



APPENDIX I-4

2013 AQUATICS BASELINE



October 10, 2013
TC111504

Mr. Kyle Stanfield, P.Eng
Director, Environment & Sustainability
New Gold Inc.
1111 Victoria Avenue East
Thunder Bay, ON
P7C 1B7

Dear Mr. Stanfield,

AMEC Environment & Infrastructure is pleased to submit the attached 2013 Aquatic Resources 2013 Baseline Investigation for the Rainy River Project.

The 2013 Aquatic Resources Baseline Investigation adds to the baseline studies conducted previously by Klohn Crippen Berger and AMEC over the period of 2008 to 2012.

We greatly appreciate the opportunity to provide support for your Rainy River Project. Should you have any questions regarding the study, please do not hesitate to contact us.

Yours Sincerely,

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited

A handwritten signature in black ink, appearing to read "J. Dietrich".

Jason Dietrich, M.Sc.
Aquatic Ecologist

A handwritten signature in black ink, appearing to read "Sheila Daniel".

Sheila Daniel, M.Sc. P.Geo.
Senior Associate Geoscientist
Head, Environmental Management



RAINY RIVER

**RAINY RIVER RESOURCES LTD.
RAINY RIVER PROJECT**

**AQUATIC RESOURCES
2013 BASELINE INVESTIGATION**

Submitted to:

**Rainy River Resources Ltd.
1111 Victoria Avenue East
Thunder Bay, Ontario
P7C 1B7**

Submitted by:

**AMEC Environment & Infrastructure
a Division of AMEC Americas Limited
160 Traders Blvd. E., Suite 110
Mississauga, Ontario
L4Z 3K7**

**October 2013
TC111504**



TABLE OF CONTENTS

	PAGE
1.0 INTRODUCTION.....	1
1.1 General Setting.....	1
1.2 General Methodology	2
1.3 Spatial Boundaries.....	2
2.0 METHODOLOGY.....	6
2.1 General Approach.....	6
2.2 Surface Water Quality.....	6
2.3 Habitat Assessment.....	6
2.4 Fisheries Resources	7
2.5 Fish Biosample Collection	9
3.0 RESULTS.....	16
3.1 Aquatic Habitat	16
3.2 Pinewood River System.....	16
3.2.1 Water Quality	16
3.2.2 Fisheries Resources	16
3.3 Loslo Creek System.....	17
3.3.1 Water Quality	17
3.3.2 Fisheries Resources	17
3.4 Marr Creek System.....	18
3.4.1 Water Quality	18
3.4.2 Fisheries Resources	18
3.5 West Creek System	18
3.5.1 Water Quality	18
3.5.2 Fisheries Resources	18
3.6 Clark Creek System.....	19
3.6.1 Water Quality	19
3.6.2 Fisheries Resources	19
4.0 DISCUSSION.....	28
5.0 REFERENCES.....	30



LIST OF TABLES

	PAGE
Table 3-1	In Situ Water Quality Measurements.....20
Table 3-2	Species Specific Catch per Unit Effort for Gillnets21
Table 3-3	Species Specific Catch per Unit Effort for Minnow Traps.....22
Table 3-4	Species Specific Catch per Unit Effort for Backpack Electroshocking23
Table 3-5	Species Specific Catch per Unit Effort for Dip Netting.....24
Table 3-6	Species Specific Catch per Unit Effort for Fyke Netting25
Table 3-7	Species Specific Catch per Unit Effort for Larval Tows26
Table 3-8	Species Specific Catch per Unit Effort for Angling27

LIST OF FIGURES

Figure 1-1	Project Location.....4
Figure 1-2	Regional Topography, Watershed and Subwatershed Boundaries.....5
Figure 2-1B	In situ Water Quality Measurement Locations 2013..... 11
Figure 2-2A	Aquatic Habitat and Stream Morphology Assessment Locations 2013..... 12
Figure 2-2B	Aquatic Habitat and Stream Morphology Assessment Locations 2013..... 13
Figure 2-3A	Fish Community Survey Locations 2013 14
Figure 2-3B	Fish Community Survey Locations 2013 15

LIST OF APPENDICES

- A Photographic Record
- B Aquatic Habitat Data
- C Fish Sampling Effort and Capture Data



1.0 INTRODUCTION

Rainy River Resources Ltd. (RRR) has been exploring the Rainy River Project (RRP) situated primarily on private lands in the Township of Chapple, approximately 65 kilometres (km) northwest of Fort Frances, in northwestern Ontario (Figure 1-1). This 2013 Aquatic Resources Report was prepared by AMEC Environment & Infrastructure, a Division of AMEC Americas Limited (AMEC) to describe the current aquatic conditions and supplement previous baseline investigations (KCB 2011; AMEC 2012, 2013a). The 2013 aquatic survey program was undertaken to provide further information specific to spring freshet conditions and fish species presence and use of fish habitat. Specifically, surveys were undertaken to investigate the use of the Pinewood River and its associated tributaries within the vicinity of the RRP by Walleye (*Sander vitreus*) and Northern Pike (*Esox lucius*) during the period of potential spawning or staging for spawning, as requested by regulatory agencies. Although Lake Sturgeon (*Acipenser fulvescens*), was not directly targeted during fisheries surveys in the spring of 2013, incidental capture and secondary source information regarding Lake Sturgeon use of the Pinewood River is also included in subsequent section of this report. The information herein will support the ongoing development of the RRP, while placing a particular focus on investigating Walleye spawning activity within the Pinewood River, as well as Northern Pike spawning activity within the smaller tributaries to Pinewood River as requested by regulatory agencies.

1.1 General Setting

The RRP is located in the Township of Chapple, District of Rainy River, in northwestern Ontario, approximately 40 km east of Lake of the Woods, 65 km northwest of Fort Frances and 420 km west of Thunder Bay (Figure 1-1). The Universal Transverse Mercator coordinates for the centroid of the proposed open pit are at 425660E, 5409700N (NAD 83 Zone 15). The RRP site and surrounding lands are dominantly privately held, with RRR holding a very large private land package.

The RRP is located within the Late Achaean Rainy River Greenstone Belt which forms part of the western Wabigoon Sub-Province, located in the Superior Province of the Canadian Shield. The terrain in the general vicinity of the RRP site transitions from upland, bedrock controlled pond areas to the northeast, to lower-lying, gently undulating terrain to the southwest. The Pinewood River system, to which most of the RRP site drains, is associated with a broad floodplain. Lands more proximal to the RRP site area are typically gently rolling to flat, with wetlands occurring in low-lying contributing watersheds and rounded bedrock outcrops and subcrops occurring in upland areas. The site area occurs within the western portion of the Great Lakes St. Lawrence Forest Region in the area between Lake Superior and Lake of the Woods; but is near to the Boreal Forest and Prairie regions and therefore exhibits some transitional characteristics. Wetlands are present due to the pervasive clay till substrates and subdued topography, which characterize much of the area, combined with extensive beaver activity.

The Pinewood River watershed covers an approximate area of 461 km², originating at the outlet of Pinewood Lake, flowing westward for approximately 75 km (path of flow) before draining into the Rainy River. At the crossing location itself, the river has a watershed in the order of 110 km² and the flow status of the watercourse is classified as permanent despite periods of intermittency in dry conditions. Zero flow conditions were observed within the Pinewood River during 2012 in some sections which are further influenced by beaver activity. Beaver activity within the Pinewood River system may create partial fish barriers to fish movement. Such obstructions to movement are temporary and cyclic, sometimes resulting in fish population fragmentation.

Land uses within the RRP site area mainly reflect low-density rural forestry and limited agricultural practices. The area is intersected by a well-developed network of both Provincial and Municipal gravel-surfaced access roads as well as private roads crossing privately-held lands.

1.2 General Methodology

Data was gathered using the standard approaches of observation, sample collection, review of existing reports. Previous baseline studies had not focused efforts during the spring period and specifically during potential spawning periods for Walleye (*Sander vitreus*) or Northern Pike (*Esox lucius*) within the Pinewood River watershed. During 2013, an evaluation of community composition and spawning activity through the use of common methods such as visual surveys, angling, gill netting, electroshocking, as well as egg, larva, fry and fingerling collection was undertaken.

1.3 Spatial Boundaries

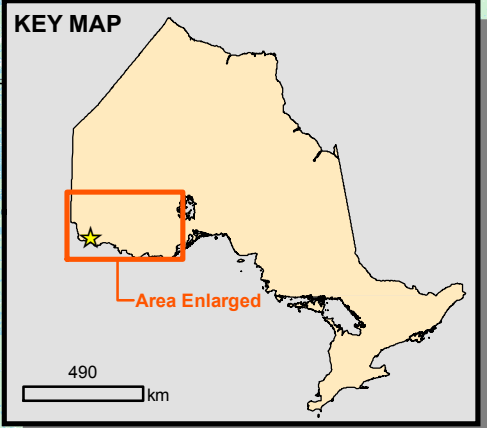
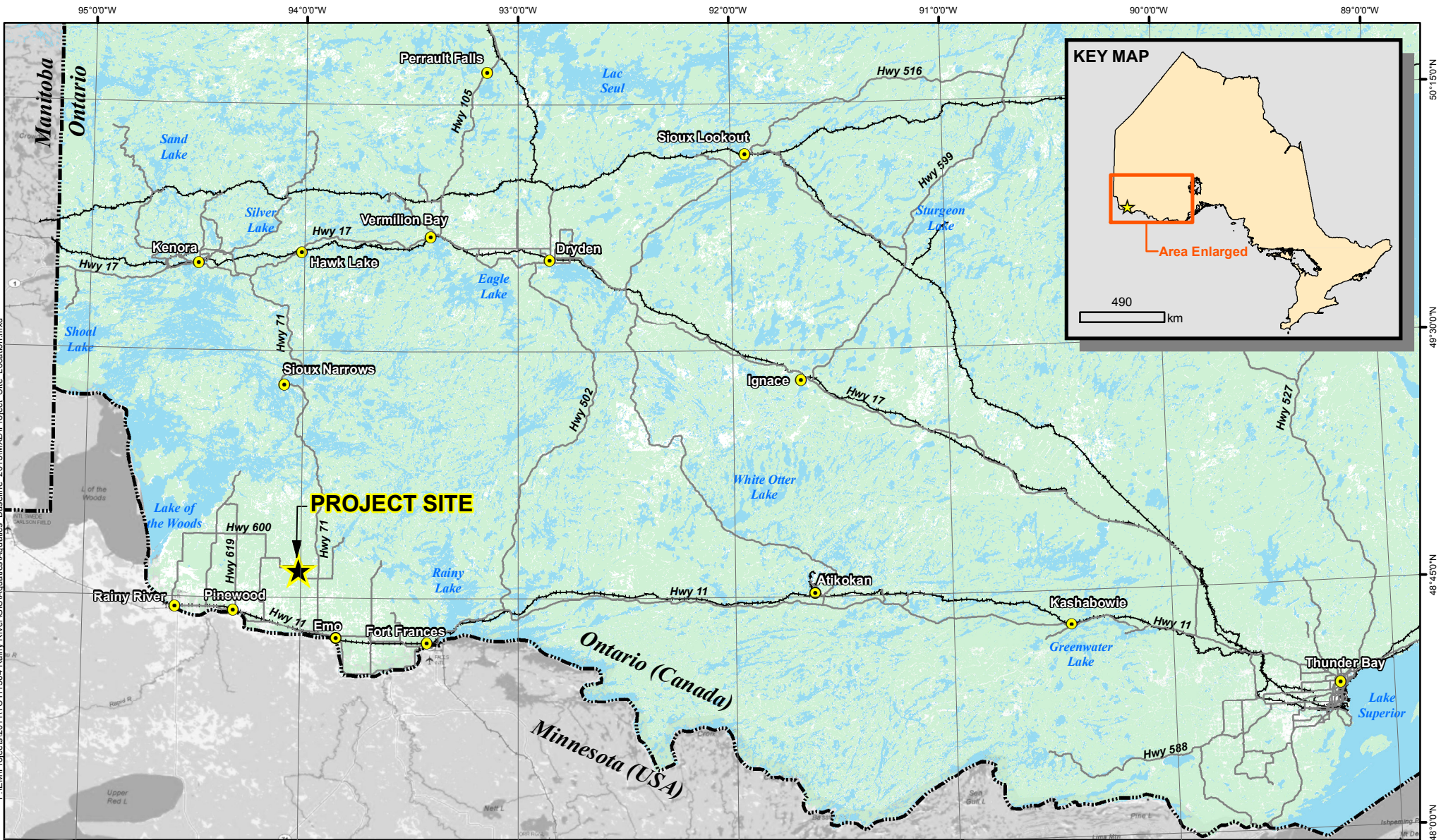
The RRP site area is positioned within the upper portion of the Pinewood River watershed (Figure 1-2). The RRP is somewhat unique from an environmental perspective in that there are no lakes located within, or adjacent to, the main RRP site.

A number of the watercourses including Marr Creek have been altered to act dominantly as agricultural drains. It should be also noted that approximately 3.3 km of the lower reach of Loslo Creek and 2.3 km of Clark Creek leading to the outflow into the Pinewood River have been previously designated as Municipal drains under the *Drainage Act* (respectively, the Cowser Drain constructed in 1980 and the Teeple Drain constructed in 1994). Only the creek names are referenced in the remainder of this report.

The RRP site area is situated within the vicinity of the following watersheds and subwatersheds: the Pinewood River, McCallum Creek (also referred to in previous reports as Jones Creek), Loslo Creek, Marr Creek, West Creek, Clark Creek, Deerlock - Tait Creek and Sturgeon Creek (Figure 1-2). Information provided in this report is specific to the following watercourses within



these watersheds: Pinewood River, Loslo Creek, West Creek, and Clark Creek (Figure 1-2). Note that creek names used in this report are local names used for ease of local recognition by stakeholders and are not geographically official names.



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Aquatics_Baseline_2013\MXD\Project_Site_Location.mxd

LEGEND

- Project Site
- Regional Communities
- Provincial / National Border
- Regional Road / Highway
- Railway

NOTES:
 - Ontario base data extracted from Land Information Ontario (MNR) data warehouse.
 - Base data outside of Ontario extracted from ESRI DeLorme World Basemap



RAINY RIVER PROJECT

Project Location

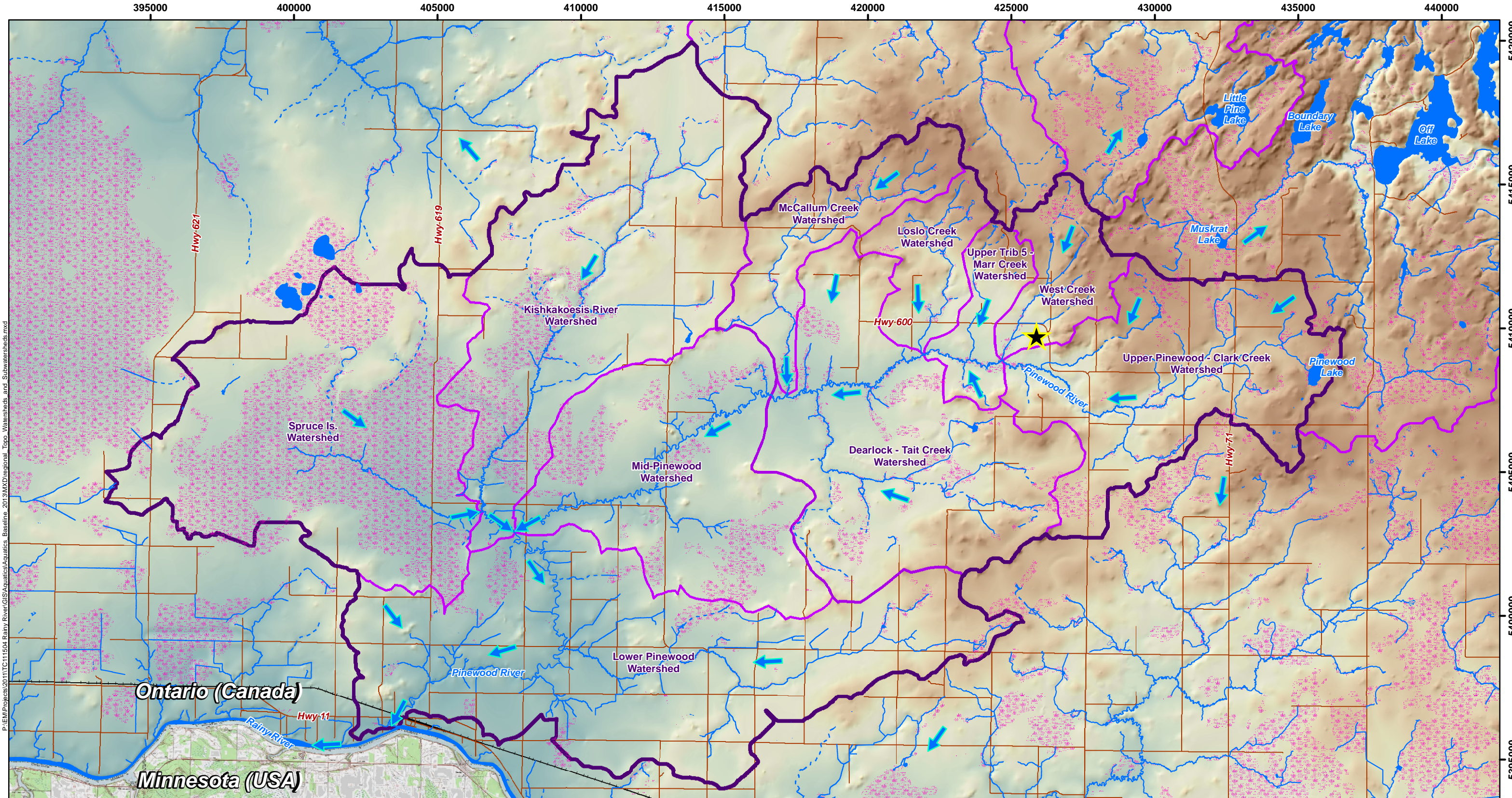


PROJECT N^o: TC111504

FIGURE: 1-1

SCALE: 1:1,800,000

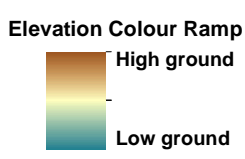
DATE: October 2013



P:\EM\Projects\2011\TC111504_Rainy River\GIS\Aquatics\Aquatics Baseline_2013\MXD\Regional_Topo_Watersheds and Subwatersheds.mxd

LEGEND

- RRP Site
- Regional Road / Highway
- Railway
- Waterbody
- Low-Lying Wetland Area
- Permanent Watercourse
- Intermittent (Intermittent Watercourse)
- General Surface Flow Direction



- Pinewood River Watershed (approx. 57,450 ha)
- Main Project Area Watershed (approx. 20,700 ha)
- Subwatershed Areas (Labelled on map)

- Upper Trib 5 - Marr Cr. approx. 1,230 ha
- Loslo Cr. approx. 1,620 ha
- West Cr. approx. 1,635 ha
- McCallum Cr. approx. 2,490 ha
- Upper Pinewood - Clark Cr. approx. 6,130 ha
- Mid-Pinewood approx. 6,530 ha
- Dearlock - Tait Cr. approx. 7,600 ha
- Kishkakoosis R. approx. 9,200 ha
- Spruce Is. approx. 9,580 ha
- Lower Pinewood approx. 11,435 ha

NOTES:

- Road data extracted from Land Information Ontario, Ontario Road Network, MNR
- Ontario base data extracted from Land Information Ontario (MNR) data warehouse, Queen's Printer for Ontario, 2011-2012
- Base data outside of Ontario extracted from ESRI USGS Topographic maps
- Watershed delineations are approximate and are derived from MNR Ontario Digital Elevation Model and Quaternary Watershed boundaries

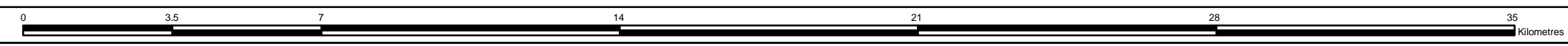
Datum: NAD83
Projection: UTM Zone 15N



RAINY RIVER PROJECT

Regional Topography, Watershed and Subwatershed Boundaries

PROJECT N ^o : TC111504	FIGURE: 1-2
SCALE: 1:127,000	DATE: October 2013



2.0 METHODOLOGY

2.1 General Approach

Sampling locations were selected based on their proximity to the RRP site, landowner permissions, accessibility and logistical feasibility. Field sampling during 2013 was conducted from May 14 to 22, 2013.

2.2 Surface Water Quality

Periodic baseline surface water quality monitoring began at the RRP in 2007 and was established as a monthly program in 2009. This initial program was augmented in the spring of 2010 to include a total of 14 monthly sampling locations (a synthesis of these long-term surface water quality results are provided in AMEC 2012a). During the the spring of 2013 a total of 29 *in situ* surface water field measurement events of physico-chemical parameters (dissolved oxygen, conductivity, temperature, total dissolved solids (TDS) and pH) were taken using portable analytical equipment, at 13 different sample locations between May 15 and May 22, 2013. Sampling locations are presented for this component in Figures 2-1A and 2-1B. Applicable parameters (dissolved oxygen and pH) were compared to the Provincial Water Quality Objectives (PWQO) for the protection of aquatic life (MOE 1994).

2.3 Habitat Assessment

Habitat sampling was completed at seven locations on the Pinewood River, two locations on Loslo Creek, one location on Marr Creek, two locations on West Creek and one location on Clark Creek. Habitat sampling locations are presented in Figures 2-2A and 2-2B.

Habitat inventories were conducted on linear channels within the RRP site area. Inventories were conducted to provide data specific to hydrogeomorphology, general fish habitat availability as well as potential preferred spawning areas for Walleye. Comprehensive fish habitat descriptions were carried out at all sampling locations and included detailed recordings of general gradient and stability observations, channel profile and cross-section morphology, substrate composition, in-stream aquatic and riparian vegetation communities, and cover opportunities. The Ministry of Transportation's (MTO) Fish and Fish Habitat sampling protocol was used at sampling locations of potential stream crossings (MTO 2009). The MTO protocol sampling parameters were recorded at the proposed or potential crossing locations, but were also designed to record surrounding upstream and downstream reaches in order to encompass contingency areas of habitat potentially used for linear infrastructure construction. Further detail with respect to habitat assessment within the vicinity of the potential crossing of the Pinewood River is provided under separate cover (AMEC 2013b).

During field investigations, topographic maps, orthophotographs, a handheld global positioning system and rangefinder were used to reference location, orientation and measure distances.

Photographic records were collected from each sampling location (Appendix A).

2.4 Fisheries Resources

Fish community surveys, with particular interest in Walleye and Northern Pike spawning timing windows and locations, were collected from May 14 to May 22, 2013, under the Ministry of Natural Resources (MNR) License to Collect Fish for Scientific Purposes No. 1073721. Techniques used to sample fish included: short duration gillnetting (≤ 8 hours), fyke nets, minnow traps, larval tows, backpack electroshocking, dip netting, spotlighting and angling. These techniques were employed to provide a diverse range of passive and active methods to assess the presences and abundance of both small-bodied and large-bodied fish species. Locations for each sampling technique are presented in Figures 2-3A and 2-3B.

In 2013, gillnets were primarily used in the lower reaches of the Pinewood River, in areas with sufficient wetted widths and depths. Gillnets 15.2 m in length, with a stretch mesh size ranging from 38.1 millimetres (mm) to 50.8 mm, were set between 1 and 8 hours (as per MNR direction) at depths of 1 to 4 metres (m). Where river widths permitted, gillnets were set in gangs perpendicular to the flow to maximize fish-net interactions. Gillnet Catch per Unit Effort (CPUE) is described in this report as the catch per 15 m standard gillnet set, calculated as:

$$\text{CPUE} = \text{total catch} / \text{set period (hours)} \times [\text{length of gill net set (m)} / 15.24]$$

Minnow traps were used as a passive method of targeting small-bodied and juvenile fish species. Traps, baited with dog kibble, were deployed in areas supporting foraging fish communities. In particular, traps were generally set for between 1 and 8 hours, along creek and river banks, at depths between 0.5 to 1 m. Minnow trap CPUE was calculated as the number of fish per trap hour:

$$\text{CPUE} = \text{total catch} / \text{number of traps set} \times \text{sampling duration (hours)}$$

Backpack electroshocking was conducted by a Provincially accredited crew leader using a Smith-Root Inc. Model LR-24 backpack electroshocker with a second crew member using a dip net. In general, the backpack electroshocker was set to 250 volts, 60 hertz with a 2% duty cycle. Habitats considered suitable for electroshocking ranged from: wadeable sections of creeks and rivers, to bank margins of deeper sections with variable substrates. One-pass electroshocking was conducted at all sites using a sweeping motion, concentrating effort equally on all available habitats. Electroshocking CPUE is presented as the total catch of individuals per electrosecond. As instances of this ratio may be considerably less than one, CPUE is presented as the total number of individuals captured per electrosecond multiplied by a factor of 1,000.

$$\text{CPUE} = \text{total catch} / \text{electroseconds} \times 1,000$$

Dip netting was conducted on one occasion when individual fish were observed travelling upstream a shallow section of Clark Creek. Dip netting was conducted by slowly walking upstream along the margins so as to not disturb substrates in the path of observation and capturing visible individuals. CPUE is calculated as the number of fish per dip.

$$\text{CPUE} = \text{total catch} / \text{dips}$$

Fyke traps were set in 2013 in West Creek, Loslo Creek and Clark Creek. Fyke nets were set so as to sample fish moving in or out of tributaries of the Pinewood River. Nets were constructed of black nylon twine with 3 centimetre (cm) stretch mesh size, of five hoops approximately 1 m in diameter, two funnels and two, 5 m long wings. Nets were set in depths ranging from 0.5 to 0.7 m of water and for between 10 to 20 hours. CPUE for this gear was calculated as the number of fish captured per hour.

Active larval tows were conducted below a partial, natural fish barrier possessing site-specific characteristics conducive to the spawning of several fish species identified within the lower Pinewood River. Tows were conducted using fine mesh drift nets (50 μm), roped to a wooden boom and towed upstream by a zodiac propelled by an outboard motor. Each tow was conducted for approximately 100 m at a consistent speed to standardize the volume of water passing through the net per sample. Sampling effort (number of tows) was based on the availability of slow water, eddies and/or pool habitats which have been shown to be valuable fish nursery grounds. CPUE was calculated as the number of larvae per larval tow.

$$\text{CPUE} = \text{total catch per larval tow}$$

Angling was utilized to capture adult fish in the Lower Pinewood River, where conditions were not favourable for conventional sampling techniques described above. Anglers used spinning rod equipment with spoons, spinners and jig heads. Each lure had a treble hook (three points) and jig heads had only one hook. Fishing effort was determined as the catch per rod per hour (rod hour). Angling effort took place in the thalweg between location PIN-23 and PIN-24 (Figure 2-3B).

$$\text{CPUE} = \text{total catch} / \text{total rod hours}$$

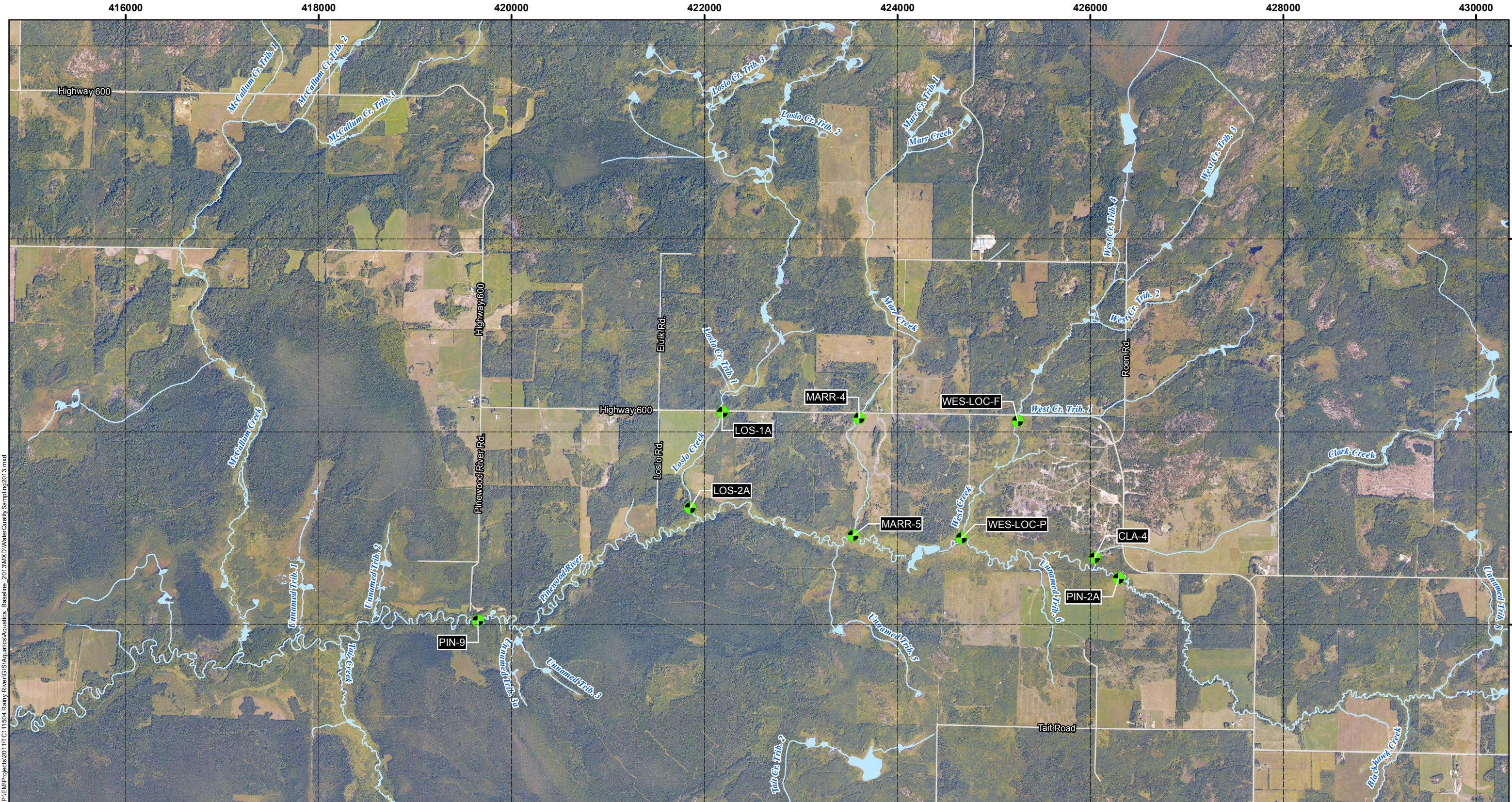
Visual surveys were conducted during the 2013 spring field survey on the Pinewood River to identify potential spawning locations of fish species, but specifically Walleye. With the aid of two high powered spotlights (≥ 3 million candle light power), a zodiac was used to troll along the shoreline, main channel and back eddy areas of the Pinewood River directly below rapids created by a rock structure approximately 5 km upstream of its confluence with the Rainy River

and approximately 500 m downstream of the Morley Dilke Road crossing (Figure 2-3A). Visual spawning surveys were conducted on May 15 (between 21:05 and 21:35), May 17 (between 21:15 and 22:45) and May 18, 2013 (between 21:05 and 22:25). The speed of travel was limited to ensure visual observation potential while causing as little disturbance as possible.

2.5 Fish Biosample Collection





All fish captured were identified to species by qualified fisheries staff, measured for length, and weighed. Forage fish were returned unharmed to the location of capture. Incidental mortalities were identified for sex and sampled for dorsal muscle tissue and calcified aging structures (scales, spines, cleithra, otoliths and fin rays as applicable to species). Calcified structure collection was consistent with the instruction of *Collection Techniques for Fish Ageing Structures, Northwest Region* (Mann 2004). Calcified structures were analyzed for age by John Tost, North Shore Environmental Services.

Adult Walleye, Northern Pike and White Sucker were handled upon capture so as to attempt to extract eggs or milt from their gonads if in a ripe and/or running condition. Sex and maturity information provided in Appendix C were gained through these means as fish were not sacrificed during this field program. Fish that were captured along with ripe or running individuals are expected to be mature and potentially spent, however, as this was not confirmed these were recorded as unknown for sex and maturity categories.



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Aquatics_Baseline_2011\3M\XDW\WaterQuality\Sampling2013.mxd

LEGEND

-  In-Situ Water Quality Sampling Location
-  Road
-  Watercourse
-  Waterbody

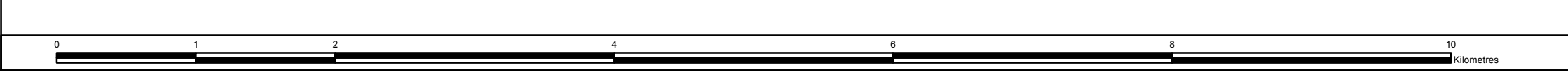
NOTES:

- Road and watercourse data extracted from Land Information Ontario (MNR).
- Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
- Other background imagery provided by ESRI World Image service.

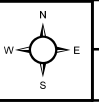


RAINY RIVER PROJECT

In-situ Water Quality Measurement Locations 2013

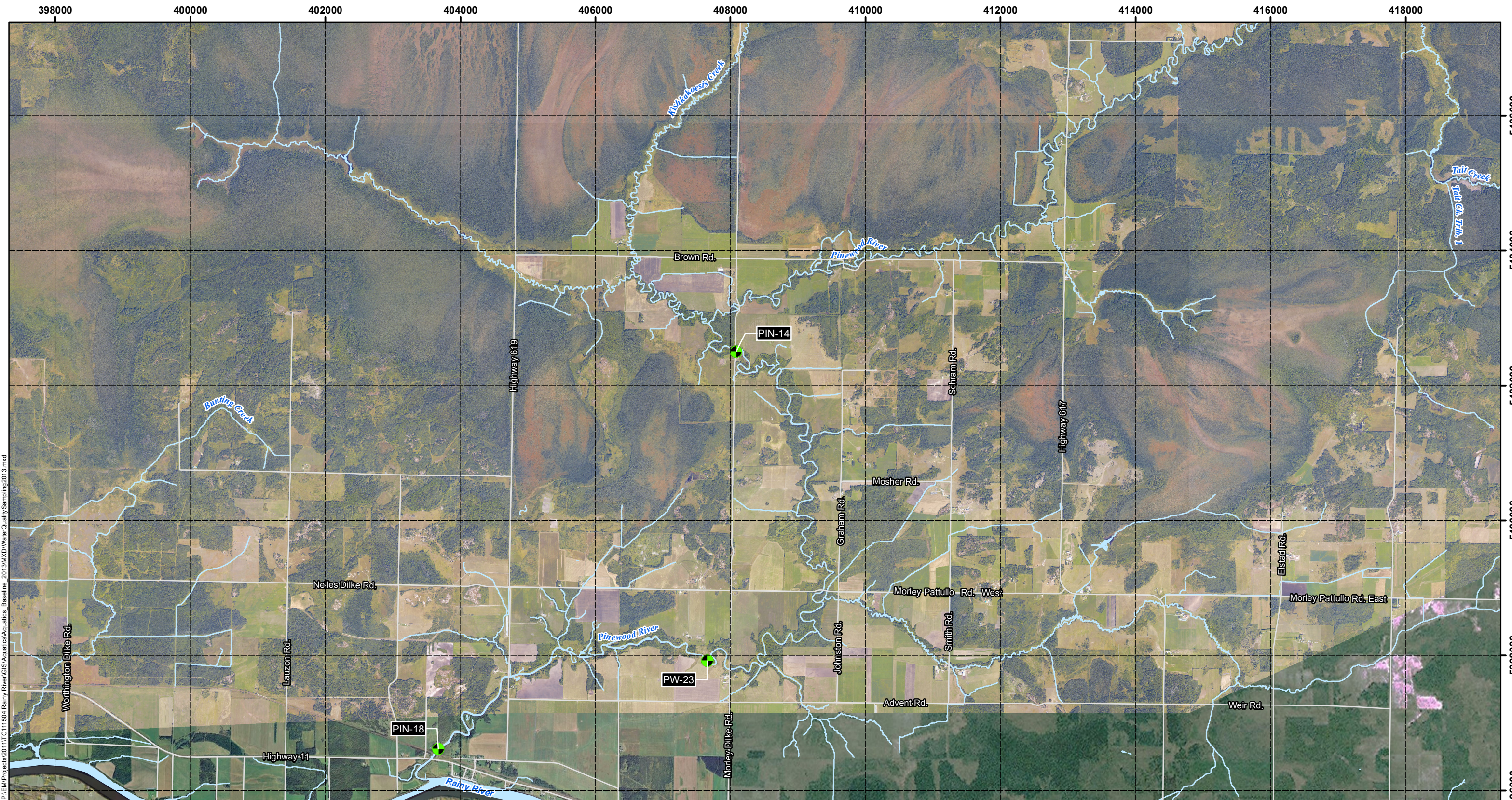


Datum: NAD83
Projection: UTM Zone 15N







PROJECT N^o: TC111504
SCALE: 1:38,000

FIGURE: 2-1A
DATE: October 2013



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Aquatics_BaseLine_20113MMD\WaterQuality\Sampling2013.mxd

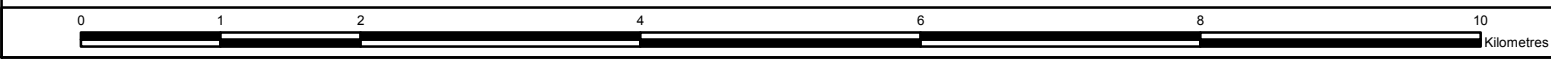
- LEGEND**
-  In-Situ Water Quality Sampling Location
 -  Road
 -  Watercourse
 -  Waterbody

NOTES:
 -Road and watercourse data extracted from Land Information Ontario (MNR).
 -Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
 -Other background imagery provided by ESRI World Image service.

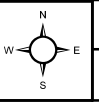


RAINY RIVER PROJECT

In-situ Water Quality Measurement Locations 2013



Datum: NAD83
 Projection: UTM Zone 15N



PROJECT N^o: TC111504

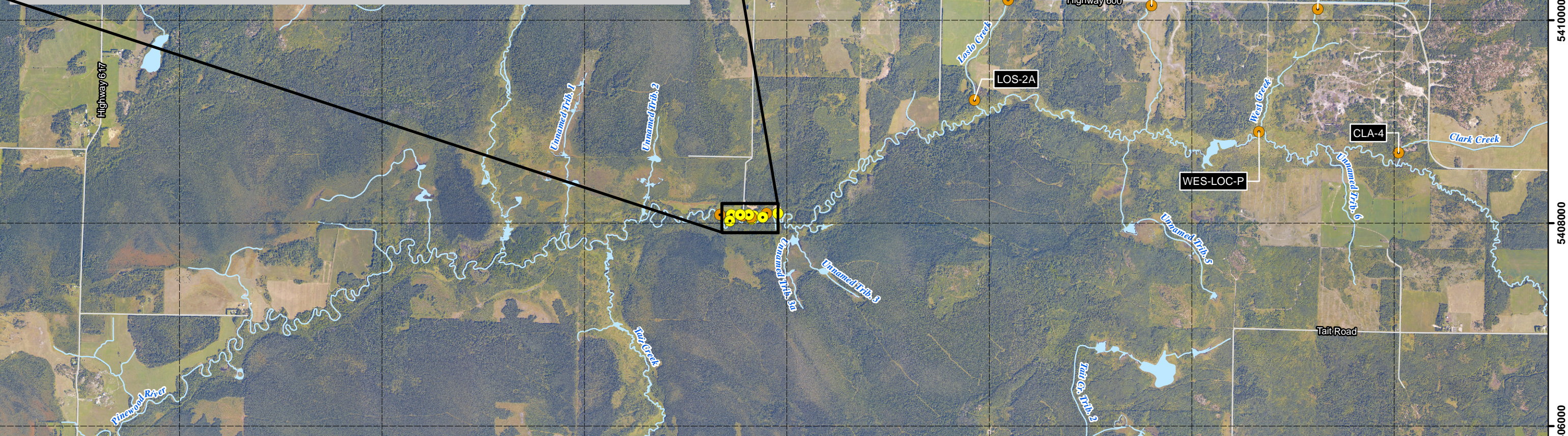
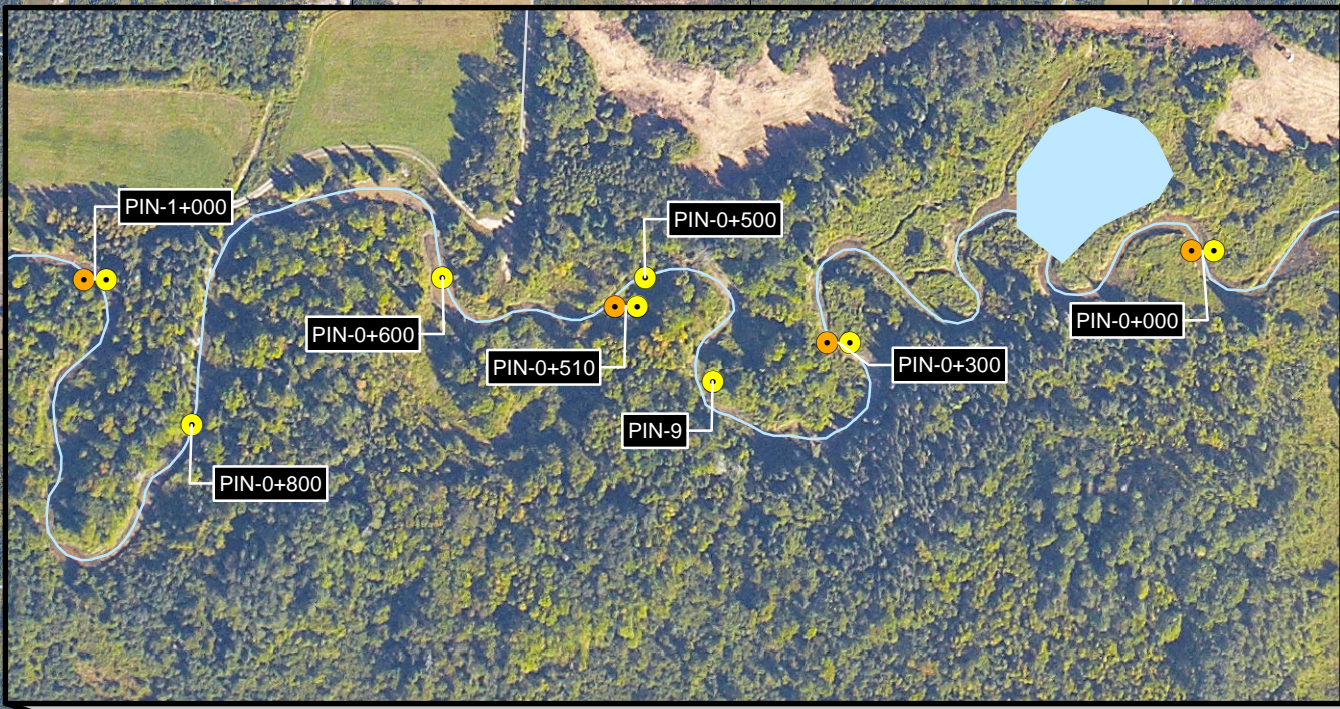
FIGURE: 2-1B

SCALE: 1:54,000

DATE: October 2013

412000 414000 416000 418000 420000 422000 424000 426000

5414000
5412000
5410000
5408000
5406000



P:\EM\Projects\2011\TC111504_Rainy_River_GIS\Aquatics\Aquatics_BaseLine_2011\3M\XD_AquaticHabitatAndStreamMorphologyAssessmentLocations2013.mxd

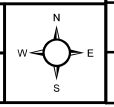
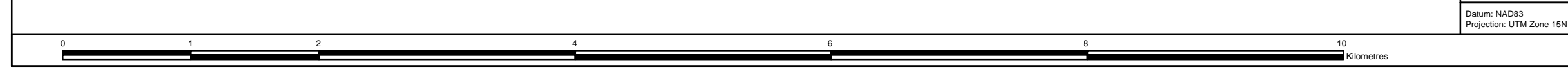
LEGEND

- Road
- Watercourse
- Waterbody
- Habitat Sampling Location**
- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location

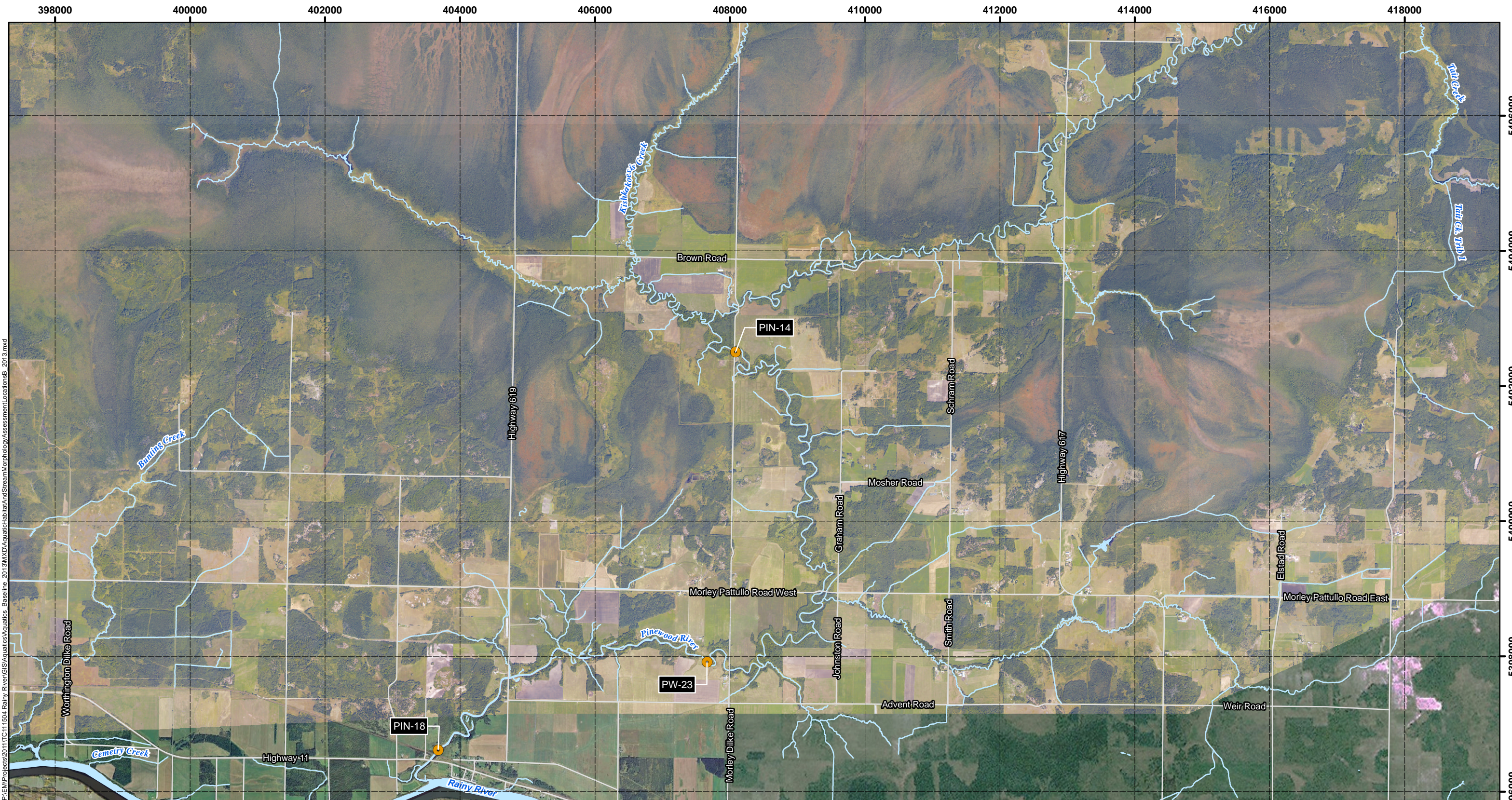
NOTES:
 -Road and watercourse data extracted from Land Information Ontario (MNR).
 -Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
 -Other background imagery provided by ESRI World Image service.



RAINY RIVER PROJECT
Aquatic Habitat and Stream Morphology Assessment Locations 2013



Datum: NAD83
 Projection: UTM Zone 15N
 PROJECT N^o: TC111504 FIGURE: 2-2A
 SCALE: 1:38,000 DATE: October 2013



P:\EM\Projects\2011\TC111504_Rainy_River\GIS\Aquatics\Aquatics_BaseLine_20113M\XD\AquaticHabitatAndStreamMorphology\AssessmentLocationsB_2013.mxd

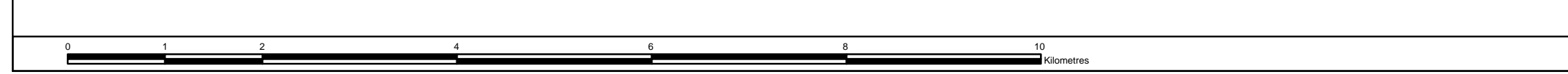
LEGEND

- Road
- Watercourse
- Waterbody
- Habitat and Bathymetry Sampling Location**
- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location

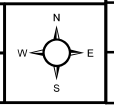
NOTES:
 -Road and watercourse data extracted from Land Information Ontario (MNR).
 -Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
 -Other background imagery provided by ESRI World Image service.



RAINY RIVER PROJECT
Aquatic Habitat and Stream Morphology Assessment Locations 2013

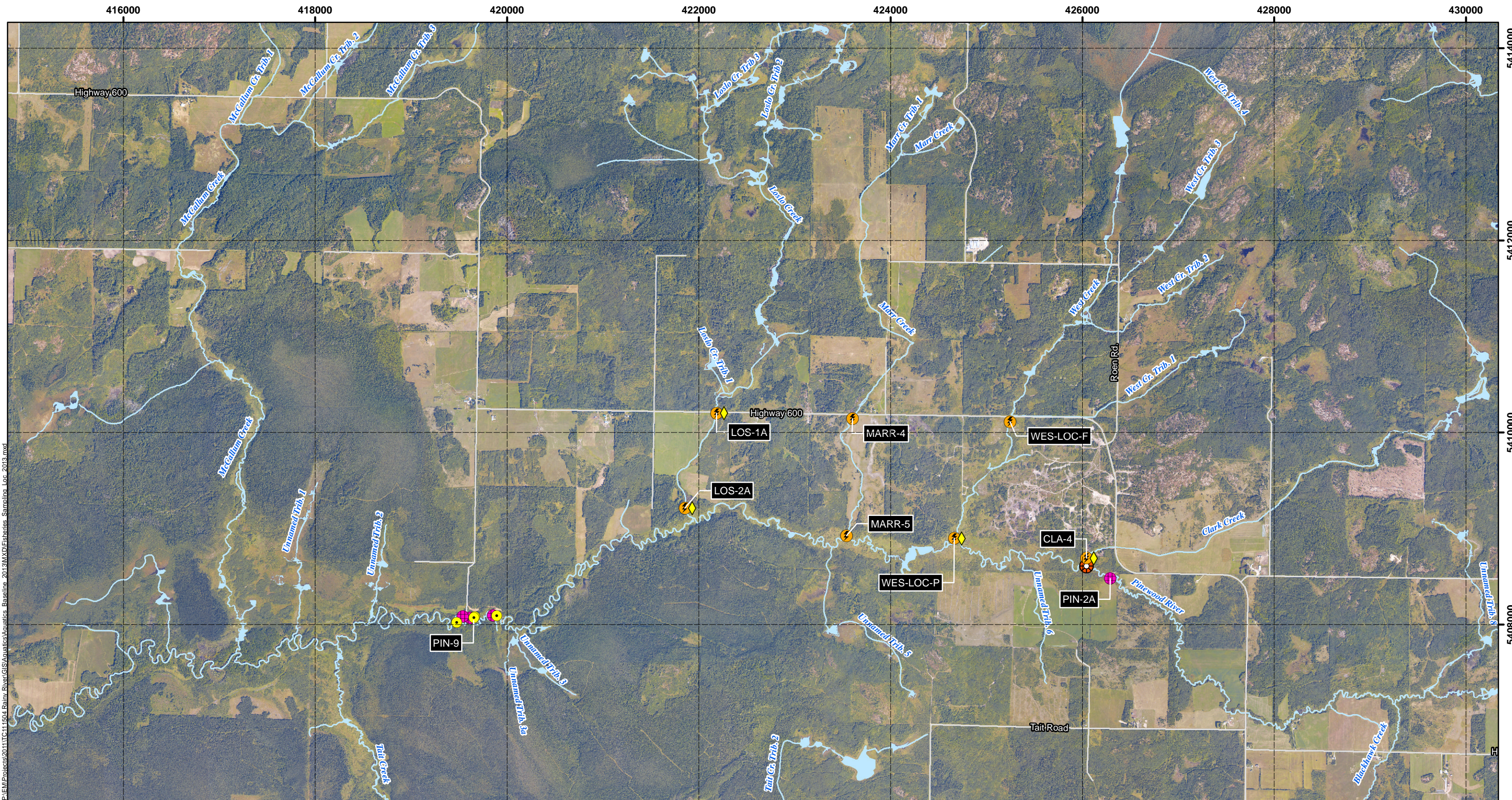


Datum: NAD83
 Projection: UTM Zone 15N



PROJECT N^o: TC111504
 SCALE: 1:54,000

FIGURE: 2-2B
 DATE: October 2013



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Aquatics_Baseline_2011\3M\XD\Fisheries_Sampling_Loc_2013.mxd

LEGEND

Gear Type

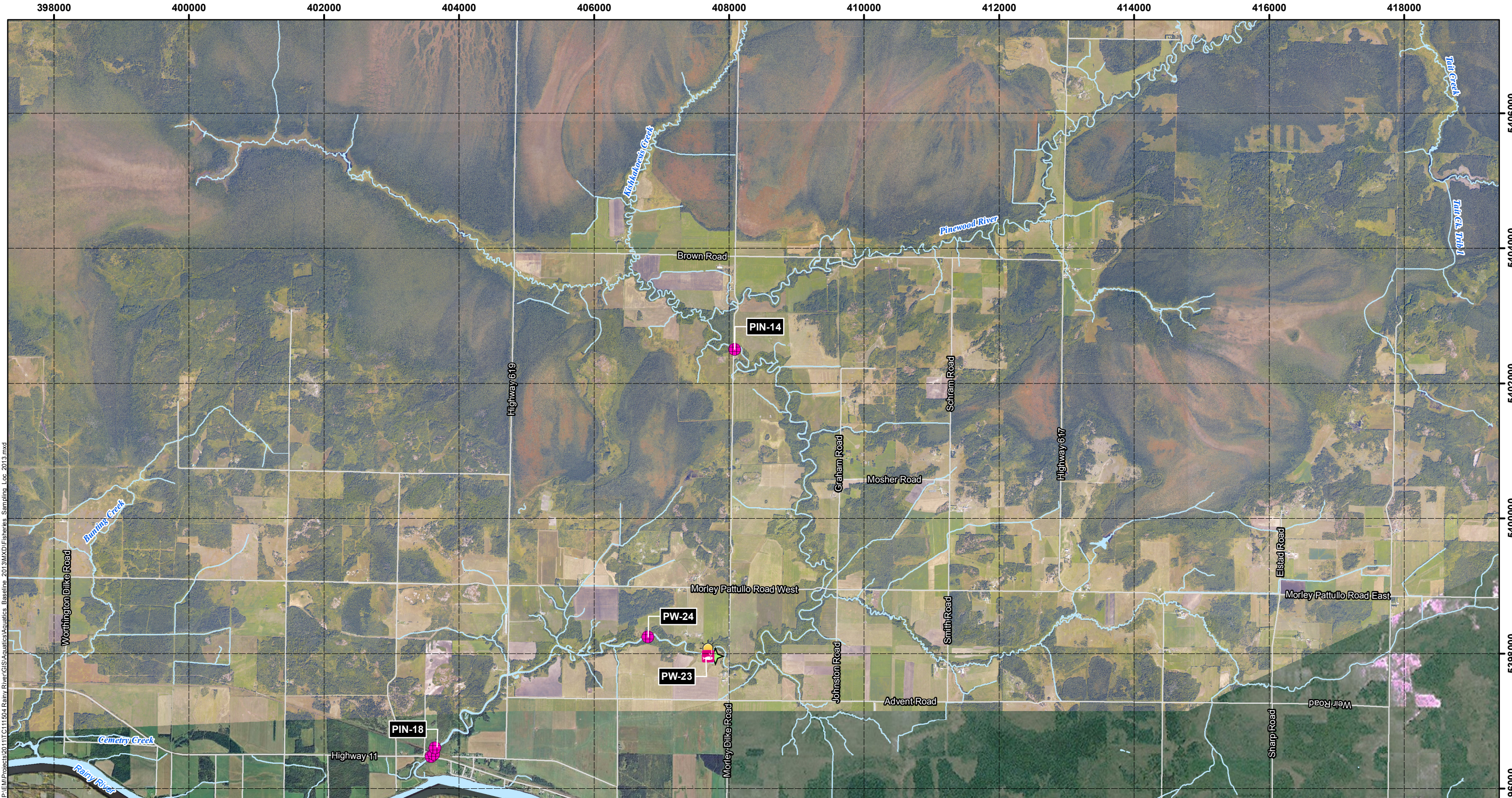
Angling	Backpack Electroshocking	Road
Fyke Net	Larval Tow	Watercourse
Minnow Trap	Visual Observation (Spotlight)	Waterbody
Gill Net		

NOTES:

- Road and watercourse data extracted from Land Information Ontario (MNR).
- Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
- Other background imagery provided by ESRI World Image service.

RAINY RIVER PROJECT	
Fish Community Survey Locations 2013	

Datum: NAD83 Projection: UTM Zone 15N			PROJECT N ^o : TC111504	FIGURE: 2-3A
			SCALE: 1:38,000	DATE: October 2013



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Aquatics_Baseline_2011\3MMXD\Fisheries_Sampling_Loc_2013.mxd

LEGEND

Gear Type

Angling	Dip Net	Road
Fyke Net	Backpack Electroshocking	Watercourse
Minnow Trap	Larval Tow	Waterbody
Gill Net	Visual Observation (Spotlight)	

0 1 2 4 6 8 10
Kilometres

NOTES:
 -Road and watercourse data extracted from Land Information Ontario (MNR).
 -Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
 -Other background imagery provided by ESRI World Image service.

Datum: NAD83
 Projection: UTM Zone 15N

RAINY RIVER	
RAINY RIVER PROJECT	
Fish Community Survey Locations 2013	
PROJECT N ^o : TC111504	FIGURE: 2-3B
SCALE: 1:54,000	DATE: October 2013

3.0 RESULTS

3.1 Aquatic Habitat

Aquatic habitats within the Pinewood River system were previously classified into habitat types as part of previous baseline studies (AMEC 2013a). These habitat types are useful from a broad scale perspective to represent available aquatic habitat. The categorization of reaches and sections of the watersheds in the study area does not negate the importance of small-scale microhabitats on aquatic resources. Overall, nine habitat types were classified and their presence was delineated throughout the study area. Based on the classification criteria, habitat types were most consistently associated with specific areas of the Pinewood River (either upper or lower) and its tributaries.

The location and distribution of habitat types are presented in AMEC 2013a. The habitat information that was collected during field investigations in 2013 further supports these classifications. Further details with respect to habitat assessment conducted in 2013 specific to the potential Highway 600 crossing location of the Pinewood River is provided under separate cover (AMEC 2013b).

Photographic representation of habitats is provided in Appendix A. Aquatic habitat measurements and information specific to field surveys conducted in 2013 are summarized in Appendix B.

3.2 Pinewood River System

3.2.1 Water Quality

Water quality measurements were collected at the Pinewood River (PIN-2A, PIN-9, PIN-14, PIN-18, PW-23; Figure 2-1A and 2-1B). Over the duration of the nine day sampling period (May 14 to 22), water temperatures ranged between 7.3 to 13.5 degrees Celsius (°C). A two day rain event near the end of the sampling period resulted in a notable drop in water temperatures from approximately 12°C to approximately 8°C (Table 3-1).

Dissolved oxygen (DO) concentrations measured *in situ* at the Pinewood River sampling locations (Table 3-1) ranged between 7.9 to 10.9 milligrams per litre (mg/L). Details of other physico-chemical parameters measured including pH, conductivity, and total dissolved solids are included in Table 3-1. DO and pH met PWQO.

3.2.2 Fisheries Resources

Fish sampling results for the Pinewood River are presented in Tables 3-2, 3-3, 3-5, 3-7 and 3-8. Results are presented as species specific CPUE based on sampling technique. A summary of

presence / absence of fish species captured during the 2013 field survey is provided in Appendix C - Table C-2; sampling locations are shown in Figures 2-3A and 2-3B.

A total of five fish species were captured in the lower Pinewood River (approximately 28 km from the RRP site) in 2013 by gill net: Walleye, White Sucker (*Catostomus commersonii*), Shorthead Redhorse (*Moxostoma macrolepidotum*), Northern Pike and Lake Sturgeon. Only one Walleye was captured by gill net at PIN-18 which was located approximately 500 m upstream of the confluence of the Pinewood River with the Rainy River. This individual was 655 mm in length and 2.3 kilograms (kg) in weight. As this fish was not sacrificed, sex and maturity were not assessed. Specific details regarding the capture of a single Lake Sturgeon (listed as Threatened in the area under Ontario's *Endangered Species Act*) from the Pinewood River in 2013 was supplied to the Fort Frances MNR on May 21, 2013.

Visual observation using light enhancement was not successful in identifying specific spawning locations for Walleye in the spring of 2013. Due to heavy precipitation events and greater than bankfull water level conditions, the depth, clarity and flow of the Pinewood River during the survey period were generally below suitable for such survey techniques.

3.3 Loslo Creek System

3.3.1 Water Quality

Water quality was measured *in situ* at two different locations along Loslo Creek (LOS-1A, LOS-2A; Figure 2-1A). Water temperatures ranged from 10.9 to 15.0°C, while DO concentrations measured 7.45 to 8.3 mg/L. Details of other physico-chemical parameters measured including pH, conductivity and total dissolved solids are included in Table 3-1. DO and pH met PWQO for cold water fish species.

3.3.2 Fisheries Resources

Species specific CPUE per sampling technique for Loslo Creek are presented in Tables 3-4 and 3-6; sampling locations are shown in Figure 2-3A. A summary of presence / absence of fish species captured during the 2013 field survey is provided in Appendix C (Table C-2).

A total of five fish species were captured in Loslo Creek in 2013: Brook Stickleback (*Culaea inconstans*), Central Mudminnow (*Umbra limi*), Finescale Dace (*Chrosomus neogaeus*), Northern Pearl Dace (*Margariscus nachtriebi*) and White Sucker. Passive and active fishing techniques did not capture Northern Pike or Walleye in this tributary in 2013.

3.4 Marr Creek System

3.4.1 Water Quality

Water quality was measured *in situ* at two locations along Marr Creek (MARR-4, MARR-5; Figure 2-1A) during spring of 2013. Water temperatures were 12.0 and 12.6°C while a single DO measured 6.79 mg/L and pH was 7.07, both parameters meeting PWQO. Details of other physico-chemical parameters measured are included in Table 3-1.

3.4.2 Fisheries Resources

Species specific CPUE for electroshocking in Marr Creek is presented in Table 3-4; sampling locations are shown in Figure 2-3A. A summary of presence / absence of fish species captured during the 2013 field survey is provided in Appendix C (Table C-2).

A total of four fish species were captured in Marr Creek in 2013: Brook Stickleback, Central Mudminnow, Fathead Minnow (*Pimephales promelas*) and Northern Pearl Dace. Northern Pike and Walleye were not found in this tributary during spring 2013 surveys.

3.5 West Creek System

3.5.1 Water Quality

Water quality parameters measured at West Creek (WES-LOC-F and WES-LOC-P; Figure 2-1A) included water temperature (11.4 and 12.4°C, respectively) while DO measurements were 6.81 and 6.46 mg/L. Details of other physico-chemical parameters measured including pH, conductivity, and total dissolved solids are included in Table 3-1. DO and pH met PWQO.

3.5.2 Fisheries Resources

Species specific CPUE per sampling technique for West Creek are presented in Tables 3-4 and 3-6, with the sampling locations shown in Figure 2-3A.

Six species of fish were captured at West Creek: Creek Chub (*Semotilus atromaculatus*), Common Shiner (*Luxilus cornutus*), Brook Stickleback, Finescale Dace, Northern Pearl Dace, and White Sucker. Back-pack electroshocking and fyke netting did not confirm the presence of Northern Pike or Walleye within the tributary during spring of 2013.

3.6 Clark Creek System

3.6.1 Water Quality

Water quality was surveyed on two occasions (May 15 and May 21, 2013) at one location on Clark Creek (CLA-4; Figure 2-1A). Water temperatures measured 14.8 and 8.1°C with pH ranging from 7.14 to 7.16, while DO measured 6.27 to 7.44 mg/L. Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat and/or met PWQO as applicable.

3.6.2 Fisheries Resources

Fish sampling results for Clark Creek are presented in Tables 3-4, 3-5 and 3-6. Results are presented as species specific CPUE per sampling technique. Sampling locations are shown in Figure 2-3A. Electroshocking and fyke nets were not successful in capturing fish during spring of 2013 in this tributary; however, White Sucker were found to be moving upstream based on dip netting captures. Northern Pike or Walleye were not observed in this tributary during the survey period.

Table 3-1: In-Situ Water Quality Measurements

Watercourse	Sample Location	Date	Temperature (°C)	Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH
PWQO			-	-	-	-	6 to 7*	6.5 to 8.5
Pinewood River	PIN-2A	20-May-13	11.0	237	119	65.7	6.51	7.75
	PIN-0+000	22-May-13	8.3	112	87	87.3	10.56	6.80
	PIN-0+800	22-May-13	9.2	138	41	63.1	9.86	7.15
	PIN-14	16-May-13	10.6	126	68	67.8	10.81	7.50
		16-May-13	12.3	135	70	65.3	7.90	7.48
		19-May-13	10.6	127	63	86.3	8.15	7.83
		21-May-13	7.3	138	70	56.1	6.55	7.03
	PIN-18	14-May-13	8.8	107	-	92.5	10.73	7.08
		15-May-13	11.0	111	86	94.9	10.46	6.81
		16-May-13	13.5	135	177	78.7	8.65	7.15
		20-May-13	8.5	173	85	63.6	6.78	7.16
	PW-23	15-May-13	11.4	148	78	92.4	10.31	7.14
		15-May-13	11.4	148	71	98.1	10.68	7.16
		15-May-13	12.8	131	86	86.1	10.91	7.15
		16-May-13	12.6	141	81	63.4	8.79	7.51
		17-May-13	13.4	152	78	69.5	6.71	6.91
		18-May-13	12.2	144	72	68.3	6.7	7.88
20-May-13		9.5	175	87	79.8	8.86	7.69	
21-May-13	7.7	166	84	69.3	10.71	6.85		
Loslo Creek	LOS-1A	17-May-13	10.9	312	163	61.6	7.45	7.16
	LOS-2A	17-May-13	15.0	208	103	65.3	7.90	7.66
		18-May-13	12.9	228	118	68.6	8.3	6.86
Marr Creek	MARR-4	18-May-13	12.0	209	104	-	-	7.75
	MARR-5	18-May-13	12.6	125	89	68.3	6.79	7.07
West Creek	WES-LOC-F	17-May-13	11.4	194	96	56.3	6.81	7.69
	WES-LOC-P	17-May-13	12.4	242	126	53.4	6.46	7.04
Clark Creek	CLA-4	15-May-13	14.8	269	144	51.8	6.27	7.16
		21-May-13	8.1	144	83	61.5	7.44	7.14

Notes:

" - "

indicates value not recorded

*

PWQO: Dissolved oxygen should not be less than 6 to 7 mg/L for temperatures from 5 to 15 °C for cold water species

Table 3-2: Species Specific Catch per Unit Effort for Gillnets

Watercourse Name	Sample Location ID	Date	Set Length (hrs)	Mesh(s) Size (mm)	Standardized Effort	CPUE = Catch per hour of 15 m Standard Gillnet Set					Total CPUE = Total Catch/Standardized Effort	Total Catch
						Northern Pike	Shorthead Redhorse	Walleye	White Sucker	Lake Sturgeon		
Pinewood River	PIN-18-GN1	14/05/13	2.75	127	2.8	0.000	0.364	0.000	0.727	0.000	1.091	3
	PIN-18-GN2	14/05/13	2.42	127	2.4	0.414	0.000	0.000	0.414	0.000	0.828	2
	PIN-18-GN3	14/05/13	2.33	127	2.3	0.429	0.429	0.000	0.000	0.000	0.858	2
	PIN-18-GN4	14/05/13	1.83	203.2	1.8	0.000	0.000	0.000	0.000	0.000	0.000	0
	PIN-18-GN1-R1	15/05/13	8.00	127, 127	16.0	0.000	0.000	0.000	0.000	0.000	0.813	13
	PIN-18-GN1-R2	16/05/13	6.33	114.3, 139.7	12.7	0.000	0.079	0.000	0.000	0.000	0.237	3
	PIN-18-GN1-R3	21/05/13	7.00	101.6, 127	14.0	0.000	0.000	0.071	0.857	0.000	0.071	1
	PIN-18-GN2-R1	15/05/13	7.33	127, 127	14.7	0.136	0.136	0.000	0.955	0.000	1.228	18
	PIN-18-GN4-R1	21/05/13	6.75	88.9, 127	13.5	0.000	0.000	0.000	0.148	0.000	0.000	0
	PW-24-GN1	14/05/13	1.18	88.9	1.2	0.000	4.227	0.000	5.072	0.000	0.000	0
	PW-24-GN2	15/05/13	4.58	76.2, 101.6	9.2	0.218	0.000	0.000	0.000	0.000	0.218	2
	PW-24-GN2-R1	15/05/13	5.17	76.2, 101.6	10.3	0.097	0.387	0.000	0.097	0.000	1.065	11
	PW-23-GN1	14/05/13	0.50	76.2	0.5	4.000	2.000	0.000	26.000	0.000	2.000	1
	PW-23-GN2	15/05/13	3.00	127, 203.2	6.0	0.167	0.000	0.000	0.167	0.000	1.833	11
	PW-23-GN3	15/05/13	3.17	88.9, 127	6.3	0.316	0.158	0.000	0.632	0.000	0.316	2
	PW-23-GN4	15/05/13	3.25	50.8, 88.9	6.5	0.308	0.769	0.000	0.615	0.000	0.923	6
	PW-23-GN2-R1	15/05/13	6.25	127, 203.2	12.5	0.000	0.000	0.000	0.000	0.000	1.280	16
	PW-23-GN2-R2	16/05/13	6.33	88.9, 127	12.7	0.158	0.000	0.000	0.079	0.000	1.738	22
	PW-23-GN2-R3	17/05/13	3.25	88.9, 127	6.5	0.308	0.154	0.000	2.923	0.083	1.077	7
	PW-23-GN2-R4	18/05/13	3.25	88.9, 127	6.5	0.000	0.154	0.000	1.846	0.000	0.923	6
	PW-23-GN2-R5	20/05/13	3.92	114.3, 127	7.8	0.000	0.128	0.000	0.638	0.000	0.000	0
	PW-23-GN2-R6	21/05/13	3.75	88.9, 139.7	7.5	0.667	0.000	0.000	0.800	0.000	0.000	0
	PW-23-GN3-R1	15/05/13	6.33	88.9, 127	12.7	0.000	0.000	0.000	0.474	0.000	0.158	2
	PW-23-GN3-R2	16/05/13	6.75	50.8, 88.9	13.5	0.370	0.000	0.000	0.222	0.000	0.963	13
	PW-23-GN3-R5	20/05/13	3.92	88.9, 101.6	7.8	0.000	0.000	0.000	0.255	0.000	0.000	0
	PW-23-GN3-R6	21/05/13	3.75	127, 203.2	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0
	PW-23-GN4-R1	15/05/13	6.42	50.8, 88.9	12.8	0.000	0.000	0.000	0.000	0.000	0.546	7
	PIN-14-GN1	15/05/13	6.00	88.9, 101.6	12.0	0.083	0.000	0.000	0.000	0.000	0.000	0
	PIN-14-GN2	19/05/13	16.00	88.9, 101.6	32.0	0.000	0.000	0.000	0.000	0.000	0.344	11
	PIN-14-GN3	21/05/13	5.50	88.9, 114.3	11.0	0.000	0.000	0.000	0.000	0.000	0.000	0
PIN-2A-GN1	20/05/13	5.58	88.9, 114.3	11.2	0.000	0.000	0.000	0.000	0.000	0.717	8	
PIN-2A-GN2	20/05/13	5.33	38.1, 76.2	10.7	0.000	0.000	0.000	0.000	0.000	0.188	2	
PIN-0+000-GN1	22/05/13	5.50	76.2, 101.6	11.0	0.000	0.000	0.000	0.000	0.000	0.000	0	
PIN-0+510-GN1	22/05/13	4.50	76.2, 114.3	9.0	0.000	0.000	0.000	0.000	0.000	0.000	0	
PIN-0+510-GN1	22/05/13	4.42	88.9, 101.6	8.8	0.000	0.000	0.000	0.000	0.000	0.000	0	
PIN-0+600-GN1	22/05/13	3.75	63.5, 88.9	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0	
Species Total CPUE						7.671	8.984	0.071	42.922	0.083	19.413	
Catch (n)						29	24	1	114	1		168

Table 3-3: Species Specific Catch per Unit Effort for Minnow Traps

Watercourse Name	Sample Location ID	Date	Set Length (hrs)	Numbers of Traps Set	Total Effort (Hrs x Area)	CPUE = Catch / (number of traps x hours)	Total CPUE	Total Catch
						Fish Species		
Pinewood River	PIN-0+000-MT1	22/05/13	5.33	1	5.3	No Catch	0.00	0
	PIN-0+000-MT2	22/05/13	5.25	1	5.3	No Catch	0.00	0
	PIN-0+510-MT1	22/05/13	4.50	1	4.5	No Catch	0.00	0
	PIN-0+600-MT1	22/05/13	5.17	1	5.2	No Catch	0.00	0
	PIN-0+600-MT2	22/05/13	3.58	1	3.6	No Catch	0.00	0
Species Total CPUE						0.00	0.00	
Catch (n)						0		0

Table 3-4: Species Specific Catch per Unit Effort for Backpack Electroshocking

Watercourse Name	Sample Location ID	Date	Effort (Electrosec)	Species Specific CPUE = [(Fish per ElectroSecond) x 100]								Total CPUE	Total Catch
				Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Pearl Dace	White Sucker		
West Creek	Wes-LocF-E1	17/05/13	564	0.00	0.00	0.53	0.18	0.00	0.00	0.18	3.37	4.26	24
	Wes-LocP-E1	17/05/13	658	0.15	0.00	0.00	0.30	0.00	0.30	0.00	0.00	0.76	5
Loslo Creek	LOS-1A-E1	17/05/13	644	0.00	0.16	0.00	0.00	0.00	0.00	0.16	0.31	0.62	4
	LOS-2A-E1	18/05/13	584	0.34	0.34	0.00	0.00	0.00	0.68	0.00	0.17	1.54	9
Marr Creek	MARR-4-E1	18/05/13	533	0.00	0.00	0.00	0.00	0.19	0.00	0.75	0.00	0.94	5
	MARR-5-E1	18/05/13	641	0.47	0.31	0.00	0.00	0.00	0.00	1.87	0.00	2.65	17
Clark Creek	CLA-3-4-E1	21/05/13	642	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Species Total CPUE				0.96	0.81	0.53	0.48	0.19	0.99	2.96	3.85	10.77	
Catch (n)													64

Table 3-5: Species Specific Catch per Unit Effort for Dip Netting

Watercourse Name	Sample Location ID	Date	Effort (Dips)	Species Specific CPUE = total catch/dips	Total CPUE	Total Catch
				White Sucker		
Pinewood River	CLA-4-DN1	16/05/13	10	0.10	0.10	1
Species Total CPUE				0.10	0.10	
Catch (n)				1		1

Table 3-6: Species Specific Catch per Unit Effort for Fyke Netting

Watercourse Name	Sample Location ID	Date	Set Length (hrs)	CPUE = fish/hours	Total CPUE	Total Catch
				Fish Species		
West Creek	Wes-LocP-FN1	17/05/13	21.5	No Catch	0.00	0
Loslo Creek	LOS-2A-FN1	17/05/13	19.4	No Catch	0.00	0
Clark Creek	CLA-4-FN1	18/05/13	10.8	No Catch	0.00	0
Species Total					0.00	-
CPUE						
Catch (n)					-	0

Table 3-7: Species Specific Catch per Unit Effort for Larval Tows

Watercourse Name	Sample Location ID	Date	Number of Tows	Sample Area (m ²)	Total Effort (AreaSampled x # of Tows)	CPUE = total catch per tow	Total CPUE	Total Catch
						Fish Species		
Pinewood River	PW-23-LT1	18/05/13	3	100	300	No Catch	0.00	0
Species Total CPUE						0.00	0.00	
Catch (n)						0		0

Table 3-8: Species Specific Catch per Unit Effort for Angling

Watercourse Name	Sample Location ID	Date	Number of Rods	Effort (hr)	Total Effort (Rod hrs)	CPUE = total catch / total rod hours	Total CPUE	Total Catch
						Fish Species		
Pinewood River	PW-23-AN1	16/05/13	2	1.25	2.5	No Catch	0.00	0
	PW-23-AN2	18/05/13	2	2.00	4	No Catch	0.00	0
Species Total CPUE						0.00	0.00	
Catch (n)						0		0

4.0 DISCUSSION

The RRP site is situated primarily on private lands in the Township of Chapple in northwestern Ontario, within the upper portion of the Pinewood River watershed. Aquatic habitat in the area supports a variety of small-bodied forage fish species. The tributaries of the Pinewood River primarily support warmwater fish communities and habitats, while the Pinewood River supports both warmwater and coolwater fish communities. For the purposes of this baseline investigation Pinewood River and four of its tributaries were surveyed. Using seven sampling techniques, short duration gillnetting (≤ 8 hours), minnow traps, larval tows, backpack electroshocking, dip netting, spotlighting and angling, 12 fish species were captured with an average of 1.58 CPUE.

Habitat inventories were conducted on linear channels within the RRP site area. Inventories were conducted to provide data specific to general fish habitat availability, as well as potential preferred spawning areas for Walleye. The results of these inventories found that habitat types as identified in AMEC (2013a) provide an indication of potential Walleye spawning and nursery habitat (Habitat Type 9) Further details with respect to habitat assessment conducted in 2013 is provided under separate cover (AMEC 2013b) specific to the potential Highway 600 crossing location of the Pinewood River.

Fish species captured in 2013 in the Pinewood River and each of the four tributaries surveyed, are generally consistent with those captured in previous years (AMEC 2012, 2013a). As such, surveys of the mainstem Pinewood River and its tributaries during spring of 2013 did not indicate any major seasonal shift in species presence / absence.

Surveys conducted using fishing gear and visual observation for Walleye in the mainstem Pinewood River, focussed on lower section of the river at locations previously identified (AMEC 2012a) as having potential as spawning locations for Walleye. Walleye were captured in the lower Pinewood River (28 km downstream from the RRP site) during fisheries surveys in September of 2012 by AMEC by both boat electroshocker and gill net ($n = 33$) (AMEC 2012a) indicating habitat use in the lower Pinewood River near its confluence with the Rainy River during early fall. Temperatures during the 2013 spring field survey ranged from 7 to 14°C in the Pinewood River. This range includes the range of general spawning activity for this species (5 to 11°C) (Kerr et al. 2004; Scott and Crossman 1998) yet the peak spawning activity window is considered to occur between 7 and 8°C. (McMahon et al. 1984; Roseman et al. 1996). Ripe and running White Sucker were captured, and typically indicates the termination of the Walleye spawning period. The lack of captured Walleye even in downstream locations of the Pinewood River in spring of 2013 may indicate that departure from this tributary to the Rainy River occurred quickly after spawning, or that the number of spawning individuals was relatively low given the available habitat, which may also be limiting.

Lake Sturgeon, classified provincially as Threatened in the area, were not present within the RRP site area and environs, but were identified within the lower reaches of the Pinewood River



(approximately 28 km downstream of the RRP) through sampling efforts by AMEC in May of 2013. Further focussed efforts to capture this species in the Pinewood River were undertaken by the MNR in the same month of 2013 and yielded another two individuals. These were captured approximately 1 km upstream of the AMEC capture location and 27 km downstream of the RRP. Specific information with regard to the effort expended by the MNR has not been made available, however, Despite a numerous set of gill net within the Pinewood River during the spring 2013 field survey by AMEC only one individual was captured providing a low CPUE and potentially indicating a lack of suitable habitat and/or a small spawning population specific to the lower Pinewood River.

5.0 REFERENCES

- AMEC. 2012. Rainy River Resources Limited, Rainy River Gold Project, Aquatic Resources 2011 Baseline Investigation.
- AMEC. 2013a. Rainy River Resources Limited, Rainy River Gold Project, 2012 Aquatic Resources Baseline Report.
- AMEC 2013b. Rainy River Resources Limited, Rainy River Project, Fish and Fish Habitat Existing Conditions for Highway 600 Realignment Township of Chapple.
- Kerr, S.J., A.J. Dextrase, N.P. Lester, C.A. Lewis and H.J. Rietveld. 2004. Strategies for managing walleye in Ontario. Percid Community Synthesis Walleye Habitat Working Group. Ontario Ministry of Natural Resources. Peterborough, Ontario.
- Klohn Crippen Berger (KCB). 2011. Rainy River Gold Project Baseline Report 2008 – 2010.
- Mann, S.E. 2004. Collection techniques for fish ageing structures Northwest Region. Ont. Min. Natur. Resour., Northwest Sci. & Info. Thunder Bay, ON. NWSI Technical Report TR-73 Revised. 18 pp. + append.
- McMahon, T.E., J.W. Terrell and P.C. Nelson. 1984. Habitat suitability information: walleye. U.S. Department of Interior, Fish and Wildlife Service Report Number FWS/OBS-82/10.56.
- Ministry of the Environment. 1994. Policies, Guidelines Provincial Water Quality Objectives of the Ministry of Environment and Energy. July 1994. Reprinted February 1999. Ministry of Transportation Ontario (MTO). 2009. Environmental Guide for Fish and Fish Habitat. Ontario Ministry of Transportation, St. Catharines. 581 pp.
- Roseman, E. F., W. W. Taylor, D. B. Hayes, R. C. Haas, R. L. Knight, and K. O. Paxton. 1996. Walleye egg deposition and survival on reefs in western Lake Erie (USA). *Annales Zoologici Fennici* 33: 341–351.
- Scott, W.B. and E.J. Crossman. 1998. *Freshwater Fishes of Canada*. Galt House Publication Ltd., Oakville, ON, Canada.



APPENDIX A

PHOTOGRAPHIC RECORD (As Observed at Spring Freshet / Flood Conditions)



Photo 1: Facing downstream at PIN-14, on lower Pinewood River, during high flows.



Photo 2: Facing downstream at PIN-14, on lower Pinewood River, after a two day rain event.



Photo 3: Facing upstream at PIN-14, on lower Pinewood River, during high flows. AMEC field staff measuring water parameters.



Photo 4: Facing upstream at PIN-14, on Lower Pinewood River, after a two day rain event.



Photo 5: Facing southwest, downstream close to PIN-18, upstream of the mouth of the Rainy River. Railway crossing also displayed crossing the lower Pinewood River.



Photo 6: Facing northeast, upstream close to PIN-18, upstream of the mouth of the Rainy River.



Photo 7: On shore, facing northeast, upstream at PIN-18, after a two day rain event. Bottom of picture shows two panel gill nets set by AMEC field staff, tied off to a shoreline tree.



Photo 8: On shore, facing northwest, downstream at PIN-18, after a two day rain event. Trans-Canada Highway 11 appears to the left, crossing the lower Pinewood River.



Photo 9: Bedrock outcrop in the lower Pinewood River, facing upstream at PW-23, during high flows. Site was identified to have features suitable for spawning.



Photo 10: On bedrock outcrop, in the lower Pinewood River, at PW-23.



Photo 11: Bedrock outcrop in the lower Pinewood River, at PW-23, completely submerged after a two day rain event.



Photo 12: Shoreline on lower Pinewood River, at PW-24.



Photo 13: Facing downstream, at PW-24, on lower Pinewood River.



Photo 14: At Highway 600 road crossing, facing northeast, upstream at LOS-1A, on Loslo Creek.



Photo 15: At Highway 600 road crossing, facing southeast, downstream at LOS-1A, on Loslo Creek.



Photo 16: Facing culverts at Highway 600 road crossing, downstream at LOS-1A, on Loslo Creek. AMEC field staff taking field notes.



Photo 17: On bank, facing upstream at LOS-1A, on Loslo Creek.



Photo 18: On bank, facing upstream at LOS-1A, on Loslo Creek. Block net temporarily setup in channel to aid in fish capture, during backpack electrofishing.



Photo 19: On bank, facing downstream at LOS-2A, on Loslo Creek.



Photo 20: On bank, at LOS-2A, on Loslo Creek. During high water levels, water pooled upstream of beaver dam began flowing around dam and entering into the creek in a few areas similar to the above example.



Photo 21: Beaver dam upstream of LOS-2A, on Loslo Creek.



Photo 22: Fyke net set in the channel of Loslo Creek, at LOS-2A.



Photo 23: On Highway 600 road crossing, facing downstream of WES-LOC-F, on West Creek.



Photo 24: Culverts at Highway 600 road crossing, facing upstream, at WES-LOC F, on West Creek.



Photo 25: On Highway 600 road crossing observing outflow from culvert, facing upstream, at WES-LOC-F, on West Creek



Photo 26: Culverts at Highway 600 road crossing, facing downstream, at WEST-LOC-F, on West Creek.



Photo 27: On bank, facing upstream, at WES-LOC-F, on West Creek.



Photo 28: On bank, facing upstream at WES-LOC-F, on West Creek. Block net temporarily set up in channel to aid in fish capture, during backpack electrofishing.



Photo 29: On bank, at WES-LOC-P, at the mouth of West Creek, emptying into the upper Pinewood River.



Photo 30: On bank, at WES-LOC-P, at the mouth of West Creek, emptying into the upper Pinewood River. Fyke net set in the channel of West Creek.



Photo 31: On Highway 600 road crossing, facing upstream, at MARR-4, on Marr Creek.



Photo 32: On Highway 600 road crossing, facing downstream, at MARR-4, on Marr Creek.



Photo 33: On bank, facing upstream at MARR-4, on Marr Creek.



Photo 34: Facing downstream at MARR-5, on Marr Creek.



Photo 35: Facing downstream at MARR-5, on Marr Creek.



Photo 36: Small wetted section of Marr Creek, at MARR-5..



Photo 37: On Highway 600 road crossing, facing upstream, at CLA-4, on Clark Creek.



Photo 38: Culverts at Highway 600 road crossing, at CLA-4, on Clark Creek.



Photo 39: On Highway 600 road crossing, facing downstream, at CLA-4, on Clark Creek.



Photo 40: Facing downstream at CLA-4, on Clark Creek.



APPENDIX B
AQUATIC HABITAT DATA

APPENDIX B

TABLE B-1

KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Watercourse Name	Sample Location ID	Watercourse Type	Location Coordinates (Zone 15)		Habitat Sheet (Y/N)	Wet/Dry	Section Length (m)	Current Velocity (m/s)	Channel Morphology (% composition)	Channel Features (m)	Other Channel Features (%)	Mean Wetted Width (m)	Mean Wetted Depth (m)	Mean Bankfull Width (m)	Mean Bankfull Depth (m)	Floodplain Width (m)	Left Upstream Bank Stability	Right Upstream Bank Stability	Substrate Composition (%)	In stream Cover (% of surface area)	Aquatic Vegetation Type (based on overall 100% distribution)		Overhead Coverage (% stream shaded)	Migratory Obstructions / Potential Critical Habitat	Spring Water Chemistry Parameters	Surrounding Land Use	Sources of Pollution	Upwellings
			Emergent	Submergent																								
Pinewood River	PIN-0+000	Permanent River	419854	5408095	Y	Wet	100	2.36	Flats: 100	Gradient: Low	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 30 Organic Debris: 5	22.00	2.40	14.50	2.00	22	Slightly Unstable	Slightly Unstable	Gr/Co: 10 Detritus: 30	Woody Debris: 30	NR	NR	NR	None	WT: 8.3°C pH: 6.80 Con: 112 µS/cm TDS: 87 ppm DO: 87.3% 10.56 mg/L	Agriculture, Forest	Agricultural Runoff	None Observed
	PIN-0+300	Permanent River	419703	5408057	Y	Wet	100	2.36	Flats: 100	Gradient: Low	Undercut Banks: 0 Beaver Dams: 0 Eroding Banks: NR Woody Structure: 30 Organic Debris: 5	16.00	1.60	NR	NR	NR	Slightly Unstable	Slightly Unstable	GR/CO	Woody Debris: 30	NR	NR	NR	None	WT: 8.3°C pH: 6.80 Con: 112 µS/cm TDS: 87 ppm DO: 87.3% 10.56 mg/L	Agriculture, Forest	Agricultural Runoff	None Observed
	PIN-0+500	Permanent River	419615	5408072	Y	Wet	100	1.88	Flats: 100	Gradient: Low	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 0 Organic Debris: 5	16.61	2.56	16.61	2.56	NR	Stable	Stable	CO: 10 Detritus: 40	Woody Debris: 25	NR	NR	NR	None	WT: 8.3°C pH: 6.80 Con: 112 µS/cm TDS: 87 ppm DO: 87.3% 10.56 mg/L	Agriculture, Forest	Agricultural Runoff	None Observed
	PIN-1+000	Permanent River	419395	5408083	Y	Wet	100	1.61	Flats: 100	Gradient: Low	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: NR Organic Debris: NR	18.00	1.40	NR	NR	NR	Stable	Stable	NR	NR	NR	NR	NR	None	WT: 9.2°C pH: 7.15 Con: 138 µS/cm TDS: 41 ppm DO: 63.1% 9.85 mg/L	Agriculture, Forest	Agricultural Runoff	None Observed
	PIN-14	Permanent River	408083	5402504	Y	Wet	200	2.35	Run: 90 Riffle: 10	Gradient: Low	Undercut Banks: NR Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 30 Organic Debris: 10	15.65	2.35	15.65	2.35	NR	Stable	Stable	Co: 20 Gr: 40 Bo: 40	Woody Debris: 30	NR	NR	NR	None However historically large beaver dam created isolated downstream pools	WT: 7.3°C pH: 7.03 Con: 138 µS/cm TDS: 70 ppm DO: 56.1% 6.55 mg/L	Agriculture	Agricultural Runoff	None Observed
	PIN-18	Permanent River	403675	5396617	Y	Wet	200	2.13	Flats: 100	Gradient: Low	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 40 Organic Debris: 20	42.35	5.61	42.35	5.61	NR	Stable	Stable	Co: 10 Si/Mu: 30 Gr: 30 Sa: 30	Woody Debris: 40	NR	NR	NR	None	WT: 8.75°C pH: 7.08 Con: 107 µS/cm DO: 92.5% 10.73 mg/L	Agriculture	Agricultural Runoff	None Observed
	PW-23	Permanent River	407640	5397982	Y	Wet	50	1.55	Flats: 20 Run: 40 Pool: 20 Riffle: 20	Gradient: Low	Undercut Banks: 10 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 20 Organic Debris: 5	15.61	1.55	54.71	2.21	NR	Slightly Unstable	Slightly Unstable	Co: 20 Gr: 10 Bo: 20 Br: 50	Woody Debris: 20	NR	NR	NR	None However a large natural bedrock dam (width of channel) impedes flows and poses a significant barrier during low flows.	WT: 12.8°C pH: 7.15 Con: 131 µS/cm TDS: 86 ppm DO: 86.1% 10.91 mg/L	Agriculture	Cattle Field	None Observed
Losio Creek	LOS-1A	Permanent Stream	422204	5410217	Y	Wet	100	0.1	Flats: 75 Pool: 25	Gradient: Low	Undercut Banks: 20 Beaver Dams/# Observed: 1 Eroding Banks: NR Woody Structure: 20 Organic Debris: 10	4.85	0.55	8.75	1.15	NR	Moderately Unstable	Moderately Unstable	Si/Mu: 30 Cl: 60 Sa: 10	Woody Debris: 20	NR	NR	NR	Beaver Dam	WT: 10.9°C pH: 7.16 Con: 312 µS/cm TDS: 163 ppm DO: 61.6% 0.59 mg/L	Agriculture	Agricultural Runoff	None Observed
	LOS-2A	Permanent Stream	421853	5409213	Y	Wet	200	0.28	Flat: 80 Riffle: 20	Gradient: Low	Undercut Banks: 10 Beaver Dams/# Observed: 1 Eroding Banks: NR Woody Structure: 30 Organic Debris: 20	1.56	0.28	2.91	0.68	NR	Slightly Unstable	Slightly Unstable	Si/Mu: 60 Sa: 20 Gr: 20	Woody Debris: 30	NR	NR	NR	Beaver Dam	WT: 12.9°C pH: 6.86 Con: 228 µS/cm TDS: 118 ppm DO: 68.6% 5.63 mg/L	Forest	None	None Observed
West Creek	WES-LOC-F	Permanent Stream	407635	5397984	Y	Wet	200	0.38	Pool: 30 Riffle: 20 Flats: 50	Gradient: Low	Undercut Banks: 30 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 40 Organic Debris: NR	1.58	0.68	2.69	1.61	NR	Slightly Unstable	Slightly Unstable	Gr: 60 Si/Mu: 40	Woody Debris: 40	NR	100%	NR	None	WT: 11.4°C pH: 7.69 Con: 194 µS/cm TDS: 96 ppm DO: 56.3% 0.49 mg/L	Agriculture	Agriculture	None Observed
	WES-LOC-P	Permanent Stream	424705	5408931	Y	Wet	100	0.15	Run: 10 Pool: 70 Riffle: 20	Gradient: Low	Undercut Banks: 10 Beaver Dams/# Observed: 0 Eroding Banks: NR Woody Structure: 40 Organic Debris: 30	3.21	0.65	4.85	1.86	NR	Moderately Unstable	Moderately Unstable	Sa: 10 Si: 30 Cl: 60	Woody Debris: 40	NR	100%	NR	None	WT: 12.4°C pH: 7.04 Con: 242 µS/cm TDS: 126 ppm DO: 53.4% 0.69 mg/L	Agriculture	Cattle Field	None Observed
Marr Creek	MARR-4	Permanent Stream	423603	5410144	Y	Wet	150	0.05	Pool: 20 Flat: 80	Gradient: Low	Undercut Banks: 20 Beaver Dams/# Observed: 1 Eroding Banks: NR Woody Structure: 30 Organic Debris: 20	0.95	0.58	3	1.05	NR	Slightly Unstable	Slightly Unstable	Gr: 10 Sa: 20 Si/Mu: 70	Woody Debris: 30	NA	NA	NR	Beaver Dam	WT: 12°C pH: 7.75 Con: 209 µS/cm TDS: 104 ppm	Agriculture	Agriculture	None Observed
	MARR-5	Intermittent Stream	423540	5408926	N	Wet	NR	NR	Flat: 90 Riffle: 10	Gradient: Low	NR	0.69	0.35	2.68	0.91	NR	NR	NR	Si/Mu: 60 Sa: 30 Gr: 10	NR	NR	NR	NR	Extreme low flows	WT: 12.6°C pH: 7.07 Con: 125 µS/cm TDS: 89 ppm DO: 68.3% 0.79 mg/L	Agriculture	Agriculture	None Observed
Clark Creek	CLA-4	Permanent Stream	426043	5408694	Y	Wet	NR	NR	Run: 80 Riffle: 20	Gradient: Low	Woody Debris: 20	2.15	1.75	2.56	2.03	NR	Slightly Unstable	Slightly Unstable	Gr: 60 Sa: 20 Co: 10	Woody Debris: 20	NR	NR	NR	None	WT: 8.4°C pH: 7.14 Con: 144 µS/cm TDS: 83 ppm DO: 61.5% 0.79 mg/L	Agriculture	Agriculture	None Observed

Note: NR = Not Recorded

APPENDIX B

TABLE B-2

KEY CHARACTERISTICS OF CREEKS AND RIVERS



Pinewood River											
Station	PIN-0+000				Station	PIN-0+500					
Coordinates	15U 0419854 5408095				Coordinates	15U 0419615 5408072					
Watercourse Type	Permanent				Watercourse Type	Permanent					
Velocity (m/s)	2.36				Velocity (m/s)	1.88					
Section Length (m)	100				Section Length (m)	100					
Surrounding Land Use	Agricultural				Surrounding Land Use	Agricultural					
Morphology					Morphology						
	Flat	Pool	Riffle	Run	Other	Flat	Pool	Riffle	Run	Other	
Percentage of Area (%)	100					100					
Mean Depth Wetted (m)	2.4					2.56					
Mean Width Wetted (m)	22					16.61					
Mean Width Bankfull (m)	14.5					16.61					
Mean Depth Bankfull (m)	2					2.56					
Substrate (%)	Gravel/Cobble: 10 Woody Debris: 30 Overhanging Veg: 30 Instream Veg: 30				Substrate (%)	Cobble: 10 Macrophytes: 40 Woody Debris: 30 Overhanging Veg: 20					
Left Bank Stability	Slightly Stable				Left Bank Stability	Stable					
Right Bank Stability	Slightly Stable				Right Bank Stability	Stable					
Stable					Habitat						
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)	
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging			
0	30	30	5	0	0	0	5	20	5	40	20
Dominant Vegetation Type					Dominant Vegetation Type						
	Submergent	Floating		Emergent			Submergent	Floating		Emergent	
Percentage (%)											
Dominant Species											
Notes	<ul style="list-style-type: none"> At flood conditions Sources of possible pollution: pesticides, run-off, sedimentation, eutrophication Riparian zone dominated by grass, alder/willow thickets, black spruce and red oiser dogwood Area is very homogenous throughout 				Notes	<ul style="list-style-type: none"> At flood conditions, reaching into forest Littoral zone dominated by: black spruce, alder willow, red maple, black ash Sources of possible pollution: pesticides, run-off, sedimentation, eutrophication 					

Pinewood River											
Station	PIN-0+300				Station	PIN-1+000					
Coordinates	15U 0419703 5408057				Coordinates	15U 0419395 5408083					
Watercourse Type	Permanent				Watercourse Type	Permanent					
Velocity (m/s)	2.36				Velocity (m/s)	1.61					
Section Length (m)	100				Section Length (m)	100					
Surrounding Land Use	Agricultural				Surrounding Land Use	Agricultural					
Morphology					Morphology						
	Flat	Pool	Riffle	Run	Other	Flat	Pool	Riffle	Run	Other	
Percentage of Area (%)	100					100					
Mean Depth Wetted (m)	1.6					1.4					
Mean Width Wetted (m)	16					18					
Mean Width Bankfull (m)	-					-					
Mean Depth Bankfull (m)	-					-					
Substrate (%)	Gravel/Cobble				Substrate (%)						
Left Bank Stability	Slightly Unstable				Left Bank Stability	Stable					
Right Bank Stability	Slightly Unstable				Right Bank Stability	Stable					
Habitat					Habitat						
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)	
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging			
0	30	30	5	0	0	0	30	30	5	0	0
Dominant Vegetation Type					Dominant Vegetation Type						
	Submergent	Floating		Emergent			Submergent	Floating		Emergent	
Percentage (%)											
Dominant Species											
Notes	<ul style="list-style-type: none"> At flooded conditions Cover provided by trees (black spruce & black ash), alder/willow thickets Minimum dogwood in this area Sources of possible pollution: pesticides, run-off, sedimentation, eutrophication 				Notes	<ul style="list-style-type: none"> At flooded conditions, water reaching into trees Dominated by black spruce. Black ash, alder/willow also present Sources of possible pollution: pesticides, run-off, sedimentation, eutrophication 					

APPENDIX B

TABLE B-2

KEY CHARACTERISTICS OF CREEKS AND RIVERS



Pinewood River												
Station	PIN-14				Station	PIN-18						
Coordinates	15U 0408083 5402504				Coordinates	15U 0403675 5396617						
Watercourse Type	Permanent				Watercourse Type	Permanent						
Velocity (m/s)	2.35				Velocity (m/s)	2.13						
Section Length (m)	200				Section Length (m)	200						
Surrounding Land Use	Agricultural, highway				Surrounding Land Use	Agricultural, highway						
Morphology					Morphology							
	Flat	Pool	Riffle	Run	Other	Flat	Pool	Riffle	Flat	Other		
Percentage of Area (%)			10	90		100						
Mean Depth Wetted (m)			1.98	2.35		5.61						
Mean Width Wetted (m)			12.81	15.65		42.35						
Mean Width Bankfull (m)			12.81	15.65		42.65						
Mean Depth Bankfull (m)			1.98	2.35		5.61						
Substrate (%)			Boulder: 50 Cobble: 40 Gravel: 10	Boulder: 40 Cobble: 20 Gravel: 40		Silt/Mud: 30 Sand: 30 Gravel: 30 Cobble: 10						
Left Bank Stability	Stable				Left Bank Stability	Stable						
Right Bank Stability	Stable				Right Bank Stability	Stable						
Habitat					Habitat							
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging				
	20	10	10			30	10	20	10	20		
Dominant Vegetation Type					Dominant Vegetation Type							
	Submergent		Floating		Emergent		Submergent		Floating		Emergent	
Percentage (%)												
Dominant Species					Grass/Sedge							
Notes					Notes							
<ul style="list-style-type: none"> Flood conditions - high water level above bankfull marks due to heavy rain from last 2 days straight Fast water velocity Flooded valleys adjacent to river Possible sources of pollution: agricultural activities, highway in close proximity 					<ul style="list-style-type: none"> At flood conditions Rained over the past couple of days Water temperature dropped to 8.5°C 							

Pinewood River												
Station	PW-23				Station	PW-23						
Coordinates	15U 0407640 539797982				Coordinates	15U 0407640 539797982						
Watercourse Type	Permanent				Watercourse Type	Permanent						
Velocity (m/s)	1.55				Velocity (m/s)	1.55						
Section Length (m)	50				Section Length (m)	50						
Surrounding Land Use	Agricultural (cattle field)				Surrounding Land Use	Agricultural (cattle field)						
Morphology					Morphology							
	Flat	Pool	Riffle	Run	Other	Flat	Pool	Riffle	Run	Other		
Percentage of Area (%)	20	20	20	40		20	20	20	40			
Mean Depth Wetted (m)	1.89	2.09	0.65	1.55		1.89	2.09	0.65	1.55			
Mean Width Wetted (m)	12.19	10.95	6.68	15.61		12.19	10.95	6.68	15.61			
Mean Width Bankfull (m)												
Mean Depth Bankfull (m)												
Substrate (%)	Boulder: 30 Cobble: 20 Gravel: 20 Sand: 20 Silt: 10	Boulder: 40 Cobble: 30 Gravel: 20 Sand: 10	Bedrock: 60 Boulder: 30 Cobble: 10	Bedrock: 50 Boulder: 20 Cobble: 20 Gravel: 10								
Left Bank Stability	Slightly Unstable				Left Bank Stability	Slightly Unstable						
Right Bank Stability	Slightly Unstable				Right Bank Stability	Slightly Unstable						
Habitat					Habitat							
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging				
	10	10	5			10	10	5				
Dominant Vegetation Type					Dominant Vegetation Type							
	Submergent		Floating		Emergent		Submergent		Floating		Emergent	
Percentage (%)												
Dominant Species												
Notes					Notes							
<ul style="list-style-type: none"> Fast flowing water over rock dam with gravel shoals creating rapids/riffles Back eddies present adjacent to fast flowing chutes Staging opportunities in back eddies Cobble/gravel shoals directly downstream from falls Water level is high, very close to bankfull conditions 					<ul style="list-style-type: none"> Water temperature 12.8°C Set a number of 2 panel nets for 8 hours, 2 days straight (caught a number of spawning white sucker/shorthead redhorse) 3 chutes of fast flowing water flowing over bedrock Migration upstream of rock dam still available 							

APPENDIX B

TABLE B-2

KEY CHARACTERISTICS OF CREEKS AND RIVERS



West Creek											
Station	Wes-Loc-F				Station	Wes-Loc-P					
Coordinates	15U 0407635 5397984				Coordinates	15U 0424705 5408931					
Watercourse Type	Permanent				Watercourse Type	Permanent					
Velocity (m/s)	0.38				Velocity (m/s)	0.15					
Section Length (m)	200				Section Length (m)	100					
Surrounding Land Use	Agricultural				Surrounding Land Use	Agricultural					
Morphology					Morphology						
	Flat	Pool	Riffle	Run	Other	Flat	Pool	Riffle	Run	Other	
Percentage of Area (%)	50	30	20			70	20	10			
Mean Depth Wetted (m)	0.68	0.56	0.28			0.65	0.35	0.6			
Mean Width Wetted (m)	1.58	1.61	0.65			3.21	1.6	1.53			
Mean Width Bankfull (m)	2.69	2.51	1.58			4.85	2.98	4.31			
Mean Depth Bankfull (m)	1.61	1.39	1.58			1.86	1.71	2.5			
Substrate (%)	Gravel: 40 Sand: 30 Silt: 30	Gravel: 60 Sand: 30 Silt: 10	Gravel: 40 Cobble: 20 Sand: 20 Silt: 20				Clay: 60 Silt/muck: 30 Sand: 10	Clay: 70 Silt/muck: 30	Silt/muck: 60 Clay: 40		
Left Bank Stability	Slightly Unstable				Left Bank Stability	Moderately Unstable					
Right Bank Stability	Slightly Unstable				Right Bank Stability	Moderately Unstable					
Habitat					Habitat						
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)	
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging		Instream	Overhanging
30	20	20		10	10	10	30	10	30	10	10
Dominant Vegetation Type					Dominant Vegetation Type						
	Submergent	Floating		Emergent			Submergent	Floating		Emergent	
Percentage (%)				100							100
Dominant Species				Grass/Sedge							Grass/Sedge
Notes					Notes						
<ul style="list-style-type: none"> Captured a number of spawning white sucker, no walleye Riffles over gravel cobble present Fish able to migrate through culvert Set block net 100m upstream from hwy 600, shocked from 50m downstream of hwy 600 and shocked up to barrier Undercut banks present Deep pools contained majority of spawning white suckers 					<ul style="list-style-type: none"> Site location at mouth of West Creek (confluence to the Pinewood River) Moderate flow into Pinewood River Beaver activity evident Evidence of recent flooding Shocked 100m upstream from Pinewood - no adult fish caught Deep pools and some riffles Set D-net for 8 hours, damaged by beavers 						

Loslo Creek											
Station	LOS-1A				Station	LOS-2A					
Coordinates	15U 0422204 5410217				Coordinates	15U 0421853 5409213					
Watercourse Type	Permanent				Watercourse Type	Permanent					
Velocity (m/s)	0.1				Velocity (m/s)	0.28					
Section Length (m)	100				Section Length (m)	200					
Surrounding Land Use	Agriculture				Surrounding Land Use	Forested (mixed woodlot: black spruce, red maple, alder willow, white birch)					
Morphology					Morphology						
	Flat	Pool	Riffle	Run	Other	Flat	Pool	Riffle	Run	Other	
Percentage of Area (%)	75	25				80		20			
Mean Depth Wetted (m)	0.55	0.85				0.65		0.28			
Mean Width Wetted (m)	4.85	4.25				1.31		1.56			
Mean Width Bankfull (m)	8.75	4.56				3.05		2.91			
Mean Depth Bankfull (m)	1.15	1.49				0.95		0.68			
Substrate (%)	Clay: 60 Silt/muck: 30 Sand: 10	Clay: 60 Silt/muck: 30 Sand: 10				Silt/muck: 70 Sand: 20 Gravel: 10		Silt/muck: 60 Sand: 20 Gravel: 20			
Left Bank Stability	Moderately Unstable				Left Bank Stability	Slightly Unstable					
Right Bank Stability	Moderately Unstable				Right Bank Stability	Slightly Unstable					
Habitat					Habitat						
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)	
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging		Instream	Overhanging
20	10	10	10	10	40	10	20	10	20	20	
Dominant Vegetation Type					Dominant Vegetation Type						
	Submergent	Floating		Emergent			Submergent	Floating		Emergent	
Percentage (%)				Grass/Sedges							Grass/Sedge
Dominant Species				Grass/Sedges							Grass/Sedge
Notes					Notes						
<ul style="list-style-type: none"> Large beaver dam - approximately 100m upstream from hwy 600 (significant fish barrier) Shocked downstream of hwy 600 approximately 50m and upstream 100m No adults captured Slow moving current, primarily flats Obstruction within the culverts Some sandy beds Not ideal spawning habitat 					<ul style="list-style-type: none"> Narrow/deep channel Outflow from large upstream beaver dam obstructing fish migration Shocked from 200m downstream of dam No walleye Large floodplain dominated by grass/sedge, alder/willow thickets Large amount of beaver activity 						

TABLE B-2

KEY CHARACTERISTICS OF CREEKS AND RIVERS

Marr Creek					Clark Creek						
Station	MARR-4				Station	CLA-4					
Coordinates	15U 0423603 5410144				Coordinates	15U 0426043 5408694					
Watercourse Type	Permanent				Watercourse Type	Permanent					
Velocity (m/s)	0.05				Velocity (m/s)						
Section Length (m)	150				Section Length (m)						
Surrounding Land Use	Agricultural				Surrounding Land Use	Agricultural					
Morphology					Morphology						
	Flat	Pool	Riffle	Run	Other		Flat	Pool	Riffle	Run	Other
Percentage of Area (%)	80	20				Percentage of Area (%)			20	80	
Mean Depth Wetted (m)	0.58	0.65				Mean Depth Wetted (m)			1.1	1.75	
Mean Width Wetted (m)	0.95	1.95				Mean Width Wetted (m)			2.03	2.15	
Mean Width Bankfull (m)	3.28	4.57				Mean Width Bankfull (m)			2.48	2.56	
Mean Depth Bankfull (m)	1.05	1.28				Mean Depth Bankfull (m)			2.41	2.03	
Substrate (%)	Silt/muck: 50 Sand: 30 Gravel: 20	Silt/muck: 50 Sand: 30 Gravel: 20				Substrate (%)			Gravel: 50 Sand: 20 Cobble: 20 Silt/muck: 10	Gravel: 60 Sand: 20 Cobble: 10	
Left Bank Stability	Slightly Unstable				Left Bank Stability	Slightly Unstable					
Right Bank Stability	Slightly Unstable				Right Bank Stability	Slightly Unstable					
Habitat					Habitat						
Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)		Undercut Banks (%)	Woody Debris (%)		Organic Debris (%)	Vascular Macrophytes (%)	
	Instream	Overhanging		Instream	Overhanging		Instream	Overhanging			
20	20	10	20	10	10	5	10	10	20	25	10
Dominant Vegetation Type					Dominant Vegetation Type						
	Submergent	Floating		Emergent			Submergent	Floating		Emergent	
Percentage (%)				Grass/Sedge		Percentage (%)				Grass/Sedge	
Dominant Species					Grass/Sedge	Dominant Species					Grass/Sedge
Notes	<ul style="list-style-type: none"> Abundant beaver activity 2 large dams approximately 100m upstream from hwy 600 crossing Dams pose significant fish passage barrier Electroshocked from below hwy 600 up to beaver dams No large-bodied adult fish captured No flow Poor water quality Not significant fish habitat 				<ul style="list-style-type: none"> High flow from rain over last 2 days Narrow/deep channel Dip netted white sucker swimming upstream Electrofishing = no catch Gravel/cobble substrate in some locations Wide grass floodplain Adjacent to agricultural fields with little buffer zone 						



APPENDIX C

FISH SAMPLING EFFORT AND CAPTURE DATA

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Sex	Maturity
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	White Sucker	WS-1	310	324	350	N	Female	Running
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	White Sucker	WS-2	365	380	20	N	Male	Running
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	White Sucker	WS-3	356	369	630	N	Female	Running
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-1	515	530	970	SC	Male	Unknown
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-2	560	576	1160	SC	Unknown	Unknown
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-3	467	485	720	SC	Unknown	Unknown
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-4	438	446	650	SC	Unknown	Unknown
Pinewood River	20/05/13	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-5	475	490	790	SC	Unknown	Unknown
Pinewood River	20/05/13	Gillnet	PIN-2A-GN2	PIN-2A	White Sucker	WS-1	375	390	710	N	Female	Running
Pinewood River	20/05/13	Gillnet	PIN-2A-GN2	PIN-2A	White Sucker	WS-2	400	404	810	N	Female	Running
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	White Sucker	WS-1	432	458	940	N	Unknown	Unknown
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	White Sucker	WS-2	383	394	860	N	Male	Running
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	White Sucker	WS-3	375	383	770	N	Male	Ripe
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	White Sucker	WS-4	325	342	480	N	Male	Ripe
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	White Sucker	WS-5	347	362	570	N	Male	Ripe
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	White Sucker	WS-6	390	422	880	N	Unknown	Unknown
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	NP-1	695	705	2350	SC	Unknown	Unknown
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	NP-2	385	393	410	N	Unknown	Unknown
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	NP-3	599	615	1500	SC	Male	Ripe
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	NP-4	545	561	1140	SC	Male	Unknown
Pinewood River	19/05/13	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	NP-5	673	691	2050	SC	Male	Unknown
Pinewood River	14/05/13	Gillnet	PIN-18-GN1	PIN-18	White Sucker	WS-1	-	460	600	N	Unknown	Unknown
Pinewood River	14/05/13	Gillnet	PIN-18-GN1	PIN-18	White Sucker	WS-2	-	446	1290	N	Ripe	Female
Pinewood River	14/05/13	Gillnet	PIN-18-GN1	PIN-18	Shorthead Redhorse	SHRH-1	-	398	730	N	Unknown	Unknown
Pinewood River	14/05/13	Gillnet	PIN-18-GN2	PIN-18	White Sucker	WS-1	-	512	1770	N	Unknown	Unknown
Pinewood River	14/05/13	Gillnet	PIN-18-GN2	PIN-18	Northern Pike	NP-1	-	998	5310	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	Walleye	WALL-1	-	655	2340	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-1	-	477	1230	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-2	-	450	1130	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-3	-	459	1140	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-4	-	455	1090	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-5	-	509	1640	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-6	-	475	1280	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-7	-	489	1330	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-8	-	455	1110	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-9	-	455	1190	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-10	-	480	1430	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-11	-	454	1250	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN1-R1	PIN-18	White Sucker	WS-12	-	461	1080	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-1	-	547	1650	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-2	-	505	1350	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-3	-	542	1530	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-4	-	535	1800	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-5	-	535	1630	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-6	-	530	1740	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-7	-	521	1520	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-8	-	535	1660	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-9	-	511	1580	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-10	-	565	1830	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-11	-	532	1700	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-12	-	510	1450	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-13	-	495	1390	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	White Sucker	WS-14	-	496	1470	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	Shorthead Redhorse	SHRH-1	-	482	1250	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	Shorthead Redhorse	SHRH-2	-	499	1300	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	Northern Pike	NP-1	-	955	5750	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PIN-18-GN2-R1	PIN-18	Northern Pike	NP-2	-	960	4440	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PIN-18-GN-1-R2	PIN-18	White Sucker	WS-1	435	498	1310	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PIN-18-GN-1-R2	PIN-18	Northern Pike	NP-1	1015	1055	7480	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PIN-18-GN-1-R2	PIN-18	Northern Pike	NP-2	812	863	3120	N	Unknown	Unknown
Pinewood River	21/05/13	Gillnet	PIN-18-GN1-R3	PIN-18	Northern Pike	NP-1	593	620	1370	N	Unknown	Unknown
Pinewood River	14/05/13	Gillnet	PW-23-GN1	PW-23	Shorthead Redhorse	SHRH-1	-	425	420	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	White Sucker	WS-1	-	498	380	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	White Sucker	WS-2	-	531	1770	N	Male	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	White Sucker	WS-3	-	419	880	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	White Sucker	WS-4	-	455	1100	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	White Sucker	WS-5	-	470	1170	N	Female	Ripe

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Sex	Maturity
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	White Sucker	WS-6	-	400	790	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	Shorthead Redhorse	SHRH-1	-	441	790	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	Shorthead Redhorse	SHRH-2	-	403	660	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	Shorthead Redhorse	SHRH-3	-	395	620	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	Shorthead Redhorse	SHRH-4	-	404	730	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2	PW-23	Shorthead Redhorse	SHRH-5	-	505	1590	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN3	PW-23	Northern Pike	NP-1	-	995	5130	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN3	PW-23	Northern Pike	NP-2	-	860	2540	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN4	PW-23	Shorthead Redhorse	SHRH-1	-	461	8500	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4	PW-23	Shorthead Redhorse	SHRH-2	-	630	2900	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4	PW-23	Shorthead Redhorse	SHRH-3	-	628	2870	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4	PW-23	Shorthead Redhorse	SHRH-4	-	538	1600	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4	PW-23	White Sucker	WS-1	-	425	760	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN4	PW-23	Northern Pike	NP-1	-	555	1080	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-1	-	365	700	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-2	-	380	740	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-3	-	385	660	N	Male	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-4	-	400	720	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-5	-	410	850	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-6	-	390	670	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-7	-	410	800	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-8	-	335	470	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-9	-	390	780	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-10	-	391	700	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-11	-	410	980	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-12	-	360	660	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	White Sucker	WS-13	-	370	720	N	Male	Running
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	Northern Pike	NP-1	-	650	1690	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	Northern Pike	NP-2	-	605	1260	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN2-R1	PW-23	Shorthead Redhorse	SHRH-1	-	490	1280	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN3-R1	PW-23	White Sucker	WS-1	-	552	1940	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN3-R1	PW-23	Northern Pike	NP-1	-	958	4430	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	White Sucker	WS-1	-	370	560	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	White Sucker	WS-2	-	420	1100	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	White Sucker	WS-3	-	555	2600	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	White Sucker	WS-4	-	477	1430	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	Northern Pike	NP-1	-	515	830	N	Female	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	Northern Pike	NP-2	-	750	2410	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-23-GN4-R1	PW-23	Shorthead Redhorse	SHRH-1	-	430	800	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-1	485	528	1460	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-2	405	425	1100	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-3	478	504	1480	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-4	456	479	1160	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-5	435	472	1020	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-6	426	461	1240	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-7	452	490	1270	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-8	448	480	1240	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-9	415	453	1150	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-10	428	460	1240	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-11	476	508	1610	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-12	500	530	1200	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-13	448	470	1170	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-14	456	491	1140	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-15	478	518	1490	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-16	445	485	1210	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-17	460	495	1560	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-18	465	500	1230	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	White Sucker	WS-19	428	440	1000	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	Northern Pike	NP-1	691	786	2250	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	Northern Pike	NP-2	695	769	2040	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN2-R2	PW-23	Shorthead Redhorse	SHRH-1	400	428	900	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-1	504	538	1280	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-2	483	511	1260	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-3	481	523	1490	N	Male	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-4	411	441	730	N	Female	Ripe
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-5	475	511	850	N	Unknown	Unknown

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Sex	Maturity
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-6	375	421	1150	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-7	453	490	1340	N	Female	Ripe
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-8	495	530	NR	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-9	504	531	1610	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-10	475	500	1330	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-11	505	540	2010	N	Unknown	Unknown
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	White Sucker	WS-12	495	529	1560	N	Female	Ripe
Pinewood River	16/05/13	Gillnet	PW-23-GN3-R2	PW-23	Shorthead Redhorse	SHRH-1	435	490	1670	N	Male	Ripe
Pinewood River	17/05/13	Gillnet	PW-23-GN2-R3	PW-23	White Sucker	WS-1	510	520	1660	N	Female	Unknown
Pinewood River	17/05/13	Gillnet	PW-23-GN2-R3	PW-23	White Sucker	WS-2	480	487	1400	N	Male	Running
Pinewood River	17/05/13	Gillnet	PW-23-GN2-R3	PW-23	White Sucker	WS-3	540	550	1750	N	Male	Unknown
Pinewood River	17/05/13	Gillnet	PW-23-GN2-R3	PW-23	White Sucker	WS-4	560	580	2080	N	Unknown	Unknown
Pinewood River	17/05/13	Gillnet	PW-23-GN2-R3	PW-23	White Sucker	WS-5	545	560	1880	N	Unknown	Unknown
Pinewood River	17/05/13	Gillnet	PW-23-GN2-R3	PW-23	Lake Sturgeon	LS-1	1560	1780	NR	N	Unknown	Unknown
Pinewood River	18/05/13	Gillnet	PW-23-GN2-R4	PW-23	White Sucker	WS-1	452	485	1200	N	Male	Unknown
Pinewood River	18/05/13	Gillnet	PW-23-GN2-R4	PW-23	White Sucker	WS-2	447	470	1110	N	Male	Ripe
Pinewood River	18/05/13	Gillnet	PW-23-GN2-R4	PW-23	White Sucker	WS-3	418	446	1000	N	Male	Ripe
Pinewood River	18/05/13	Gillnet	PW-23-GN2-R4	PW-23	White Sucker	WS-4	463	505	1360	N	Male	Ripe
Pinewood River	18/05/13	Gillnet	PW-23-GN2-R4	PW-23	White Sucker	WS-5	433	462	1240	N	Male	Ripe
Pinewood River	18/05/13	Gillnet	PW-23-GN2-R4	PW-23	White Sucker	WS-6	448	480	1350	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-24-GN2	PW-24	White Sucker	WS-1	-	515	1660	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-24-GN2	PW-24	White Sucker	WS-2	-	412	1400	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	White Sucker	WS-1	-	510	1800	N	Female	Running
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	White Sucker	WS-2	-	475	1220	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	White Sucker	WS-3	-	570	1630	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	White Sucker	WS-4	-	510	1500	N	Female	Ripe
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Shorthead Redhorse	SHRH-1	-	525	1640	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Shorthead Redhorse	SHRH-2	-	549	1990	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Shorthead Redhorse	SHRH-3	-	515	1630	N	Unknown	Unknown
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Shorthead Redhorse	SHRH-4	-	622	2830	N	Male	Running
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Shorthead Redhorse	SHRH-5	-	335	400	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Northern Pike	NP-1	-	410	350	N	Male	Ripe
Pinewood River	15/05/13	Gillnet	PW-24-GN2-R1	PW-24	Northern Pike	NP-2	-	465	550	N	Male	Ripe
Loslo Creek	17/05/13	Backpack	LOS-1A-E1	LOS-1A	White Sucker	WS-1	115	123	30	N	Unknown	Unknown
Loslo Creek	17/05/13	Backpack	LOS-1A-E1	LOS-1A	Central Mudminnow	CMM-1	-	NR	NR	N	Unknown	Unknown
Loslo Creek	17/05/13	Backpack	LOS-1A-E1	LOS-1A	White Sucker	WS-2	55	60	NR	N	Unknown	Unknown
Loslo Creek	17/05/13	Backpack	LOS-1A-E1	LOS-1A	Pearl Dace	PD-1	-	40	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Brook Stickleback	BSB-1	-	15	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Brook Stickleback	BSB-3	-	25	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Central Mudminnow	CMM-1	-	30	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Central Mudminnow	CMM-2	-	35	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Finescale Dace	FSD-1	-	30	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Finescale Dace	FSD-2	-	15	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Finescale Dace	FSD-3	-	17	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	Finescale Dace	FSD-4	-	13	NR	N	Unknown	Unknown
Loslo Creek	18/05/13	Backpack	LOS-2A-E1	LOS-2A	White Sucker	WS-1	-	100	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-1	420	430	930	N	Female	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-2	395	405	910	N	Female	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-3	389	403	810	N	Female	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-4	395	407	740	N	Female	Ripe
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-5	370	385	710	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-6	367	379	690	N	Female	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-7	380	393	890	N	Female	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-8	360	370	670	N	Female	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-9	369	380	750	N	Male	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-10	379	390	850	N	Female	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-11	375	389	1590	N	Female	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-12	103	107	50	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-13	349	356	600	N	Male	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-14	389	399	810	N	Female	Ripe
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-15	410	425	970	N	Female	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-16	395	405	810	N	Female	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-17	350	360	550	N	Male	Running
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-18	365	378	670	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	White Sucker	WS-19	149	153	50	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	Pearl Dace	PD-1	105	NR	NR	N	Unknown	Unknown

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Sex	Maturity
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	Common Shiner	CS-1	100	NR	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	Common Shiner	CS-2	100	NR	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	Common Shiner	CS-3	120	NR	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocF-E1	WES-LOCF	Creek Chub	CC-1	NR	NR	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocP-E1	WES-LOCP	Creek Chub	CC-1	130	NR	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocP-E1	WES-LOCP	Creek Chub	CC-2	NR	NR	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocP-E1	WES-LOCP	Finescale Dace	FSD-1	53	60	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocP-E1	WES-LOCP	Finescale Dace	FSD-2	51	55	NR	N	Unknown	Unknown
West Creek	17/05/13	Backpack	Wes-LocP-E1	WES-LOCP	Brook Stickleback	BSB-1	36	39	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	Marr-4-E1	MARR-4	Pearl Dace	PD-1	-	68	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	Marr-4-E1	MARR-4	Pearl Dace	PD-2	70	74	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	Marr-4-E1	MARR-4	Pearl Dace	PD-3	51	55	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	Marr-4-E1	MARR-4	Pearl Dace	PD-4	50	55	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	Marr-4-E1	MARR-4	Fathead Minnow	FHM-1	55	60	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-1	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-2	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-3	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-4	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-5	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-6	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-7	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-8	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-9	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-10	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-11	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Pearl Dace	PD-12	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Central Mudminnow	CMM-1	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Central Mudminnow	CMM-2	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Brook Stickleback	BSB-1	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Brook Stickleback	BSB-2	-	-	NR	N	Unknown	Unknown
Marr Creek	18/05/13	Backpack	MARR-5-E1	MARR-5	Brook Stickleback	BSB-3	-	-	NR	N	Unknown	Unknown
Clark Creek	16/05/13	Dip Net	CLA-4-DN1	CLA-4	White Sucker	WS-1	355	365	NR	N	Male	Ripe

Note: SC = Scales (left); N = None; N/R = Not Recorded

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Captured Fish By Species															
	Area	Sample ID	Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Lake Sturgeon	Northern Pike	Pearl Dace	Shorthead Redhorse	Walleye	White Sucker	TOTAL
Sampling Location Mapping I.D. 2013	Upper Pinewood	PIN-2A-GN1	0	0	0	0	0	0	0	5	0	0	0	3	8
	Upper Pinewood	PIN-2A-GN2	0	0	0	0	0	0	0	0	0	0	0	2	2
	Mid Pinewood	PIN-0+000-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+510	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+510-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+600-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+000-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+000-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+510-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+600-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mid Pinewood	PIN-0+600-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PIN-14-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PIN-14-GN2	0	0	0	0	0	0	0	5	0	0	0	6	11
	Lower Pinewood	PIN-14-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PIN-18-GN1	0	0	0	0	0	0	0	0	0	1	0	2	3
	Lower Pinewood	PIN-18-GN1-R1	0	0	0	0	0	0	0	0	0	0	1	12	13
	Lower Pinewood	PIN-18-GN1-R2	0	0	0	0	0	0	0	2	0	0	0	1	3
	Lower Pinewood	PIN-18-GN1-R3	0	0	0	0	0	0	0	1	0	0	0	0	1
	Lower Pinewood	PIN-18-GN2	0	0	0	0	0	0	0	1	0	0	0	1	2
	Lower Pinewood	PIN-18-GN2-R1	0	0	0	0	0	0	0	2	0	2	0	14	18
	Lower Pinewood	PIN-18-GN3	0	0	0	0	0	0	0	1	0	1	0	0	2
	Lower Pinewood	PIN-18-GN4	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PIN-18-GN4-R1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PW-23-GN1	0	0	0	0	0	0	0	0	0	1	0	0	1
	Lower Pinewood	PW-23-GN2	0	0	0	0	0	0	0	0	0	5	0	6	11
	Lower Pinewood	PW-23-GN2-R1	0	0	0	0	0	0	0	2	0	1	0	13	16
	Lower Pinewood	PW-23-GN2-R2	0	0	0	0	0	0	0	2	0	1	0	19	22
	Lower Pinewood	PW-23-GN2-R3	0	0	0	0	0	0	1	0	0	0	0	5	6
	Lower Pinewood	PW-23-GN2-R4	0	0	0	0	0	0	0	0	0	0	0	6	6
	Lower Pinewood	PW-23-GN2-R5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PW-23-GN2-R6	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PW-23-GN3	0	0	0	0	0	0	0	2	0	0	0	0	2
	Lower Pinewood	PW-23-GN3-R1	0	0	0	0	0	0	0	1	0	0	0	1	2
	Lower Pinewood	PW-23-GN3-R2	0	0	0	0	0	0	0	0	0	1	0	12	13
	Lower Pinewood	PW-23-GN3-R5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PW-23-GN3-R6	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PW-23-GN4	0	0	0	0	0	0	0	1	0	4	0	1	6
	Lower Pinewood	PW-23-GN4-R1	0	0	0	0	0	0	0	2	0	1	0	4	7
	Lower Pinewood	PW-23-AN1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Pinewood	PW-23-AN2	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower Pinewood	PW-23-DT1	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lower Pinewood	PW-24-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lower Pinewood	PW-24-GN2	0	0	0	0	0	0	0	0	0	0	0	2	2	
Lower Pinewood	PW-24-GN2-R1	0	0	0	0	0	0	0	2	0	5	0	4	11	

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Captured Fish By Species																
	Area	Sample ID	Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Lake Sturgeon	Northern Pike	Pearl Dace	Shorthead Redhorse	Walleye	White Sucker	TOTAL	
Sampling Location Mapping I.D. 2013	Loslo Creek	LOS-1A-E1	0	2	0	0	0	0	0	0	1	0	0	2	5	
	Loslo Creek	LOS-2A-E1	2	1	0	0	0	4	0	0	0	0	0	1	8	
	Loslo Creek	LOS-2A-D1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	West Creek	Wes-LocF-E1	0	0	3	1	0	0	0	0	1	0	0	19	24	
	West Creek	Wes-LocP-E1	1	0	0	2	0	2	0	0	0	0	0	0	5	
	West Creek	Wes-LocP-D1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Clark Creek	CLA-3-4-E1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Clark Creek	CLA-4-DN1	0	0	0	0	0	0	0	0	0	0	0	1	1	
	Clark Creek	CLA-4-D1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Marr Creek	MARR-4-E1	0	0	0	0	1	0	0	0	4	0	0	0	5	
	Marr Creek	MARR-5-E1	3	2	0	0	0	0	0	0	12	0	0	0	17	
	TOTAL			6	5	3	3	1	6	1	29	18	23	1	137	233

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Captured Fish By Species														
Area	Sample ID	Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Lake Sturgeon	Northern Pike	Pearl Dace	Shorthead Redhorse	Walleye	White Sucker	TOTAL
Upper Pinewood	PIN-2A-GN1								X				X	2
Upper Pinewood	PIN-2A-GN2												X	1
Mid Pinewood	PIN-9 (0+000)-GN1													0
Mid Pinewood	PIN-9 (0+510)													0
Mid Pinewood	PIN-9 (0+510)-GN1													0
Mid Pinewood	PIN-9 (0+600)-GN1													0
Mid Pinewood	PIN-9 (0+000)-MT1													0
Mid Pinewood	PIN-9 (0+000)-MT2													0
Mid Pinewood	PIN-9 (0+510)-MT1													0
Mid Pinewood	PIN-9 (0+600)-MT1													0
Mid Pinewood	PIN-9 (0+600)-MT2													0
Lower Pinewood	PIN-14-GN1													0
Lower Pinewood	PIN-14-GN2								X				X	2
Lower Pinewood	PIN-14-GN3													0
Lower Pinewood	PIN-18-GN1										X		X	2
Lower Pinewood	PIN-18-GN1-R1										X		X	2
Lower Pinewood	PIN-18-GN1-R2								X				X	2
Lower Pinewood	PIN-18-GN1-R3								X					1
Lower Pinewood	PIN-18-GN2								X				X	2
Lower Pinewood	PIN-18-GN2-R1								X		X		X	3
Lower Pinewood	PIN-18-GN3								X		X			2
Lower Pinewood	PIN-18-GN4													0
Lower Pinewood	PIN-18-GN4-R1													0
Lower Pinewood	PW-23-GN1										X			1
Lower Pinewood	PW-23-GN2										X		X	2
Lower Pinewood	PW-23-GN2-R1								X		X		X	3
Lower Pinewood	PW-23-GN2-R2								X		X		X	3
Lower Pinewood	PW-23-GN2-R3							X					X	2
Lower Pinewood	PW-23-GN2-R4												X	1
Lower Pinewood	PW-23-GN2-R5													0
Lower Pinewood	PW-23-GN2-R6													0
Lower Pinewood	PW-23-GN3								X					1
Lower Pinewood	PW-23-GN3-R1								X				X	2
Lower Pinewood	PW-23-GN3-R2										X		X	2
Lower Pinewood	PW-23-GN3-R5													0
Lower Pinewood	PW-23-GN3-R6													0
Lower Pinewood	PW-23-GN4								X		X		X	3
Lower Pinewood	PW-23-GN4-R1								X		X		X	3
Lower Pinewood	PW-23-AN1													0
Lower Pinewood	PW-23-AN2													0
Lower Pinewood	PW-23-DT1													0
Lower Pinewood	PW-24-GN1													0
Lower Pinewood	PW-24-GN2												X	1
Lower Pinewood	PW-24-GN2-R1								X		X		X	3

Sampling Location Mapping I.D. 2013

APPENDIX C
TABLE C-1: FISHERIES SAMPLING EFFORT AND CAPTURES



Captured Fish By Species																
Sampling Location Mapping I.D. 2013	Area	Sample ID	Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Lake Sturgeon	Northern Pike	Pearl Dace	Shorthead Redhorse	Walleye	White Sucker	TOTAL	
	Loslo Creek	LOS-1A-E1		X							X			X	3	
	Loslo Creek	LOS-2A-E1	X	X				X						X	4	
	Loslo Creek	LOS-2A-D1													0	
	West Creek	Wes-LocF-E1			X	X					X			X	4	
	West Creek	Wes-LocP-E1	X			X		X							3	
	West Creek	Wes-LocP-D1													0	
	Clark Creek	CLA-3-4-E1													0	
	Clark Creek	CLA-4-DN1												X	1	
	Clark Creek	CLA-4-D1													0	
	Marr Creek	MARR-4-E1					X				X				2	
	Marr Creek	MARR-5-E1	X	X							X				3	
	TOTAL			3	3	1	2	1	2	1	14	4	11	1	23	66