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0641538E 5543888N
 End UTM 0641511E 5544018N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.42	0.616	cobble/boulders	hard
Center	2.22	0.554	cobble/boulders	hard
Right	1.73	0.553	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
66.1	L	0641282	5543730	1.75	clay/gravel	hard
66.1	C	0641227	5543790	3.00	sand/coble/boulders	hard
66.1	R	0641146	5543875	2.75	clay/sand	medium
66.2	L	0641489	5543853	2.50	cobble/gravel	hard
66.2	C	0641459	5543927	3.75	cobble/gravel/boulders	hard
66.2	R	0641404	5544028	3.50	sand/cobble/gravel	hard
66.3	L	0641630	5543899	2.00	sand/gravel	hard
66.3	C	0641647	5543970	3.75	sand/cobble/gravel	hard
66.3	R	0641640	5544088	2.75	clay/gravel	hard
66.4	L	0641844	5543861	2.25	cobble/gravel	hard
66.4	C	0641873	5544014	2.50	cobble boulders	hard
66.4	R	0641903	5544048	2.75	clay/cobble	hard

SEGMENT: 66 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud; cobble; rip-rap; rock harbour; no erosion

Left Bank -mud; gravel; cobble; rip-rap; concrete wall; little erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 67 Start UTM 0641977E 5543930N

End UTM 0642875E 5544006N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0642715E 5543896N

End UTM 0642682E 5543979N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.54	0.815	cobble/boulders	hard
Center	1.79	0.621	cobble/boulders	hard
Right	1.63	0.805	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
67.1	L	641994	5543873	2.50	cobble/boulders	hard
67.1	C	642003	5543918	3.25	boulders	hard
67.1	R	642003	5543983	3.50	boulders	hard
67.2	L	642349	5543839	3.25	cobble/boulders	hard
67.2	C	642361	5543931	3.25	cobble/boulders	hard
67.2	R	642333	5543980	2.75	cobble/boulders	hard
67.3	L	642680	5543850	2.75	cobble/boulders	hard
67.3	C	642675	5543900	3.25	cobble/boulders	hard
67.3	R	642596	5543942	2.50	cobble/gravel	hard
67.4	L	642998	5544059	2.75	sand/cobble/gravel	hard
67.4	C	642935	5544169	2.75	boulders	hard
67.4	R	642881	5544257	1.50	sand/cobble/gravel	hard

SEGMENT: 67 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0642386	5543896	culvert
Right Bank	0642827	5543964	culvert

Right Bank -rip-rap; 2 culverts

Left Bank -cobble; rip-rap; some mud; boulderss

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 68 Start UTM 0642875E 5544006N

End UTM 0643526E 5544624N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0643299E 5544525N

End UTM 0643241E 5544632N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.16	0.830	cobble/gravel	hard
Center	2.58	0.636	cobble/boulders	hard
Right	1.80	0.642	boulders/rip-rap	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
68.1	L	0643192	5544479	3.00	cobble/gravel	hard
68.1	C	064315	5544521	3.00	cobble/gravel	hard
68.1	R	0643095	5544519	2.50	sand/gravel	medium
68.2	L	0643148	5544468	2.75	boulders	hard
68.2	C	0643105	5544569	3.25	boulders	hard
68.2	R	0643094	5544648	2.75	cobble/boulders	hard
68.3	L	0643316	5544603	3.50	cobble/boulders	hard
68.3	C	0643323	5544662	3.75	cobble	hard
68.3	R	0643283	5544721	3.00	cobble	hard
68.4	L	0643331	5544590	3.25	cobble/boulders	hard
68.4	C	0643309	5544628	3.50	boulders	hard
68.4	R	0643296	5544674	3.25	cobble/gravel/boulders	hard

SEGMENT: 68 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0643297	5544665	culvert

Right Bank -rip-rap; mud; culvert; no erosion

Left Bank -cobble; mud; boulderss; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 69 Start UTM 0643526E 5544624N

End UTM 0644140E 5545205N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0644158E 5544793N

End UTM 0644105E 5544887N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.65	0.608	cobble/boulders	hard
Center	3.32	0.664	cobble/boulders	hard
Right	2.10	0.882	boulders/rip-rap	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
69.1	L	0643424	5544571	3.00	cobble/gravel/boulders	hard
69.1	C	0643410	5544631	3.00	boulders	hard
69.1	R	0643374	5544713	2.50	cobble/boulders	hard
69.2	L	0643535	5544559	2.00	gravel	hard
69.2	C	0643516	5544615	3.00	boulders	hard
69.2	R	0643510	5544684	1.75	cobble	hard
69.3	L	0643996	5544649	3.25	cobble	hard
69.3	C	0643954	5544717	3.75	sand/cobble	hard
69.3	R	0643911	5544758	1.50	sand/cobble/gravel	hard
69.4	L	0644216	5544938	3.00	cobble	hard
69.4	C	0644120	5544988	3.50	boulders	hard
69.4	R	0644098	5544995	3.00	cobble/gravel	hard

SEGMENT: 69 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0644085	5544834	drainage ditch
Left Bank	0644147	5544861	ditch

Right Bank -cobble; mud; drainage ditch; rock harbour; little erosion

Left Bank -mud; cobble; ditch; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 70 Start UTM 0644140E 5545205N

End UTM 0644601E 5547203N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0644292E 5545205N

End UTM 0644601E 5546632N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.04	0.573	cobble/boulders	hard
Center	2.61	0.688	cobble/boulders	hard
Right	3.24	0.478	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
70.1	L	0644288	5545184	2.75	cobble/boulders	hard
70.1	C	0644266	5545168	3.50	cobble	hard
70.1	R	0644207	5545190	1.75	cobble	hard
70.2	L	0644194	5545599	2.75	cobble	hard
70.2	C	0644069	5545555	3.50	cobble	hard
70.2	R	0643991	5545598	1.75	sand/gravel	medium
70.3	L	0644117	5546132	3.75	cobble/gravel	hard
70.3	C	0644068	5546124	4.00	cobble/gravel	hard
70.3	R	0644988	5546125	3.50	cobble/boulders	hard
70.4	L	0644304	5546533	2.50	sand/gravel	hard
70.4	C	0644279	5546591	3.75	cobble	hard
70.4	R	0644161	5546617	4.75	cobble	hard

SEGMENT: 70 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0644354	5546883	culvert

Right Bank -mud; rip-rap; culvert; no erosion

Left Bank -cobble; mud; boulders; poured concrete; no erosion

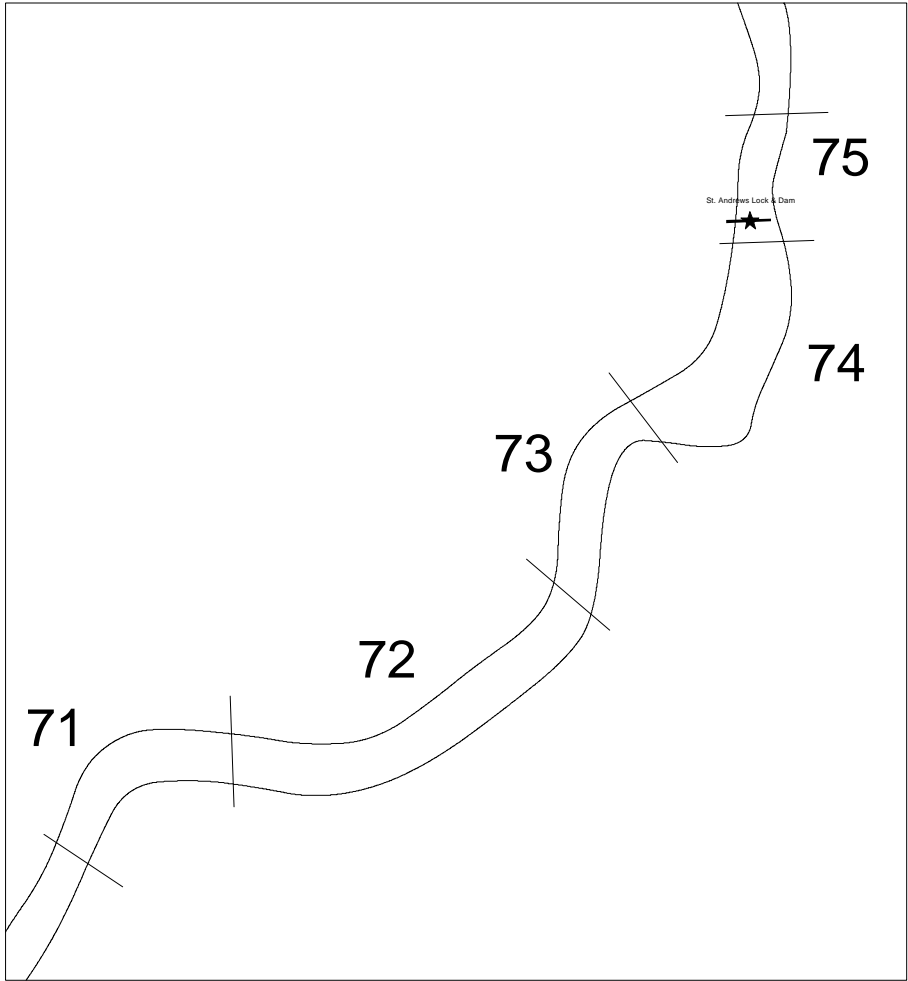


Figure 18. Red River segments 71-75.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 71 Start UTM 0644601E 5547203N

End UTM 0645388E 5547545N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0644954E 5547550N

End UTM 0644962E 5547607N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.91	0.519	cobble/boulders	hard
Center	2.96	0.483	cobble/boulders	hard
Right	3.21	0.456	boulders/rip-rap	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
71.1	L	0644594	5547110	3.50	cobble/gravel	hard
71.1	C	0644492	5547136	4.00	cobble/boulders	hard
71.1	R	0644447	5547080	3.50	cobble	hard
71.2	L	0644642	5547218	3.00	cobble/gravel	hard
71.2	C	0644620	5547334	4.00	cobble/gravel	hard
71.2	R	0644566	5547340	4.00	cobble/gravel	hard
71.3	L	0644949	5547503	2.50	cobble	hard
71.3	C	0644906	5547674	4.00	clay/cobble/boulders	hard
71.3	R	0644865	5547749	3.75	gravel	hard
71.4	L	0645188	5547548	2.00	cobble	hard
71.4	C	0645205	5547565	4.00	cobble/boulders	hard
71.4	R	0645211	5547632	2.50	cobble/gravel	hard

SEGMENT: 71 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -rip-rap; no erosion

Left Bank -mud; sand; rip-rap; cobble; culvert; little erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 72 Start UTM 0645388E 5547545N

End UTM 0646629E 5548333N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0646313E 5547888N

End UTM 0646222E 55479378N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.61	0.413	sand/cobble/boulders	hard
Center	3.21	0.481	cobble/boulders	hard
Right	3.00	0.312	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
72.1	L	0645330	5547399	2.50	sand/gravel	hard
72.1	C	0645352	5547472	3.00	boulders	hard
72.1	R	0645390	5547544	2.25	cobble/boulders	hard
72.2	L	0646072	5547554	3.25	cobble/gravel	hard
72.2	C	0646059	5547611	4.25	sand/boulders	hard
72.2	R	0646970	5547745	2.25	cobble/boulders	hard
72.3	L	0646215	5547762	3.50	cobble/boulders	hard
72.3	C	0646219	5547813	4.25	cobble/boulders	hard
72.3	R	0646113	5547848	3.25	cobble	hard
72.4	L	0646479	5547910	3.50	cobble	hard
72.4	C	0646414	5547969	4.50	clay/cobble	hard
72.4	R	0646374	5548005	4.00	sand/cobble/gravel	hard

SEGMENT: 72 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0645808	5547601	culvert

Right Bank -mud; rip-rap; sand; cobble; culvert; no erosion

Left Bank -mud; cobble; rip-rap; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 73 Start UTM 0646629E 5548333N

End UTM 0647153E 5549124N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0646910E 5548977N

End UTM 0646884E 5548989N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.21	0.310	cobble/boulders	hard
Center	4.57	0.292	gravel/cobble	medium
Right	3.97	0.295	cobble/boulders	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
73.1	L	0646593	5548021	4.00	cobble/gravel	hard
73.1	C	0646578	5548060	4.25	cobble/boulders	hard
73.1	R	0646474	5548101	3.50	cobble	hard
73.2	L	0646756	5548239	4.00	cobble/gravel	hard
73.2	C	0646673	5548269	4.50	sand/boulders	hard
73.2	R	0646607	5548287	2.50	sand/cobble/gravel	hard
73.3	L	0646783	5548473	4.75	cobble	hard
73.3	C	0646655	5548558	4.50	sand/gravel	hard
73.3	R	0646641	5548567	2.75	sand/gravel	hard
73.4	L	0646850	5548781	3.00	sand/cobble/gravel	hard
73.4	C	0646736	5548830	4.75	sand/cobble/gravel	hard
73.4	R	0646685	5548904	3.00	clay	soft

SEGMENT: 73 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0646673	5548595	road culvert
Right Bank	0647153	5549124	road culvert

Right Bank -mud; rip-rap; sand; 2 culverts; no erosion

Left Bank -cobble/rip-rap; mud; 1 overhanging tree; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 74 Start UTM 0647153E 5549124N

End UTM Lockport

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 02 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0647560E 5549425N

End UTM 0647504E 5549533N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.54	0.383	gravel	hard
Center	4.70	0.409	gravel/coble	hard
Right	4.76	0.270	gravel	hard

HABITAT SURVEY II

Date 07 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
74.1	L	0646927	5548967	1.75	sand/gravel	hard
74.1	C	0646895	5548999	5.00	sand/boulders	hard
74.1	R	0646838	5549040	4.75	sand/cobble/boulders	hard
74.2	L	0647166	5549012	1.75	clay	soft
74.2	C	0647138	5549086	5.00	clay/boulders	hard
74.2	R	0647112	5549161	3.00	cobble	hard
74.3	L	0647538	5549364	4.25	clay	soft
74.3	C	0647467	5549401	6.25	clay/sand	hard
74.3	R	0647439	5549426	3.00	cobble	hard
74.4	L	0647574	5549641	3.25	cobble/boulders	hard
74.4	C	0647553	5549636	6.00	clay	hard
74.4	R			4.75	clay	hard

SEGMENT: 74 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-cobble; mud/rip-rap; no erosion
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Left Bank	-mud; cobble; sand; wetland sedges; drainage ditch
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 75 Start UTM Lockport Bridge

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0647386E 5550351N

End UTM 0647524E 5550336N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.10	0.302	gravel/cobble	hard
Center	4.54	0.393	gravel/cobble	hard
Right	3.78	0.398	gravel/cobble	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
75.1	L	0647522	5549998	1.00	boulders	hard
75.1	C	0647495	5549953	4.50	boulders	hard
75.1	R	0647458	5549894	2.50	boulders	hard
75.2	L	0647533	5549990	1.75	cobble/boulders	hard
75.2	C	0647459	5550000	3.25	clay/sand/boulders	hard
75.2	R	0647355	5549980	4.75	clay/sand	hard
75.3	L	0647527	5550154	2.75	cobble/gravel	hard
75.3	C	0647478	5550176	4.75	sand/gravel	hard
75.3	R	0647404	5550187	4.50	cobble/boulders	hard
75.4	L	0647555	5550336	3.00	cobble/gravel	hard
75.4	C	0647516	5550356	5.00	cobble/boulders	hard
75.4	R	0647423	5550339	2.75	cobble/boulders	hard

SEGMENT: 75 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-rip-rap; cobble/boulders; little erosion
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Left Bank	-rip-rap; cobble/boulders; no erosion
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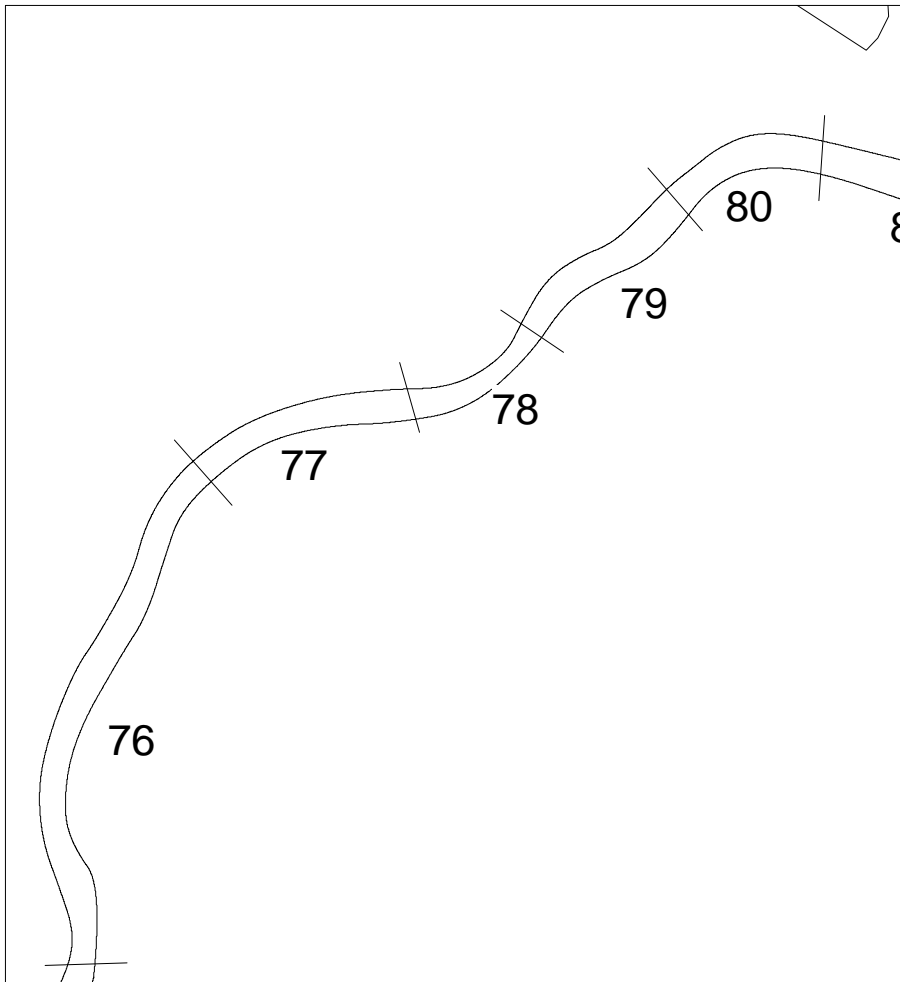


Figure 19. Red River segments 76-80.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 76 Start UTM 0647473E 5550559N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0647671E 5551870N

End UTM 0647596E 5551965N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.54	0.294	sand/gravel	medium
Center	3.02	0.285	sand/gravel	medium
Right	4.37	0.433	cobble/boulders	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
76.1	L	0647526	5550507	4.75	cobble/boulders	hard
76.1	C	0647563	5550424	5.00	clay/boulders	hard
76.1	R	0647536	5550414	2.75	cobble/gravel	hard
76.2	L	0647432	5551301	4.00	cobble/boulders	hard
76.2	C	0647318	5551307	5.50	clay/boulders	hard
76.2	R	0647332	5551308	4.00	clay/cobble	hard
76.3	L	0647669	5551981	2.00	gravel	hard
76.3	C	0647594	5552013	4.50	cobble/boulders	hard
76.3	R	0647582	5552035	5.00	clay/boulders	hard
76.4	L	0647941	5552407	3.00	cobble/gravel/boulders	hard
76.4	C	0647892	5552404	5.50	clay/boulders	hard
76.4	R	0647843	5552386	4.50	cobble/boulders	hard

SEGMENT: 76 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -cobble/rip-rap; mud; gravel; sand; grass; some erosion

Left Bank -cobble/rip-rap; gravel; mud; grass/bushes; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 77 Start UTM 0648159E 5552867N

End UTM 0649594E 5553506N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0648547E 5553134N

End UTM 0648530E 5553506N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.27	0.265	boulders	hard
Center	3.19	0.197	cobble/boulders	hard
Right	5.00	0.362	cobble	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
77.1	L	0648031	5552658	4.50	cobble/gravel/boulders	hard
77.1	C	0647975	5552703	6.00	clay/boulders	hard
77.1	R	0647927	5552725	4.50	cobble/boulders	hard
77.2	L	0648198	5552856	4.50	cobble/boulders	hard
77.2	C	0648179	5552864	6.25	cobble/boulders	hard
77.2	R	0648138	5552897	5.00	boulders	hard
77.3	L	0648457	5553125	3.00	cobble/gravel	hard
77.3	C	0648405	5553197	5.00	cobble/boulders	hard
77.3	R	0648363	5553235	4.50	cobble/boulders	hard
77.4	L	0648943	5553285	1.50	cobble/boulders	hard
77.4	C	0648914	5553355	3.25	cobble/boulders	hard
77.4	R	0648890	5553446	4.75	boulders	hard

SEGMENT: 77 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-rip-rap; scrub; boulders; grass; some erosion
-------------------	--

Left Bank	-mud; grass; boulders; boat launch; little erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 78 Start UTM 0649594E 5553506N

End UTM 0649864E 5553692N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0649787E 5553405N

End UTM 0649771E 5553481N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.34	0.233	cobble	hard
Center	5.60	0.243	cobble	hard
Right	2.92	0.170	cobble/boulders	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
78.1	L	0649239	5553343	2.00	gravel	hard
78.1	C	0649225	5553386	4.00	cobble/boulders	hard
78.1	R	0649199	5553454	3.75	gravel	hard
78.2	L	0649478	5553283	2.50	cobble/gravel	hard
78.2	C	0649454	5553376	5.00	clay/cobble	hard
78.2	R	0649442	5553454	2.75	cobble/gravel	hard
78.3	L	0649804	5553409	4.50	clay/cobble	hard
78.3	C	0649766	5553458	5.50	clay/cobble	hard
78.3	R	0649712	6663517	3.00	cobble/boulders	hard
78.4	L	0649961	5553626	4.25	cobble/boulders	hard
78.4	C	0649909	5553662	6.00	cobble/boulders	hard
78.4	R	0649839	5553686	3.00	cobble/gravel	hard

SEGMENT: 78 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -mud/gravel; grass; rip-rap; trees; some erosion

Left Bank -rip-rap; grass; boulders; no erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 79 Start UTM 0649864E 5553692N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0650248E 5554045N

End UTM 0650255E 5554094N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.31	0.122	cobble/gravel	hard
Center	5.50	0.171	cobble	hard
Right	5.60	0.341	cobble/sand	medium

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
79.1	L	0649957	5553722	4.00	cobble/gravel/boulders	hard
79.1	C	0649926	5553748	5.25	clay/gravel	hard
79.1	R	0649908	5553764	3.00	sand/boulders	hard
79.2	L	0650078	5553941	3.00	cobble/gravel/boulders	hard
79.2	C	0650004	5553997	6.00	clay/cobble	hard
79.2	R	0649940	5554070	5.50	clay	soft
79.3	L	0650413	5554084	3.00	clay	soft
79.3	C	0650419	5554113	6.50	clay	hard
79.3	R	0650401	5554138	3.00	cobble/boulders	hard
79.4	L	0650728	5554107	4.50	clay	soft
79.4	C	0650637	5554217	6.75	clay	hard
79.4	R	0650589	5554306	3.00	gravel	hard

SEGMENT: 79 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; boulders; cobble; grass; erosion
-------------------	--

Left Bank	-mud; boulders; grass; erosion
------------------	--------------------------------

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 80 Start UTM 0650637E 5554315N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0650910E 5554000N

End UTM 0650839E 5554516N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.40	0.201	cobble	hard
Center	5.70	0.197	cobble/gravel	hard
Right	5.10	0.256	gravel/cobble	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
80.1	L	0650846	5554402	4.50	cobble	hard
80.1	C	0650804	5554430	5.75	cobble/boulders	hard
80.1	R	0650719	5554467	3.25	clay	soft
80.2	L	0650940	5554517	4.25	cobble/gravel/boulders	hard
80.2	C	0650910	5554566	7.00	clay	hard
80.2	R	0650848	5554618	5.25	clay/boulders	hard
80.3	L	0651143	5554552	3.00	gravel	hard
80.3	C	0651124	5554647	6.50	boulders	hard
80.3	R	0651113	5554727	4.50	cobble/gravel	hard
80.4	L	0651249	5554702	2.25	sand/boulders	hard
80.4	C	0651280	5554758	7.50	clay/boulders	hard
80.4	R	0651306	5554784	5.00	cobble/boulders	hard

SEGMENT: 80 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0650748	5554479	drainage ditch
Right Bank	0650940	5554578	storm drain
Right Bank	0651043	5554709	storm drain

Right Bank -rip-rap; grass; scrub; boulders; mud; some erosion

Left Bank -cobble; boulders; grass; few trees; some erosion

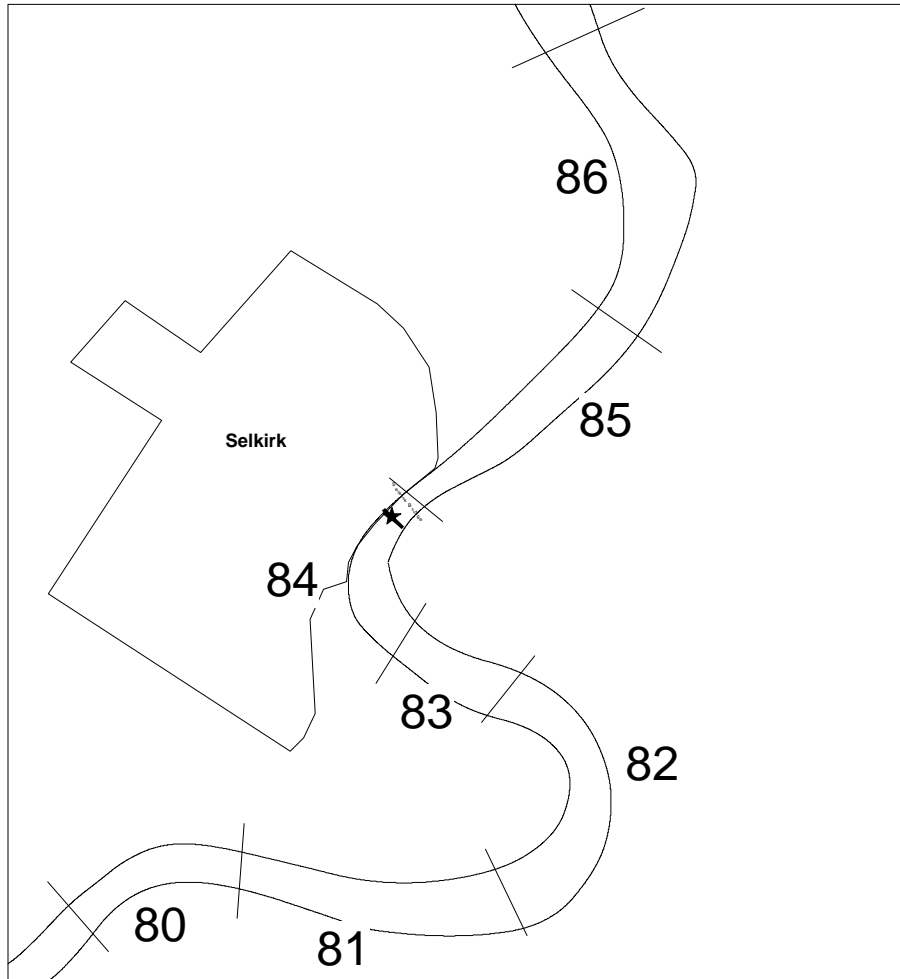


Figure 20. Red River segments 80-86.

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 81 Start UTM 0651215E 5554784N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0651632E 5554583N

End UTM 0651630E 5554691N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.00	0.247	sand	medium
Center	4.90	0.213	sand/cobble	hard
Right	6.00	0.175	cobble	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
81.1	L	0651594	5554594	2.25	clay	medium
81.1	C	0651607	5554679	4.50	clay/boulders	hard
81.1	R	0651582	5554728	5.00	sand	hard
81.2	L	0651792	5554491	2.25	sand	medium
81.2	C	0651805	5554582	4.50	clay/boulders	hard
81.2	R	0651808	5554704	4.75	cobble/gravel	hard
81.3	L	0652121	5554522	4.00	gravel	hard
81.3	C	0652109	5554541	5.00	clay	hard
81.3	R	0652118	5554624	4.25	cobble/gravel	hard
81.4	L	0652291	5554419	4.50	clay/gravel	hard
81.4	C	0652290	5554452	5.50	clay	hard
81.4	R	0652295	5554587	4.00	clay/cobble	hard

SEGMENT: 81 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-rip-rap; cobble/boulders; grass; little erosion
-------------------	--

Left Bank	-mud; scrub/grass; inlet; erosion
------------------	-----------------------------------

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 82 Start UTM 0652163E 5554609N

End UTM 0653050E 5555303N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0653054E 5554520N

End UTM 0652958E 5554643N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.69	0.188	mud	medium
Center	5.00	0.210	gravel	medium
Right	3.89	0.230	mud	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
82.1	L	0652596	5554386	4.25	clay/gravel	medium
82.1	C	0652539	5554390	5.50	clay/cobble/boulders	hard
82.1	R	0652564	5554538	4.25	clay	medium
82.2	L	0653214	5554629	4.00	clay	medium
82.2	C	0653098	5554611	4.25	clay	hard
82.2	R	0653022	5554746	4.00	gravel	hard
82.3	L	0653342	5554934	4.00	gravel	hard
82.3	C	0653293	5554886	4.50	clay/gravel	hard
82.3	R	0653200	5554916	4.00	clay/gravel	hard
82.4	L	0653310	5555309	3.50	clay/gravel	medium
82.4	C	0653240	5555218	6.25	clay	hard
82.4	R	0653163	5555148	4.50	clay	soft

SEGMENT: 82 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-rip-rap; scrub/trees; grass; erosion
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Left Bank	-mud; grass; trees; gravel/cobble; boulders; erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 83 Start UTM 0653050E 5555303N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0652840E 5555676N

End UTM 0652765E 5555507N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	4.31	0.174	cobble	hard
Center	4.36	0.192	cobble	hard
Right	3.82	0.272	cobble/gravel	hard

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
83.1	L	0652912	5555570	3.75	clay/gravel	medium
83.1	C	0652874	5555482	4.75	gravel	hard
83.1	R	0652841	5555410	3.75	sand	medium
83.2	L	0652808	5555609	3.25	clay/sand	medium
83.2	C	0652786	5555545	5.00	clay/gravel	hard
83.2	R	0652792	5555492	3.25	clay/sand	medium
83.3	L	0652674	5555751	2.50	clay	medium
83.3	C	0652606	5555602	5.50	clay/gravel	hard
83.3	R	0652585	5555525	3.50	clay/sand	medium
83.4	L	0652507	5555748	2.25	clay	medium
83.4	C	0652458	5555663	5.50	clay	hard
83.4	R	0652441	5555590	3.50	clay	soft

SEGMENT: 83 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-mud; scrub/trees; erosion
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Left Bank	-steep mud cliffs; erosion
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 84 Start UTM 0652461E 5555731N

End UTM E N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0652200E 5555888N

End UTM 0652143E 5555758N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	6.40	0.516	cobble	hard
Center	5.40	0.212	cobble/gravel	hard
Right	5.40	0.170	cobble/mud	medium

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
84.1	L	0652331	5555852	2.50	clay	medium
84.1	C	0652272	5555821	6.25	clay	hard
84.	R	0652225	5555760	5.00	clay	hard
84.2	L	0652247	5555944	4.00	sand/gravel	hard
84.2	C	0652154	5555916	6.50	clay/boulders	hard
84.2	R	0652114	5555876	5.00	clay	soft
84.3	L	0652252	5556006	3.75	sand/gravel	medium
84.3	C	0652182	5556014	8.00	clay	hard
84.3	R	0652057	5556082	5.50	clay	hard
84.4	L	0652205	5556136	2.25	cobble/gravel	hard
84.4	C	0652159	5556188	9.00	clay	hard
84.4	R	0652099	5556245	3.50	cobble/gravel	hard

SEGMENT: 84 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0652077	5555959	drain

Right Bank -mud; rip-rap; scrub/trees; grass; little erosion

Left Bank -mud; grass/scrub; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 85 Start UTM 0652223E 5556358N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0652755E 5556663N

End UTM 0652699E 5556761N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	3.25	0.176	mud/sand	medium
Center	6.65	0.685	mud	medium
Right	6.60	0.207	mud	medium

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
85.1	L	0652307	5556328	5.50	clay	soft
85.1	C	0652283	5556376	6.50	clay/cobble/gravel	hard
85.1	R	0652254	5556376	4.50	clay/cobble	hard
85.2	L	0652613	5556488	3.75	clay	soft
85.2	C	0652558	5556499	6.50	sand	hard
85.2	R	0652578	5556634	5.25	clay	soft
85.3	L	0652903	5556713	4.00	clay	soft
85.3	C	0652809	5556708	6.50	gravel	hard
85.3	R	0652773	5556795	4.25	clay	medium
85.4	L	0653161	5556894	3.50	clay	medium
85.4	C	0653076	5556917	6.50	clay	soft
85.4	R	0653025	5557011	3.50	clay/gravel/boulders	hard

SEGMENT: 85 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0652688	5556769	drain

Right Bank -some rip-rap; inlet; dock; boat launch; drain; bushes; little erosion

Left Bank -mud; scrub/gras; willow; some erosion

RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 86 Start UTM 0653309E 5557243N

End UTM _____

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 10 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0653703E 5557913N

End UTM 0653524E 5557865N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.00	0.237	mud	medium
Center	2.77		mud	medium
Right	4.65	0.199	mud	soft

HABITAT SURVEY II

Date 09 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
86.1	L	0653307	5557022	2.75	clay	medium
86.1	C	0653240	5557047	6.75	clay	soft
86.1	R	0653190	5557141	4.00	clay	soft
86.2	L	0653537	5557262	4.00	clay	medium
86.2	C	0653453	5557208		clay/boulders	hard
86.2	R	0653377	5557393	3.50	clay	soft
86.3	L	0653703	5557754	4.00	clay	medium
86.3	C	0653602	5557773	5.00	clay	medium
86.3	R	0653494	5557816	2.75	clay	soft
86.4	L	0653447	5557393	4.75	clay	medium
86.4	C	0653336	5558362	6.00	clay	soft
86.4	R	0653228	5558348	5.00	clay	medium

SEGMENT: 86 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank -grass; brush/scrub; some erosion

Left Bank -mud; grass; brush; erosion

3.2 ASSINIBOINE RIVER (Segments 101-130)

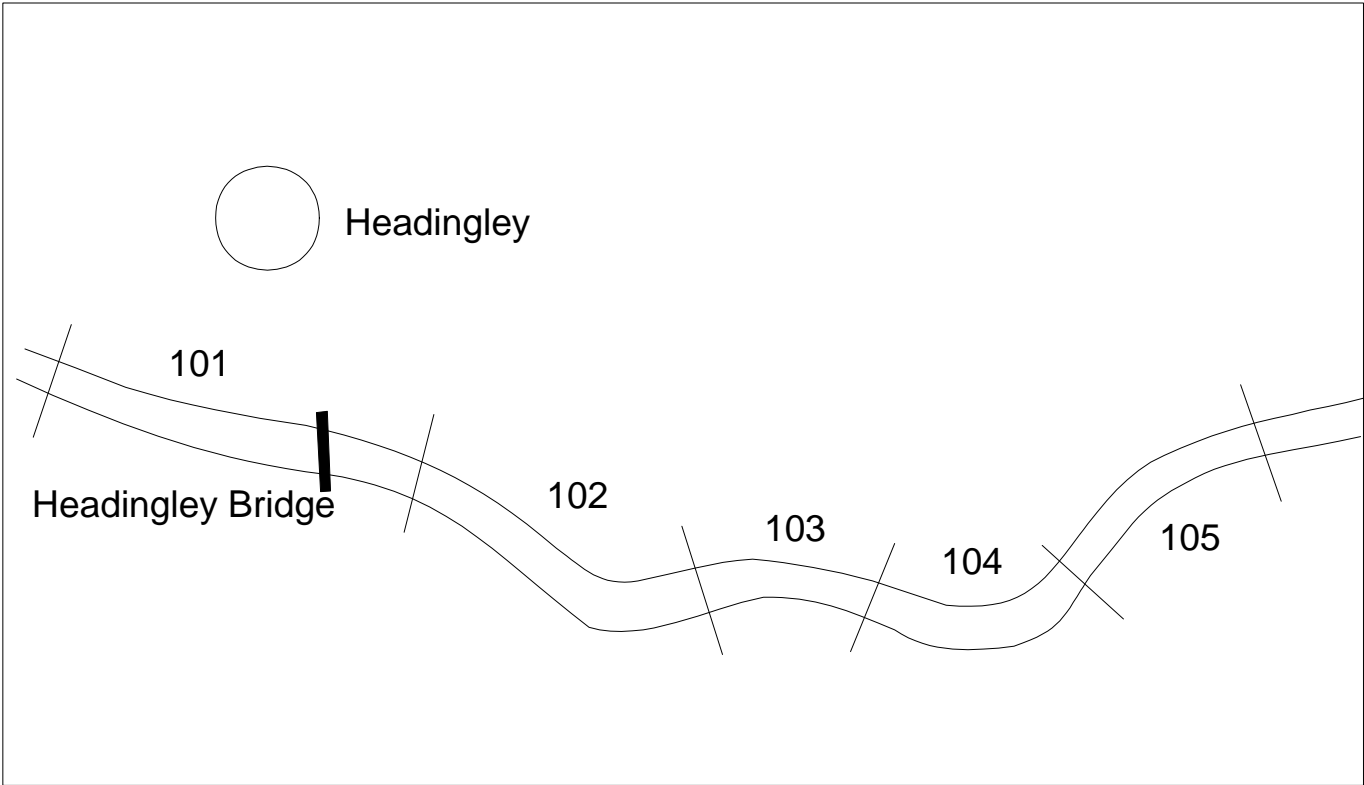


Figure 21. Assiniboine River segments 101 - 105.

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 101 Start UTM 0613962E 5525137N

End UTM 0614886E 5524882N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0614389E 5524993N

End UTM 0614368E 5525132N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.19	0.281	mud	hard
Center	1.53	0.297	mud	hard
Right	1.97	0.352	sand/gravel	hard

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
101.1	L	0613707	5525194	3.00	mud	medium
101.1	C	0613691	5525252	4.00	mud	medium
101.1	R	0613725	5525293	4.00	mud	medium
101.2	L	0614085	5525172	3.00	mud	medium
101.2	C	0614044	5525183	3.00	mud	medium
101.2	R	0614082	5525159	3.75	sand/gravel	medium
101.3	L	0614446	5525055	3.00	clay/gravel	hard
101.3	C	0614447	5525093	2.50	clay/boulder	hard
101.3	R	0614449	5525127	3.90	clay/sand	medium
101.4	L	0614740	5525031	3.50	sand/gravel	hard
101.4	C	0614733	5525070	3.00	clay/gravel	hard
101.4	R	0614727	5525126	2.20	clay/gravel	hard

SEGMENT: 101 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right Bank	0614656	5524931	culvert - 5 ft diameter - flows into cobble riffle area
Left Bank	0614383	5525132	culvert - new, with rip rap
Bridge			new road bridge
Bridge			old railway bridge

Right Bank	-grass shoreline, no erosion -mud bank between bridges -rip rapped -downstream of bridge shoreline is grassed and semi-stable
-------------------	---

Left Bank	-grass shoreline with mud/sand banks -erosion near culvert at bridge -rip rap between bridges
------------------	---

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 102 Start UTM 0614886E 5524882N

End UTM 0615777E 5524556N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0615326E 5524628N

End UTM 0615344E 5524678N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.97	0.465	sand	medium
Center	1.17	0.487	sand	medium
Right	0.74	0.361	gravel/cobble	hard

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
102.1	L	0615054	5524927	2.30	sand	medium
102.1	C	0615066	5524956	2.60	sand	medium
102.1	R	0615073	5524988	2.70	clay/sand/boulder	hard
102.2	L	0615104	5524224	2.50	sand	medium
102.2	C	0615121	5524840	2.70	sand	medium
102.2	R	0615123	5524874	2.40	sand	medium
102.3	L	0615320	5524733	2.40	sand	medium
102.3	C	0615276	5524751	2.70	sand	medium
102.3	R	0615230	5524760	2.50	clay/sand/boulder	hard
102.4	L	0615380	5524503	2.60	clay/sand/boulder	hard
102.4	C	0615433	5524556	2.50	sand	medium
102.4	R	0615406	5524612	2.70	clay/sand/boulder	hard

SEGMENT: 102 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassed shoreline -stable, no erosion evident
-------------------	---

Left Bank	-mud/sand bank with larger deciduous trees in first half of segment -stable grassy bank along second half of segment
------------------	---

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 103 Start UTM 0615777E 5524556N
 End UTM 0616410E 5524541N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0616200E 5524701N
 End UTM 0616202E 5524696N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.10	0.457	gravel/cobble	hard
Center	1.91	0.446	sand/gravel	hard
Right	1.37	0.515	sand/cobble	hard

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
103.1	L	0615672	5524517	2.30	sand	medium
103.1	C	0615694	5524567	2.40	clay/sand/boulder	hard
103.1	R	0615596	5524602	2.50	sand	medium
103.2	L	0615807	5524592	2.20	clay/sand/boulder	hard
103.2	C	0615790	5524611	2.60	clay/sand/boulder	hard
103.2	R	0615777	5524629	2.20	sand	medium
103.3	L	0616026	5524684	2.30	clay/sand/boulder	hard
103.3	C	0616025	5524715	2.40	clay/boulder	hard
103.3	R	0615983	5524734	2.40	clay/boulder	hard
103.4	L	0616153	5524660	3.00	clay/boulder	hard
103.4	C	0616155	5524685	3.40	clay/boulder	hard
103.4	R	0616172	5524712	2.80	clay/boulder	hard

SEGMENT: 103 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy, stable bank -no riparian cover -some aquatic macrophytes
-------------------	---

Left Bank	-stable grassy shoreline -no cover -some large deciduous trees near downstream end of segment
------------------	---

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 104 Start UTM 0616410E 5524541N

End UTM 0617042E 5524617N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0616861E 5524472N

End UTM 0616841E 5524540N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.00	0.386	cobble	hard
Center	0.99	0.480	cobble	hard
Right	1.10	0.506	cobble/gravel	hard

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
104.1	L	0616305	5524592	2.70	sand	medium
104.1	C	0616315	5524662	3.20	clay/boulder	hard
104.1	R	0616321	5524622	2.70	clay/boulder	hard
104.2	L	0616421	5524623	2.80	clay/boulder	hard
104.2	C	0616438	5524519	3.30	clay/boulder	hard
104.2	R	0616463	5524536	3.20	clay/boulder	hard
104.3	L	0616607	5524561	2.20	clay/sand/boulder	hard
104.3	C	0616616	5524487	3.30	sand	medium
104.3	R	0616600	5524518	3.20	clay/sand/boulder	hard
104.4	L	0616845	5524538	2.00	clay/boulder	hard
104.4	C	0616836	5524514	2.50	clay/sand/boulder	hard
104.4	R	0616851	5524559	2.30	clay/boulder	hard

SEGMENT: 104 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy, muddy shoreline -some large deciduous trees
-------------------	---

Left Bank	-grassy, muddy shoreline -willows along shoreline with roots exposed
------------------	---

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 105 Start UTM 0617042E 5524617N
 End UTM 0617476E 5525032N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0617203E 5524901N
 End UTM 0617173E 5524943N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.52	0.267	cobble/gravel	hard
Center	1.14	0.428	cobble/gravel	hard
Right	0.97	0.303	sand	medium

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
105.1	L	0617150	5524649	2.20	clay/sand/boulder	hard
105.1	C	0617128	5524646	2.50	clay/boulder	hard
105.1	R	0617107	5524653	2.40	sand	medium
105.2	L	0617200	5524733	2.00	clay/sand/boulder	hard
105.2	C	0617155	5524771	3.00	clay/sand/boulder	hard
105.2	R	0617100	5524799	2.40	sand	medium
105.3	L	0617301	5524870	2.20	clay/sand/boulder	hard
105.3	C	0617301	5524878	2.80	clay/sand/boulder	hard
105.3	R	0617249	5524897	2.20	sand	medium
105.4	L	0617288	5524998	2.50	sand	medium
105.4	C	0617286	5525033	3.20	clay/boulder	hard
105.4	R	0617245	5525027	2.80	clay/boulder	hard

SEGMENT: 105 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy, stable bank
-------------------	----------------------

Left Bank	-grassy, stable shoreline -undercut bank at downstream end of segment
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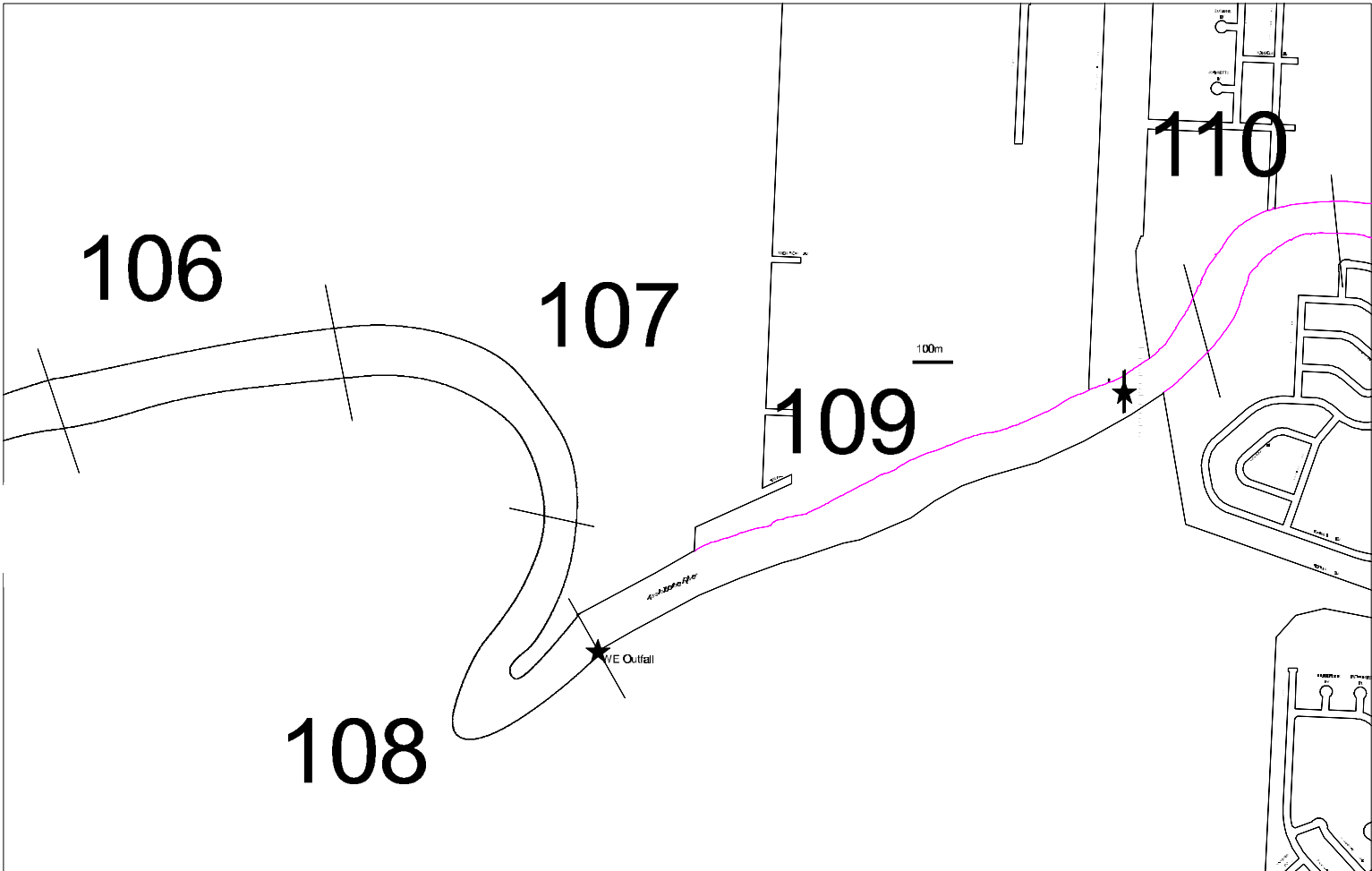


Figure 22. Assiniboine River segments 106-110.

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 106 Start UTM 0617476E 5525032N
 End UTM 0618289E 5525273N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0617852E 5525201N
 End UTM 0617813E 5525216N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.98	0.368	cobble	hard
Center	1.30	0.357	sand	medium
Right	1.11	0.432	cobble	hard

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
106.1	L	0617339	5525040	3.30	clay/boulder	hard
106.1	C	0617357	5525870	3.20	clay/sand/boulder	hard
106.1	R	0617279	5525088	2.60	clay/sand/boulder	hard
106.2	L	0617470	5525057	2.20	clay/boulder	hard
106.2	C	0617468	5525062	2.60	clay/sand/boulder	hard
106.2	R	0617445	5525103	2.40	clay/boulder	hard
106.3	L	0617649	5525088	2.30	clay/sand/boulder	hard
106.3	C	0617655	5525084	2.80	clay/sand/boulder	hard
106.3	R	0617614	5525150	2.50	clay/sand/boulder	hard
106.4	L	0617835	5525154	2.00	clay/boulder	hard
106.4	C	0617813	5525194	2.30	clay/boulder	hard
106.4	R	0617822	5525257	2.40	clay/boulder	hard

SEGMENT: 106 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy shoreline with occasional large woody debris in water
-------------------	---

Left Bank	-mud shoreline with occasional trees/roots
------------------	--

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 107 Start UTM 0618209E 5525273N
 End UTM 0618727E 5524848N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0618672E 5525149N
 End UTM 0618699E 5525225N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.96	0.413	mud	hard
Center	1.13	0.565	mud/cobble	hard
Right	0.86	0.281	gravel/cobble	medium

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
107.1	L	0618139	5525195	2.40	clay/boulder	hard
107.1	C	0618193	5525122	2.10	sand	medium
107.1	R	0618192	5525167	2.50	clay/sand/boulder	hard
107.2	L	0618585	5525169	2.20	gravel	hard
107.2	C	0618575	5525287	2.20	clay/boulder	hard
107.2	R	0618585	5525245	2.10	clay/gravel/boulder	hard
107.3	L	0618695	5525074	2.00	clay/sand/boulder	hard
107.3	C	0618737	5525227	2.70	clay/sand/boulder	hard
107.3	R	0618739	5525243	2.00	clay/gravel/boulder	hard
107.4	L	0618777	5525019	1.80	sand	medium
107.4	C	0618787	5525045	2.30	clay/sand/boulder	medium
107.4	R	0618863	5525022	2.20	sand/gravel	hard

SEGMENT: 107 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy shoreline -very little erosion
-------------------	---

Left Bank	-high eroding mud banks -grass becomes prevalent downstream of island and extends for 75m -some deciduous trees overhanging bank
------------------	--

RIVER: Assiniboine River

Grid Zone 14U, NAD 27

SEGMENT: 108

Start UTM

0618727E

5524848N

End UTM

0618983E

5524619N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0618531E 5524552N
End UTM 0618567E 5524570N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.20	0.384	sand	medium
Center	1.84	0.438	sand/mud	medium
Right	1.86	0.290	mud/gravel	medium

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
108.1	L	0618758	5524898	1.80	sand	medium
108.1	C	0618767	5524924	2.20	clay/sand/boulder	hard
108.1	R	0618819	5524855	2.00	clay/boulder	hard
108.2	L	0618629	5524769	1.60	sand	medium
108.2	C	0618667	5524720	2.20	clay/sand/boulder	hard
108.2	R	0618689	5524679	2.70	clay/sand/boulder	hard
108.3	L	0618524	5524526	2.20	gravel	hard
108.3	C	0618565	5524530	2.50	sand	hard
108.3	R	0618586	5524539	2.40	clay/sand/boulder	hard
108.4	L	0618654	5524416	1.80	clay/sand/boulder	hard
108.4	C	0618658	5524419	2.20	clay/sand/boulder	hard
108.4	R	0618677	5524533	3.00	clay/boulder	hard
108.5	L	0618874	5524429	2.00	clay/boulder	hard
108.5	C	0618859	5524453	1.70	clay/boulder	hard
108.5	R	0618843	5524503	2.10	clay/sand/boulder	hard

SEGMENT: 108 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left Bank	0618983	5524619	COWWEWTP outfall

Right Bank

- grassy shoreline
- little erosion
- exposed boulders on bend point
- sand/mud bank
- some undercutting at downstream end

Left Bank

- grassy shoreline
- little erosion
- some overhanging deciduous trees
- bank eroding at transect
- boulders downstream of transect
- cobble under the hydro line

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 109 Start UTM 0618983E 5524619N
 End UTM 0620340E 5525103N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0619613E 5524915N
 End UTM 0619591E 5524909N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.67	0.387	gravel/cobble	hard
Center	1.02	0.543	gravel/cobble	hard
Right	1.12	0.601	sand/gravel/cobble	hard

HABITAT SURVEY II

Date 08 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
109.1	L	0619030	5524526	1.40	clay/boulder	hard
109.1	C	0618995	5524543	1.40	clay/boulder	hard
109.1	R	0618953	5524578	1.80	clay/boulder	hard
109.2	L	0619267	5524696	1.60	clay/boulder	hard
109.2	C	0619243	5524721	1.80	clay/boulder	hard
109.2	R	0619157	5524741	1.60	clay/boulder	hard
109.3	L	0619690	5524836	2.00	clay/boulder	hard
109.3	C	0619667	5524874	2.00	clay/gravel/boulder	hard
109.3	R	0619684	5524903	2.70	sand	soft
109.4	L	0620165	5525100	1.80	clay/boulder	hard
109.4	C	0620142	5525130	2.10	clay/boulder	hard
109.4	R	0620137	5525182	2.10	clay/boulder	hard

SEGMENT: 109 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0619792	5524987	culvert

Right Bank	-grassy shoreline, with some exposed boulders -some erosion -mud under bridge -some trees
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Left Bank	-grassy shoreline -fallen trees -some erosion -boulders on shoreline 200 m upstream of bridge
------------------	--

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 110 Start UTM 0620340E 5525103N
 End UTM 0620975E 5525567N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 06 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0620706E 5525536N
 End UTM 0620692E 5525581N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.81	0.598	cobble	hard
Center	1.20	0.481	sand/cobble	hard
Right	1.11	0.452	sand/cobble	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
110.1	L	0620381	5525165	2.00	cobble/gravel	hard
110.1	C	0620355	5525172	2.00	cobble/gravel	hard
110.1	R	0620357	5525188	2.00	cobble/gravel	hard
110.2	L	0620494	5525323	2.00	cobble/gravel	hard
110.2	C	0620494	5525325	2.25	clay/gravel	hard
110.2	R	0620446	5525378	2.00	clay/gravel	hard
110.3	L	0620418	5525425	2.00	clay/gravel	hard
110.3	C	0620575	5525416	2.25	clay/gravel	hard
110.3	R	0620567	5525392	2.00	clay/sand	medium
110.4	L	0620526	5525558	2.25	cobble/boulder	hard
110.4	C	0620682	5525635	2.50	sand/cobble/gravel	hard
110.4	R	0620684	5525205	2.50	clay/sand	hard

SEGMENT: 110 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0620665	5525659	culvert

Right Bank	-grassy, stable shoreline -a few boulders -no cover
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Left Bank	-grassy, stable shoreline -a few boulders -some undercutting in downstream half of segment
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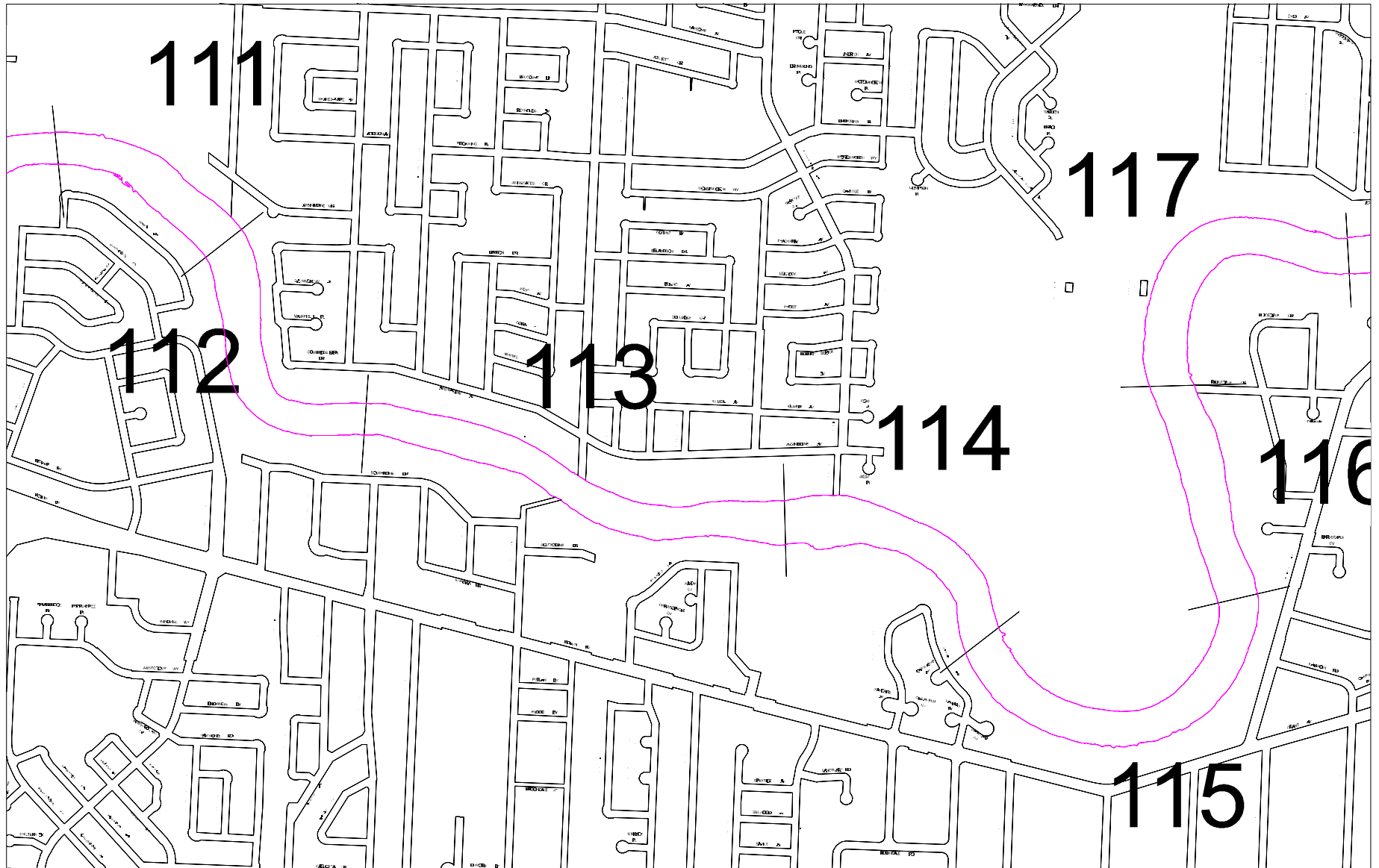


Figure 23. Assiniboine River segments 111-117.

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 111 Start UTM 0620975E 5525567N
 End UTM 0621218E 5525384N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0621098E 5525396N
 End UTM 0621171E 5525496N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.91	0.567	cobble	hard
Center	0.75	0.625	cobble	hard
Right	0.83	0.399	cobble/mud	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
111.1	L	0620893	5525618	2.25	cobble	hard
111.1	C	0620926	5525550	2.50	cobble/gravel	hard
111.1	R	0620895	5525608	2.25	clay/cobble	hard
111.2	L	0620989	5525546	2.00	cobble/gravel	hard
111.2	C	0620997	5525565	2.50	cobble/boulder	hard
111.2	R	0621006	5525591	2.50	clay/cobble/gravel	hard
111.3	L	0621056	5525533	2.00	clay/gravel	hard
111.3	C	0621106	5525530	2.50	cobble/gravel/boulder	hard
111.3	R	0621096	5525551	1.00	clay	medium
111.4	L	0621133	5525337	2.50	clay	medium
111.4	C	0621156	5525463	2.25	clay/gravel	hard
111.4	R	0621200	5525543	2.00	cobble/gravel	hard

SEGMENT: 111 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left bank	0621128	5525361	60cm inside diameter culvert

Right Bank	-stable grassy shoreline -some minor slumping
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Left Bank	-upstream half of segment- grassy stable shoreline -downstream half of segment- trees to shoreline -some erosion -some rip rap
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RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 112 Start UTM 0621218E 5525384N
 End UTM 0621506E 5524925N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0621294E 5524977N
 End UTM 0621330E 5524975N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.21	0.235	sand/mud	medium
Center	2.01	0.365	sand	medium
Right	1.00	0.315	cobble	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
112.1	L	0621267	5525341	2.50	clay/sand	medium
112.1	C	0621297	5525355	2.00	sand/gravel	hard
112.1	R	0621329	5525368	2.25	clay	medium
112.2	L	0621240	5525180	2.50	clay	medium
112.2	C	0621260	5525184	2.50	clay/gravel	hard
112.2	R	0621317	5525256	2.25	clay/gravel	hard
112.3	L	0621315	5524988	2.75	clay	medium
112.3	C	0621353	5525000	3.50	clay	medium
112.3	R	0621325	5524998	2.50	cobble/boulder	hard
112.4	L	0621441	5524922	2.00	cobble/boulder	hard
112.4	C	0621390	5524937	3.75	clay/gravel/boulder	hard
112.4	R	0621391	5524966	3.50	cobble/gravel	hard

SEGMENT: 112 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left bank	0621301	5525178	60 cm diameter culvert
Left bank	0621294	5524977	120 cm diameter culvert

Right Bank	-grassy shoreline -some exposed cobble -little erosion
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Left Bank	-grassy shoreline, with steep banks -sand/mud/gravel/cobble banks
------------------	--

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 113 Start UTM 0621506E 5524925N
 End UTM 0622557E 5524705N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0621891E 5524850N
 End UTM 0621915E 5524873N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.70	0.411	cobble/gravel	hard
Center	0.96	0.397	cobble	hard
Right	1.26	0.593	cobble	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
113.1	L	0621608	5524863	2.25	cobble/boulder	hard
113.1	C	0621661	5524938	2.50	cobble	hard
113.1	R	0621639	5524969	2.25	clay/gravel	hard
113.2	L	0621788	5524875	2.00	cobble/gravel	hard
113.2	C	0621787	5524892	2.50	clay/cobble/gravel	hard
113.2	R	0621785	5524917	2.25	clay/cobble/boulder	hard
113.3	L	0621955	5524826	2.00	cobble/gravel	hard
113.3	C	0621960	5524849	2.25	clay/cobble/gravel	hard
113.3	R	0621953	5524845	2.50	clay/boulder	hard
113.4	L	0622284	5524716	2.00	clay/gravel	hard
113.4	C	0622278	5524745	2.75	gravel/boulder	hard
113.4	R	0622234	5524765	2.50	clay/cobble	hard
113.5	L	0622441	5524687	1.75	cobble/boulder	hard
113.5	C	0622437	5524719	2.50	cobble/gravel	hard
113.5	R	0622452	5524278	1.00	clay/cobble	hard

SEGMENT: 113 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0621744	5524918	culvert
	0622511	5524717	120 cm culvert - rip rap
Left bank	0621909	5524885	culvert
	0622473	5524717	culvert - with eddy

Right Bank	-grassed shoreline, with some larger deciduous trees -some undercutting
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Left Bank	-grassed shoreline with large deciduous trees on bank -undercut mud/sand banks -overhanging trees -some cobble in lower half of segment
------------------	--

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 114 Start UTM 0622557E 5524705N
 End UTM 0623135E 5524416N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0622914E 5524622N
 End UTM 0622913E 5524673N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.10	0.298	sand	hard
Center	1.00	0.548	cobble/gravel	hard
Right	1.21	0.469	sand	medium

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
114.1	L	0622712	5524647	1.75	gravel	hard
114.1	C	0622700	5524685	2.00	cobble/gravel	hard
114.1	R	0622687	5524704	2.00	clay/gravel	hard
114.2	L	0622808	5524611	2.25	clay/gravel	hard
114.2	C	0622806	5524669	2.00	gravel	hard
114.2	R	0622804	5524704	2.00	clay	hard
114.3	L	0622965	5524601	2.25	clay/sand/gravel	hard
114.3	C	0622975	5524613	2.50	clay/gravel	hard
114.3	R	0622988	5524619	2.50	clay/gravel	hard
114.4	L	0623056	5524473	2.25	clay/gravel	hard
114.4	C	0623085	5524524	3.75	clay	hard
114.4	R	0623115	5524576	3.00	clay	medium

SEGMENT: 114 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy shoreline -high bank in lower half of segment
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Left Bank	-mud/sand banks -exposed cobble riffle in river -some trees over hanging -sand banks in lower half of segment -cobble rip rap starting at end of segment
------------------	--

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 115 Start UTM 0623135E 5524416N
 End UTM 0623807E 5524481N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0623401E 5524137N
 End UTM 0623421E 5524180N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.56	0.286	mud/sand	medium
Center	1.71	0.369	mud/sand	hard
Right	1.63	0.228	mud/sand	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
115.1	L	0623094	5524403	2.00	clay/boulder	hard
115.1	C	0623114	5524407	2.50	gravel	hard
115.1	R	0623159	5524444	2.50	clay/gravel	hard
115.2	L	0623192	5524227	2.75	clay/cobble	hard
115.2	C	0623217	5524285	2.50	cobble/gravel	hard
115.2	R	0623195	5524234	2.75	clay/gravel	hard
115.3	L	0623570	5524162	4.00	clay	hard
115.3	C	0623551	5524185	5.00	clay	hard
115.3	R	0623537	5524171	2.50	clay	medium
115.4	L	0623757	5524265	2.50	clay/cobble	hard
115.4	C	0623728	5524272	3.25	clay	hard
115.4	R	0623720	5524327	2.50	clay	medium

SEGMENT: 115 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left bank	0623225	5524219	culvert
	0623748	5524322	large culvert

Right Bank
-grassy
-sand/mud bar at point of bend

Left Bank
-sand/mud and grass shoreline
-rip rap
-erosion at downstream end of rip rap
-some overhanging trees
-bank is more stable toward downstream end of segment

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 116 Start UTM 0623807E 5524481N
 End UTM 0623676E 5525045N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0623751E 5524685N
 End UTM 0623730E 5524684N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.32	0.285	cobble/boulder	hard
Center	1.04	0.379	cobble	hard
Right	1.00	0.465	cobble	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
116.1	L	0623855	5524532	2.50	clay/gravel	hard
116.1	C	0623800	5524505	2.50	clay/cobble/gravel	hard
116.1	R	0623763	5524499	2.50	clay	hard
116.2	L	0623757	5524605	2.00	cobble/gravel	hard
116.2	C	0623731	5524611	2.50	clay/cobble	hard
116.2	R	0623718	5524601	2.50	clay	medium
116.3	L	0623782	5524695	2.25	gravel	hard
116.3	C	0623752	5524666	2.50	gravel/boulder	hard
116.3	R	0623716	5524680	2.50	clay	medium
116.4	L	0623724	5524870	2.25	gravel	hard
116.4	C	0623705	5524878	2.25	gravel	hard
116.4	R	0623657	5524844	2.50	clay	medium

SEGMENT: 116 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	

Right Bank	-grassy -mild erosion -some larger deciduous trees and willows in lower half
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Left Bank	-grassy -erosion is minimal -some overhanging large deciduous trees
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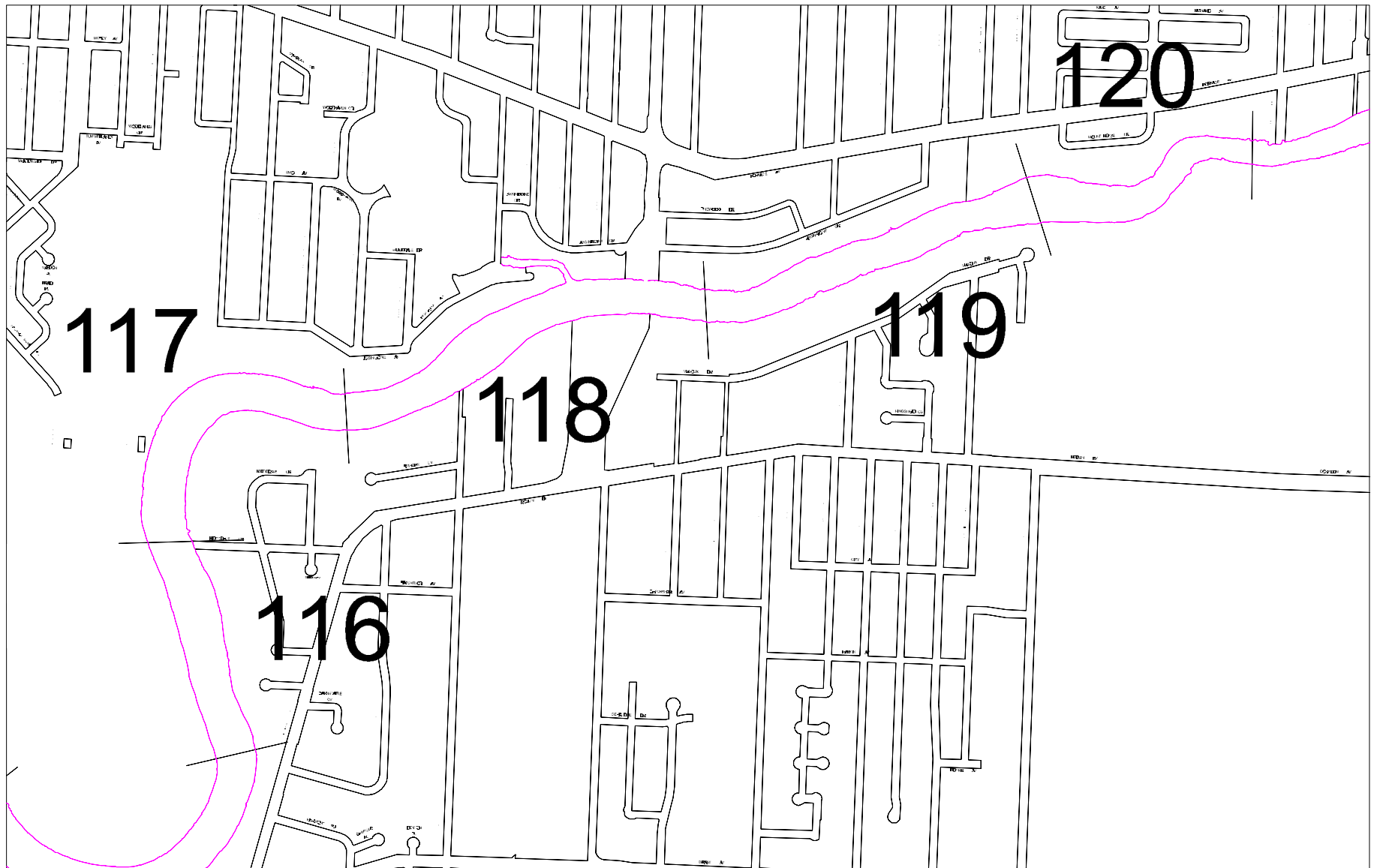


Figure 24. Assiniboine River segments 116-120.

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 117 Start UTM 0623676E 5525045N
 End UTM 0624085E 5525322N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0623800E 5525322N
 End UTM 0623647E 5525300N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.25	0.342	sand/gravel	medium
Center	1.63	0.323	sand	medium
Right	1.01	0.205	mud	medium

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
117.1	L	0623659	5525015	2.25	gravel	hard
117.1	C	0623606	5524978	2.50	gravel	hard
117.1	R	0623550	5525000	2.50	clay	soft
117.2	L	0623647	5525068	2.50	cobble/gravel	hard
117.2	C	0623624	6625079	2.50	gravel	hard
117.2	R	0623575	5525100	2.75	clay	medium
117.3	L	0623603	5525280	2.50	clay	medium
117.3	C	0623556	5525289	2.75	clay	medium
117.3	R	0623548	5525318	3.50	clay	soft
117.4	L	0623785	5525359	2.50	clay	medium
117.4	C	0623804	5525430	3.00	cobble/gravel	hard
117.4	R	0623799	5525417	2.25	gravel	hard

SEGMENT: 117 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0623620	5525034	culvert

Right Bank -some erosion
-grass covered where stable

Left Bank -stable, grass covered
-erosive downstream of bend
-some overhanging trees and willows
-some undercut banks

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 118 Start UTM 0624085E 5525322N
 End UTM 0624967E 5525614N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0624462E 5525505N
 End UTM 0624411E 5525578N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.75	0.357	cobble/boulder	hard
Center	1.10	0.129	cobble/boulder	hard
Right	1.18	0.470	sand/gravel	medium

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
118.1	L	0624180	5525310	2.00	clay/boulder	hard
118.1	C	0624165	5525362	2.50	cobble/gravel	hard
118.1	R	0624146	5525412	2.25	cobble/gravel	hard
118.2	L	0624266	5525521	2.00	cobble/gravel	hard
118.2	C	0624262	5525557	2.25	cobble/gravel	hard
118.2	R	0624283	5525543	2.50	cobble/gravel	hard
118.3	L	0624556	5525556	2.25	cobble/gravel	
118.3	C	0624550	5525545	2.75	clay/sand	medium
118.3	R	0624533	5525544	2.50	clay	hard
118.4	L	0624739	5525574	2.00	gravel	hard
118.4	C	0624730	5525640	2.50	cobble/gravel	hard
118.4	R	0624707	5525696	1.75	clay/gravel	hard

SEGMENT: 118 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0624812	5525636	culvert
	0624771	5525670	bridge
Left bank	0624640	5525633	culvert

Right Bank	-grassed, stable shoreline -some large deciduous trees overhanging bank -rip rap under bridge
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Left Bank	-mud and sand bank -slight erosion -willows -some undercuts upstream of Sturgeon Creek mouth -rip rap under bridge
------------------	--

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 119 Start UTM 0624967E 5525614N
 End UTM 0625782E 5525867N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0625408E 5525763N
 End UTM 0625396E 5525836N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.56	0.808	cobble/boulder	hard
Center	0.76	0.836	cobble/boulder	hard
Right	0.70	0.824	cobble/boulder	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
119.1	L	0624845	5525556	2.00	clay/boulder	hard
119.1	C	0624847	5525640	2.25	clay/boulder	hard
119.1	R	0624859	5525692	2.00	clay/gravel	hard
119.2	L	0625134	5525524	1.75	cobble/gravel	hard
119.2	C	0625125	5525551	2.00	cobble/boulder	hard
119.2	R	0625117	5525630	2.00	cobble/boulder	hard
119.3	L	0625447	5525576	1.75	cobble/boulder	hard
119.3	C	0625417	5525610	1.75	cobble/boulder	hard
119.3	R	0625336	5525694	1.75	cobble/gravel	hard
119.4	L	0625511	5525824	1.75	cobble/gravel	hard
119.4	C	0625517	5525716	2.00	cobble/gravel	hard
119.4	R	0625502	5525785	2.00	cobble/gravel	hard

SEGMENT: 119 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0625430	5525799	large culvert
	0625689	5525855	culvert
Left bank	0625782	5525867	culvert

Right Bank	-grassy, stable, some overhanging trees -some exposed boulders -shallow straight section
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Left Bank	-high, stable banks -cobble on shore -willows and trees stabilizing mud banks -slight erosion near culvert
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RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 120 Start UTM 0625782E 5525867N
 End UTM 0626199E 5525959N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0626105E 5525832N
 End UTM 0626069E 5525919N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.9	0.440	cobble/boulder	hard
Center	1.82	0.500	cobble/sand	hard
Right	1.40	0.402	cobble/gravel	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
120.1	L	0625757	5525846	1.75	cobble/gravel	hard
120.1	C	0625768	5525868	2.00	gravel	hard
120.1	R	0625756	5525862	2.00	cobble/gravel	hard
120.2	L	0625896	5525837	2.00	clay	medium
120.2	C	0625910	5525859	2.50	clay/gravel	hard
120.2	R	0625911	5525911	1.75	gravel	hard
120.3	L	0626090	5525852	2.25	cobble/gravel	hard
120.3	C	0626074	5525875	2.75	cobble/gravel	hard
120.3	R	0626068	5525896	2.50	cobble/gravel	hard
120.4	L	0626191	5525943	1.00	clay	medium
120.4	C	0626161	5526032	2.25	cobble/gravel	hard
120.4	R	0626174	5525990	2.00	clay/cobble/gravel	hard

SEGMENT: 120 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
	0626069	5525919	shallow riffle
	0626105	5525832	culvert, back eddy

Right Bank -stable and grassy

Left Bank -some erosion
-grass, willows, and larger deciduous trees
-rip rap at culvert

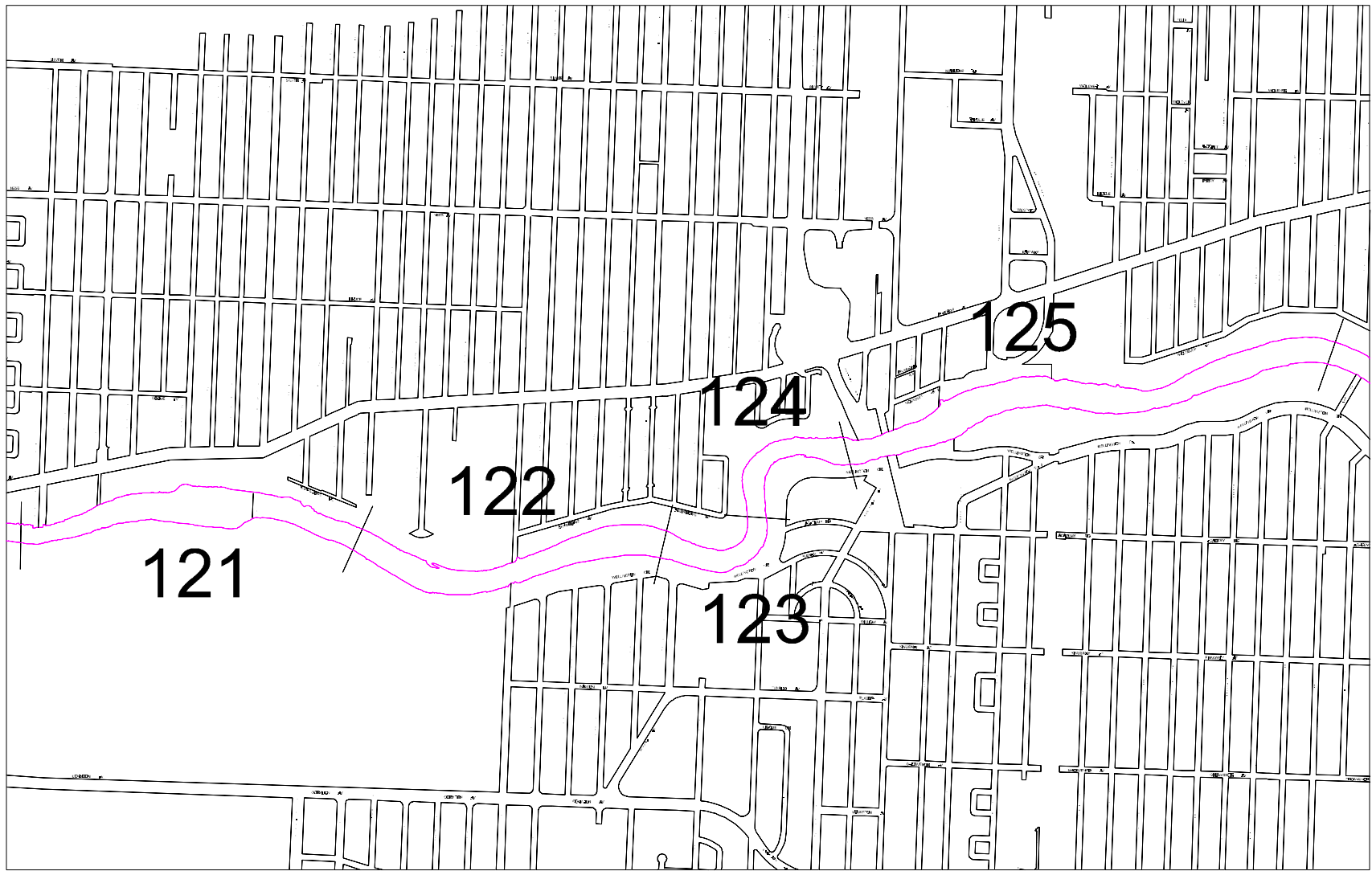


Figure 25. Assiniboine River segments 121-125.

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 121 Start UTM 0626199E 5525959N
 End UTM 0627553E 5525928N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0626863E 5526102N
 End UTM 0626837E 5526125N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	0.65	0.513	gravel/cobble	hard
Center	0.81	0.690	gravel/cobble	hard
Right	1.00	0.514	gravel/cobble	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
121.1	L	0626360	5525988	2.25	cobble/gravel	hard
121.1	C	0626354	5526022	2.50	cobble/boulder	hard
121.1	R	0626342	5525960	1.75	clay/boulder	hard
121.2	L	0626661	5526057	1.75	cobble/boulder	hard
121.2	C	0626738	5525991	2.25	cobble/boulder	hard
121.2	R	0626751	5526008	1.75	cobble	hard
121.3	L	0626985	5526016	2.00	cobble/gravel	hard
121.3	C	0626923	5526018	1.75	cobble/boulder	hard
121.3	R	0626993	5526010	2.25	cobble/gravel/boulder	hard
121.4	L	0627265	5526059	2.50	gravel	hard
121.4	C	0627253	5526037	2.25	gravel	hard
121.4	R	0627267	5526107	3.25	gravel	hard

SEGMENT: 121 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0626414	5526009	large culvert
Left bank	0626617	5526065	concrete culvert

Right Bank

- stable and grassy in upstream half of segment
- bank highly eroded up to foot bridge
- some overhanging deciduous trees
- stable grass bank downstream of bridge
- lower half of reach shallow, boulders prevalent
- rip rap at bridge

Left Bank

- slightly eroding
- some trees and grass for first half of segment
- intermittent patches of boulders
- eroding bank downstream of foot bridge
- some overhanging trees

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 122 Start UTM 0627553E 5525928N
 End UTM 0628227E 5525947N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0627897E 5525824N
 End UTM 0627892E 5525877N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.53	0.354	mud/sand	medium
Center	1.74	0.383	mud	medium
Right	1.38	0.216	mud	hard

HABITAT SURVEY II

Date 06 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
122.1	L	0627437	5525929	2.75	gravel	hard
122.1	C	0627444	5525973	2.50	cobble/gravel	
122.1	R	0627444	5526006	2.75	clay/gravel	hard
122.2	L	0627761	5525759	3.00	clay	medium
122.2	C	0627717	5525815	3.00	gravel	hard
122.2	R	0627737	5525820	2.50	gravel	hard
122.3	L	0627943	5525846	3.50	clay/gravel	hard
122.3	C	0627934	5525841	3.75	clay	soft
122.3	R	0627939	5525893	2.50	clay	medium
122.4	L	0638223	5525903	2.50	gravel	hard
122.4	C	0628209	5525944	2.50	sand/gravel	hard
122.4	R	0628180	5525949	3.00	clay	medium

SEGMENT: 122 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0628010	5525830	culvert
Left bank	0627968	5525802	culvert

Right Bank	-eroding banks just downstream of Truro Creek -becomes grassy downstream of transect -some overhanging deciduous growth
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Left Bank	-eroding bank until 300 m downstream of Truro Creek -cobble along shore downstream of transect
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RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 123 Start UTM 0628227E 5525947N
 End UTM 0628777E 5526019N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0628684E 5525901N
 End UTM 0628638E 5525930N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.24	0.401	gravel/cobble	hard
Center	0.97	0.630	gravel/cobble	hard
Right	1.27	0.652	sand/gravel	medium

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
123.1	L	0628552	5525869	2.00	cobble/gravel	hard
123.1	C	0628534	5525902	2.50	cobble/gravel/boulder	hard
123.1	R	0628588	5526009	2.00	cobble/gravel	hard
123.2	L	0628672	5525958	2.50	sand/cobble/gravel	hard
123.2	C	0628623	5525914	2.75	cobble/gravel/boulder	hard
123.2	R	0628577	5525875	2.25	cobble/boulder	hard
123.3	L	0628734	5525937	2.50	clay/gravel	hard
123.3	C	0628723	5525967	2.75	clay/gravel/boulder	hard
123.3	R	0628705	5525982	2.50	boulder	hard
123.4	L	0628784	5525993	2.50	cobble/gravel	hard
123.4	C	0628763	5525977	2.75	cobble/gravel	hard
123.4	R	0628743	5525970	3.00	clay	medium

SEGMENT: 123 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left bank	0628559	5526004	two small culverts
	0628745	5525937	culvert

Right Bank
-high banks
-relatively stable
-deciduous canopy

Left Bank
-willows close to mud shoreline
-some overhanging deciduous trees
-some undercutting
-eroding bank downstream of first culvert
-recent rip rap on steep bank in downstream portion of segment

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 124 Start UTM 0628777E 5526019N
 End UTM 0629028E 5526218N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 09 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0628783E 5526208N
 End UTM 0628777E 5526211N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.50	0.421	sand/cobble	medium
Center	1.74	0.564	boulder	hard
Right	1.26	0.564	gravel/cobble	hard

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
124.1	L	0628854	5526079	2.00	cobble/gravel	hard
124.1	C	0628831	5526070	2.75	clay/gravel	hard
124.1	R	0628792	5526042	2.00	clay	medium
124.2	L	0628785	5526135	2.00	cobble/boulder	hard
124.2	C	0628741	5526146	2.50	cobble/gravel	hard
124.2	R	0628715	5526150	2.23	cobble/boulder	hard
124.3	L	0628776	5526217	1.75	cobble/boulder	hard
124.3	C	0628742	5526218	3.50	clay/boulder	hard
124.3	R	0628707	5526221	2.25	cobble/gravel	
124.4	L	0628859	5526222	2.00	cobble/boulder	hard
124.4	C	0628869	5526234	2.50	boulder	hard
124.4	R	0628887	5526152	2.25	cobble/boulder	hard

SEGMENT: 124 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0628789	5526203	120 cm culvert

Right Bank	<ul style="list-style-type: none">-some instability of banks around bend-grassed shoreline with some fallen deciduous trees-high bank downstream of culvert-bank face unstable, but grassed along shore-shallow riffle upstream of bridge
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Left Bank	<ul style="list-style-type: none">-erosion to point of bend-stable banks downstream of transect
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RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 125 Start UTM 0629028E 5526218N
 End UTM 0630694E 5526548N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 05 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0629965E 5526376N
 End UTM 0629972E 5526431N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.05	0.621	sand/gravel/cobble	hard
Center	0.97	0.784	cobble/boulder	hard
Right	0.78	1.126	cobble/boulder	hard

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
125.1	L	0629094	5526261	2.25	cobble/gravel	hard
125.1	C	0629113	5526281	2.00	cobble/boulder	hard
125.1	R	0629086	5526385	1.50	clay/gravel	hard
125.2	L	0629425	5526312	1.50	gravel	hard
125.2	C	0629447	5526359	1.50	gravel	hard
125.2	R	0629419	5526413	1.50	cobble/gravel	hard
125.3	L	0629759	5526449	2.50	cobble/gravel	hard
125.3	C	0629779	5526472	1.50	clay	medium
125.3	R	0629825	5526518	2.75	cobble/gravel/boulder	hard
125.4	L	0630239	5526438	2.75	cla/gravel	hard
125.4	C	0630247	5526419	3.00	clay	medium
125.4	R	0630190	5526440	2.75	clay/gravel	hard

SEGMENT: 125 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0630330	5526500	150 cm diameter culvert
	0629129	5526244	120 cm diameter culvert
	0629152	5526270	90 cm diameter culvert

Right Bank	<ul style="list-style-type: none">-gently sloped mud and sand banks-mild erosion-some trees falling into river but primarily a grass shoreline-cobble riffle area at mouth of culvert
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Left Bank	<ul style="list-style-type: none">-gently sloped mud and sand banks-mild erosion, some trees falling into river-cobble under bridge railway bridge-eroding bank downstream of bridges
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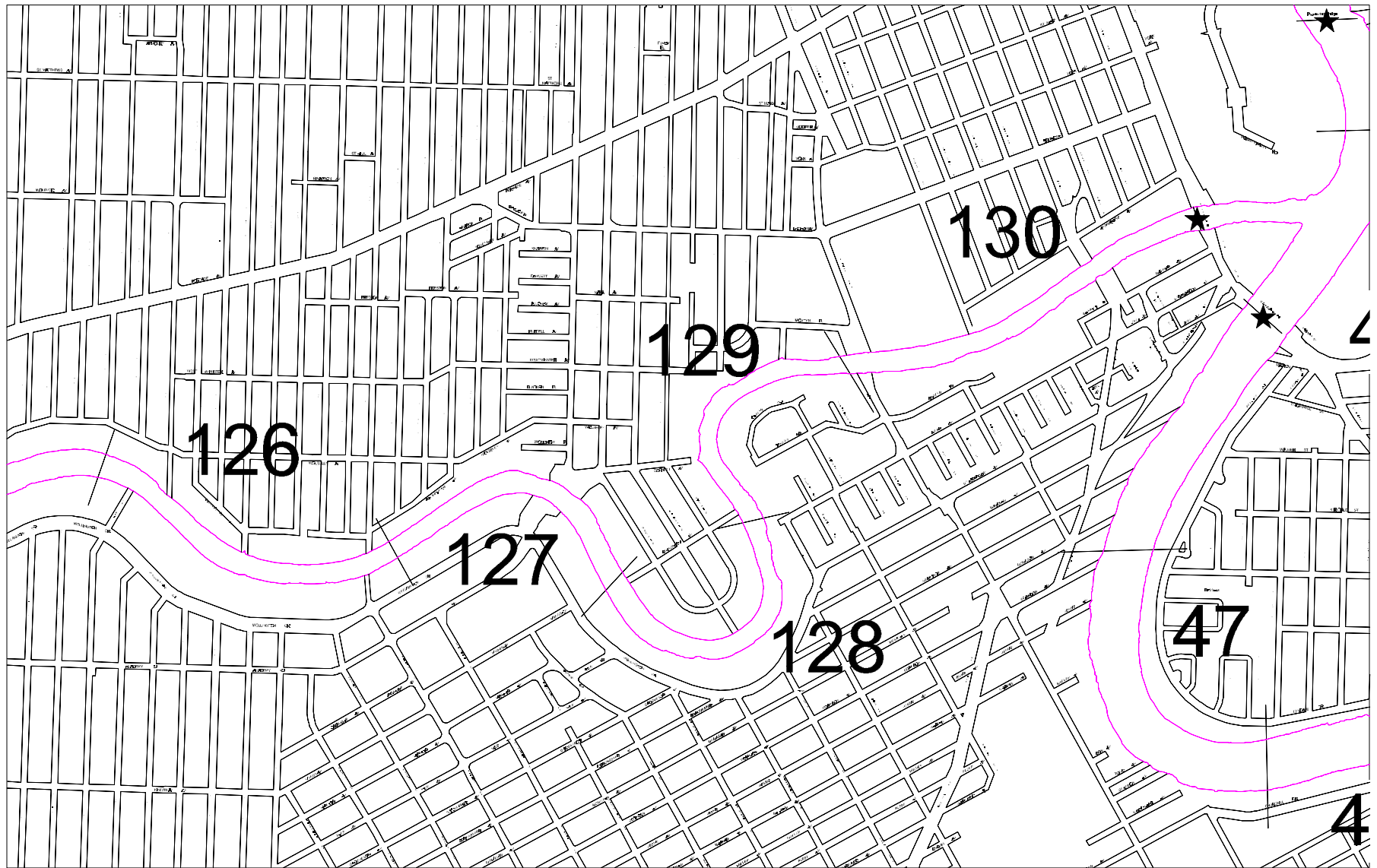


Figure 26. Assiniboine River segments 126-130.

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 126 Start UTM 0630694E 5526548N
 End UTM 0631682E 5526372N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 05 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0631204E 5526265N
 End UTM 0631168E 5526248N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.23	0.508	mud/cobble	medium
Center	1.77	0.663	sand/mud	medium
Right	1.24	0.408	mud/sand	soft

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
126.1	L	0630619	5526538	2.75	clay	medium
126.1	C	0630611	5526526	3.00	clay	medium
126.1	R	0630605	5226566	3.25	clay	medium
126.2	L	0630831	5526535	3.50	clay	medium
126.2	C	0630869	5526575	4.50	clay	medium
126.2	R	0630866	5526516	3.50	clay/gravel	hard
126.3	L	0631121	5526239	5.00	clay	medium
126.3	C	0631134	5526252	4.75	clay	hard
126.3	R	0631134	5526284	3.75	clay	medium
126.4	L	0631311	5526246	3.00	cobble/boulder	hard
126.4	C	0631294	5526345	6.00	clay	medium
126.4	R	0631328	5526302	3.75	clay	soft

SEGMENT: 126 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0631258	5526229	culvert
	0631085	5526266	3 culverts in this area
Left bank	0630771	5526508	150 cm diameter culvert

Right Bank	<ul style="list-style-type: none">-mud shoreline-three areas of rip rap-some trees and willows-mild erosion, but relatively stable
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Left Bank	<ul style="list-style-type: none">-stable mud/sand bank-some of the bank has been stabilized with lumber-some erosion near downstream end of segment
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RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 127 Start UTM 0631682E 5526372N
 End UTM 0632272E 5526265N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 05 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0632015E 5526540N
 End UTM 0631966E 5526503N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	1.02	1.014	gravel/boulder	hard
Center	1.12	0.727	mud/boulder	medium
Right	1.85	0.613	cobble/boulder	hard

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
127.1	L	0631620	5526339	3.50	cobble/boulder	hard
127.1	C	0631606	5526335	5.75	clay	medium
127.1	R	0631559	5526337	3.75	clay	soft
127.2	L	0632029	5526568	3.00	clay/sand	medium
127.2	C	0632016	5526539	3.50	clay/boulder	hard
127.2	R	0632037	5526566	3.50	clay/boulder	hard
127.3	L	0632174	5526413	2.75	clay	medium
127.3	C	0632182	5526428	3.50	clay/sand/boulder	hard
127.3	R	0632165	5526431	3.00	clay/gravel	hard
127.4	L	0632158	5526298	2.75	clay/sand	medium
127.4	C	0632193	5526350	3.75	clay	medium
127.4	R	0632261	5526418	4.75	clay/boulder	hard

SEGMENT: 127 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0631775	5526422	120 cm diameter culvert

Right Bank	<ul style="list-style-type: none">-stable mud/sand bank-areas of bank stabilization-some fallen trees-isolated erosion especially downstream of bridge
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Left Bank	<ul style="list-style-type: none">-stable mud/sand bank-some fallen trees-erosion occurring on first bend upstream of bridge
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RIVER: Red River **Grid Zone 14U, NAD 27**

SEGMENT: 128 Start UTM 0632272E 5526265N
 End UTM 0632749E 5526283N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 05 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0632504E 5526009N
 End UTM 0632525E 5526007N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.12	0.552	mud/cobble	medium
Center	1.59	0.597	mud	medium
Right	1.41	0.497	mud	medium

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
128.1	L	0632277	5526214	3.75	clay	medium
128.1	C	0632259	5526221	3.75	clay	medium
128.1	R	0632294	5526241	4.00	cobble/gravel/boulder	hard
128.2	L	0632419	5526052	4.25	clay	medium
128.2	C	0632429	5526190	4.00	clay	medium
128.2	R	0632363	5526098	3.50	clay	medium
128.3	L	0632534	5525993	4.50	cobble/gravel	hard
128.3	C	0632524	5525994	4.50	clay/gravel	hard
128.3	R	0632534	5525933	3.75	clay	medium
128.4	L	0632745	5526034	5.75	clay	medium
128.4	C	0632767	5525998	6.00	clay	medium
128.4	R	0632760	5526022	3.00	clay	medium

SEGMENT: 128 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Left bank	0632677	5526001	concrete abutment
Left bank	0632486	5526004	60 cm diameter culvert

Right Bank

- mud/sand bank
- sand point extending into river at bend
- some bank slumping at start of segment
- bank is relatively stable at low water

Left Bank

- mud/sand bank
- stable at upstream end of segment
- extensive erosion across from sand point on right bank
- exposed roots at bend

RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 129 Start UTM 0632749E 5526283N
 End UTM 0633055E 5526875N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 05 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0632631E 5526733N
 End UTM 0632603E 5526754E

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.94	0.279	mud	medium
Center	4.76	0.443	cobble/boulder	hard
Right	2.12	0.262	cobble/boulder	hard

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
129.1	L	0632789	5526226	5.00	cobble/gravel/boulder	hard
129.1	C	0632816	5526221	6.50	clay	medium
129.1	R	0632724	5526252	3.75	clay	medium
129.2	L	0632697	5526500	3.50	cobble/gravel	hard
129.2	C	0632696	5526475	5.00	clay	medium
129.2	R	0632701	5526467	3.00	clay	medium
129.3	L	0632655	5526797	3.00	clay	medium
129.3	C	0632634	5526815	5.75	clay	medium
129.3	R	0632616	5526874	2.75	cobble/gravel/boulder	hard
129.4	L	0632858	5526959	4.00	clay	medium
129.4	C	0632868	5526954	6.50	clay	medium
129.4	R	0632885	5526888	2.50	cobble	hard

SEGMENT: 129 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0632602	5526655	60 cm diameter culvert
	0632622	5526839	150 cm diameter culvert
	0632838	5526865	150 cm diameter culvert

Right Bank	-mud and sand bank -no riparian cover -small sections of rip rap
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Left Bank	-mud/sand bank -eroding from start of segment to bend -some rip rap has been applied -sand bar at bend -extensive erosion downstream of sand bar
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RIVER: Assiniboine River **Grid Zone 14U, NAD 27**

SEGMENT: 130 Start UTM 0633055E 5526875N
 End UTM 0634419E 5527386N

A) CROSS SECTIONAL DATA

HABITAT SURVEY I

Date 05 Nov 98 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section Start UTM 0633772E 5527110N
 End UTM 0633734E 5527200N

Quarter Point	Depth (m)	Velocity (m/sec)	Substrate	Compaction
Left	2.61	0.215	mud	medium
Center	3.14	0.462	mud	soft
Right	2.80	0.422	mud	soft

HABITAT SURVEY II

Date 02 July 99 James St. Stage (masl) _____ Discharge (m³/sec) _____

Cross Section	Quarter Point	UTM (14U) NAD 27		Depth (m)	Substrate	Compaction
		E	N			
130.1	L	0633077	5526881	3.00	clay	soft
130.1	C	063029	5526945	4.25	clay	hard
130.1	R	0633026	5527021	4.50	clay	soft
130.2	L	0633532	5526901	3.50	clay	hard
130.2	C	0633516	5526961	6.50	clay	medium
130.2	R	0633490	5526988	2.50	cobble	hard
130.3	L	0633831	5527181	4.00	clay/gravel	hard
130.3	C	0633820	5527175	4.75	clay	medium
130.3	R	0633264	5527239	5.00	clay	soft
130.4	L	0634147	5527466	3.50	cobble/gravel	hard
130.4	C	0634053	5527307	4.75	clay	hard
130.4	R	0633967	5527614	3.00	clay/cobble/gravel	hard

SEGMENT: 130 (Continued)

B) RIPARIAN AND SHORELINE FEATURES

Feature	UTM (14U), NAD 27		Description
	E	N	
Right bank	0633821	5527252	150 cm diameter culvert
Left bank	0633464	5526969	180 cm diameter culvert
	0634419	5527386	railway bridge

Right Bank	-mud/sand bank -eroding up to walkway -extensive rip rap from Osborne Bridge to the "Forks"
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Left Bank	-mud/sand bank -extensive erosion -some overhanging riparian cover -rip rap under bridges and at one other location
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