

Site 18

Unnamed Tributary of Nelson River

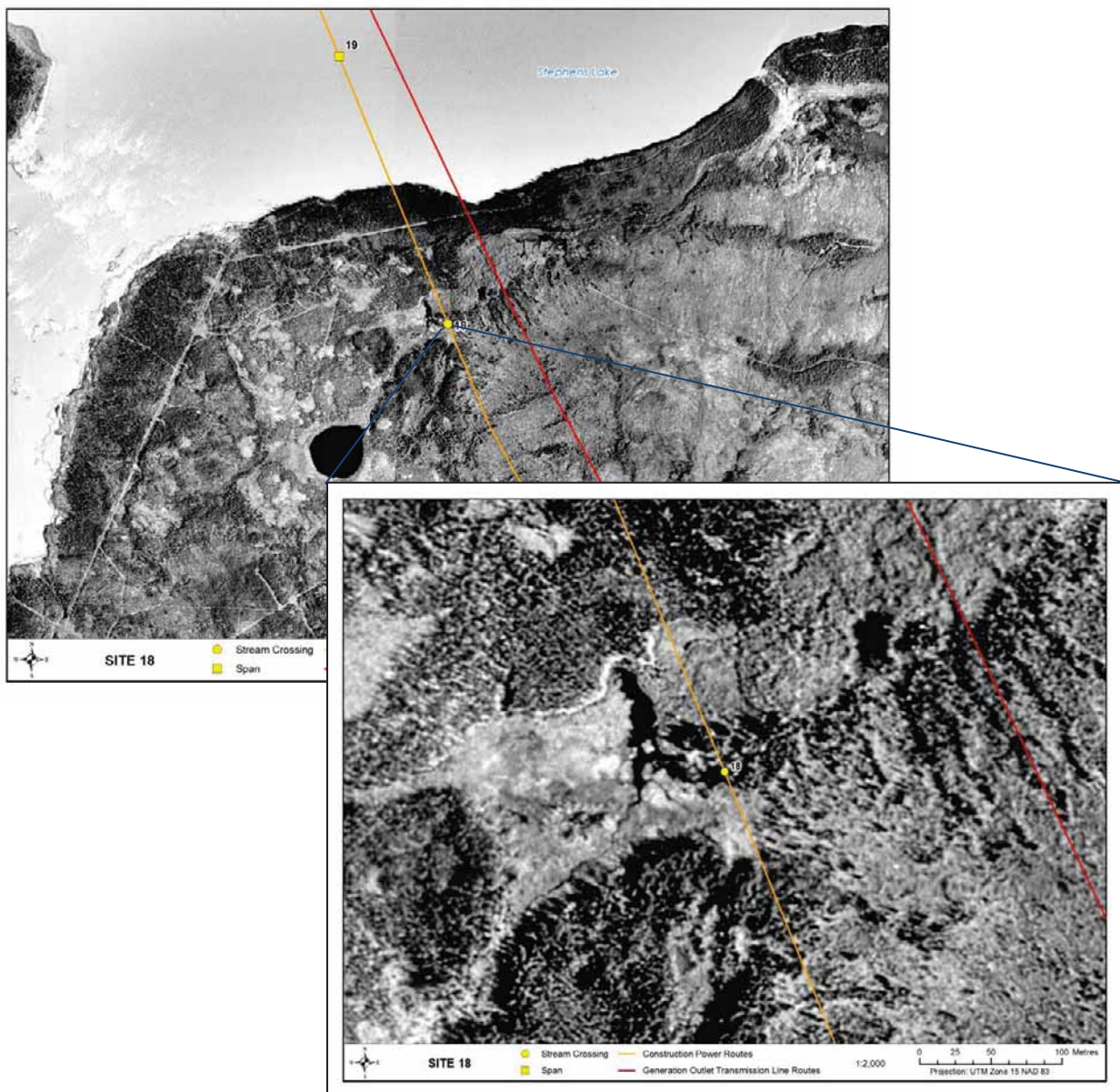
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 365158
Northing: 6246184

Location Depicted Below:

General Morphology

Gen. Description: Wetland/bog drainage
Pattern: -
Confinement: Unconfined
Stage: Moderate
Flow Regime: Perennial
U/S Drainage: 1 km²
Receiving Water/Dist.: Nelson River/2 km



Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 1-4
Wetted Width (m) 1-4

Water Depths (m)

Max. ~1.5
Avg. <1.0

Banks

Right Bank Height (m): - Shape: - Stability: -
Left Bank Height (m): - Shape: - Stability: -

Substrate

Substrate Type (%)

Fines 100
Small Gravel -
Large Gravel -
Cobble -
Boulder -

Habitat Type

Habitat Composition (%)

Pool 98
Flat -
Run -
Riffle 2 (at margins of beaver dam)

Cover Types

Total Cover Available (%)

US 5 DS 20

Cover Composition (% of Total)

Large Woody Debris - 10
Overhanging Vegetation - -
Instream Vegetation 100 90
Pool - -
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss Y
Grasses/Sedges Y
Shrubs Y
Conifers -
Deciduous -
Mixed Forest -
Canopy Cover (%) -

+ Water Quality Data

Surface Temp (°C): 17 DO (mg/L): 7.01
Specific Conductance (µS/cm): 136 pH: 5.08
TDS (g/L): 0.09 Turbidity (NTU): 3.59
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Spawning **Rearing/Feeding** **Overwintering**

Large-Bodied Fish: Moderate Moderate Low
Small-Bodied Fish: Moderate Moderate Moderate

Impediments to Migration: None observed

Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Low



Photograph Documentation



Photo 1. View of crossing at Site 18.



Photo 2. Upstream view 50 m downstream from Site 18 crossing.



Photo 3. Downstream view of crossing at Site 18.



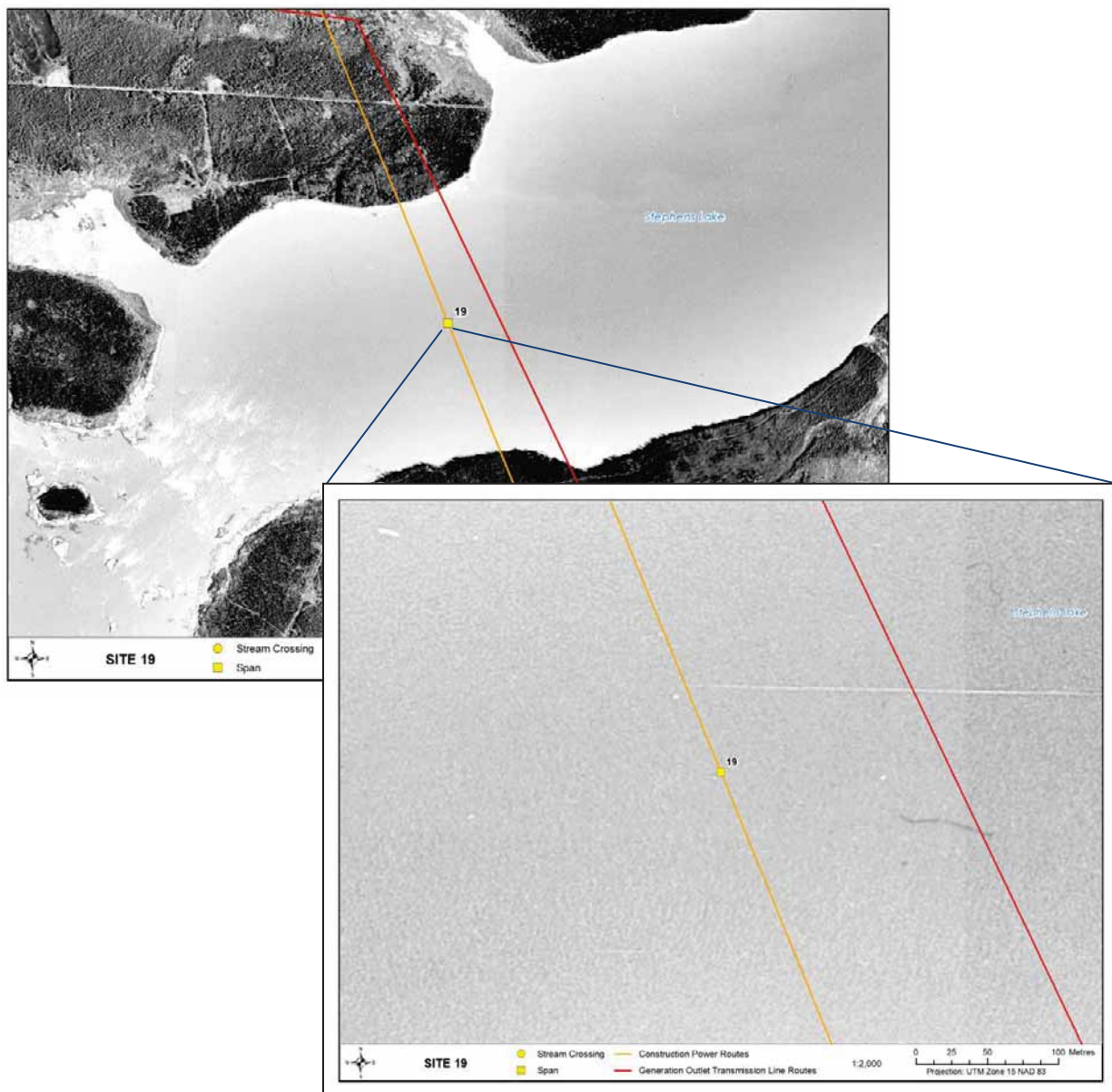
Photo 4. Beaver dam and impoundment downstream of Site 18.

Location

Datum:	NAD 83	
UTM:	<i>Zone:</i>	15V
	<i>Easting:</i>	364829
	<i>Northing:</i>	6246995
Location Depicted Below:		

General Morphology

Gen. Description:	Large River
Pattern:	Straight
Confinement:	Confined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1,376,565 km ²
Receiving Water/Dist.:	Stephens Lake/3 km



Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 810
Wetted Width (m) 810

Water Depths (m)

Max. -
Avg. -

Banks

Right Bank Height (m): - Shape: vertical Stability: unstable
Left Bank Height (m): - Shape: vertical Stability: unstable

Substrate

Substrate Type (%)

Fines -
Small Gravel -
Large Gravel -
Cobble -
Boulder -

Habitat Type

Habitat Composition (%)

Pool -
Flat -
Run -
Riffle -

Cover Types

Total Cover Available (%)

US DS

- -

Cover Composition (% of Total)

Large Woody Debris -
Overhanging Vegetation -
Instream Vegetation -
Pool -
Boulder -
Undercut Bank -
Surface Turbulence -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges -
Shrubs -
Conifers Y
Deciduous -
Mixed Forest -
Canopy Cover (%) -

+ Water Quality Data

Surface Temp (°C): -
Specific Conductance (µS/cm): -
TDS (g/L): -
Salinity (ppt): -

DO (mg/L): -
pH: -
Turbidity (NTU): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Spawning

Rearing/Feeding

Overwintering

Large-Bodied Fish:

High

Moderate-High

Low

Small-Bodied Fish:

High

Moderate-High

Low

Impediments to Migration: None observed

Common Fish: brook stickleback, burbot, cisco, fathead minnow, finescale dace, freshwater drum, goldeye, Iowa darter, Johnny darter, lake chub, lake sturgeon, lake whitefish, longnose dace, longnose sucker, mooneye, northern pike, northern redbelly dace, pearl dace, rainbow smelt, sauger, slimy sculpin, spottail shiner, trout-perch, walleye, white sucker, yellow perch (J. Holm, pers. comm., July 2011)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate-High



📷 Photograph Documentation



Photo 1. View of crossing at Site 19.

Site 21

Unnamed Tributary of Stephens Lake

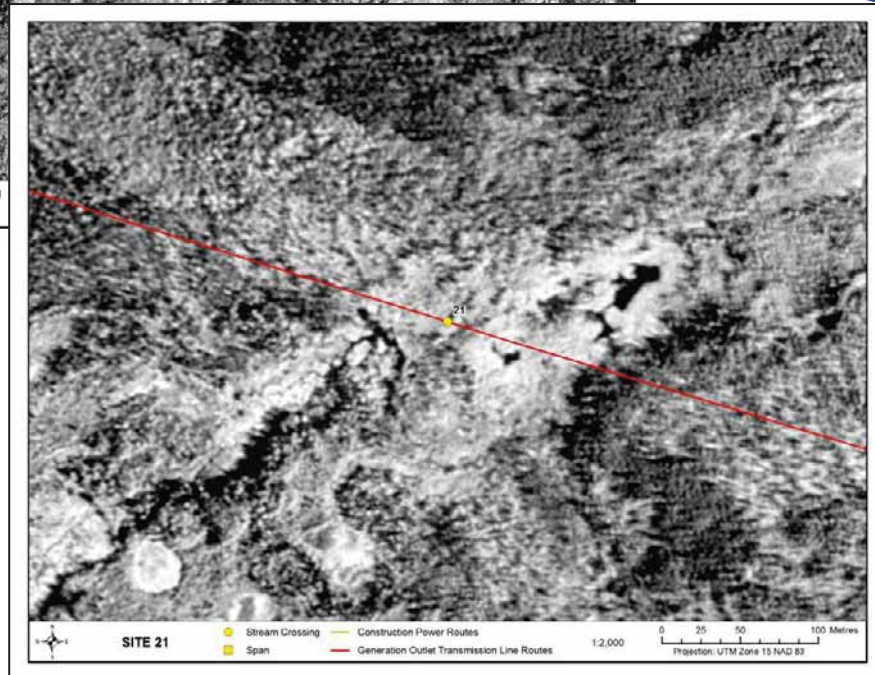
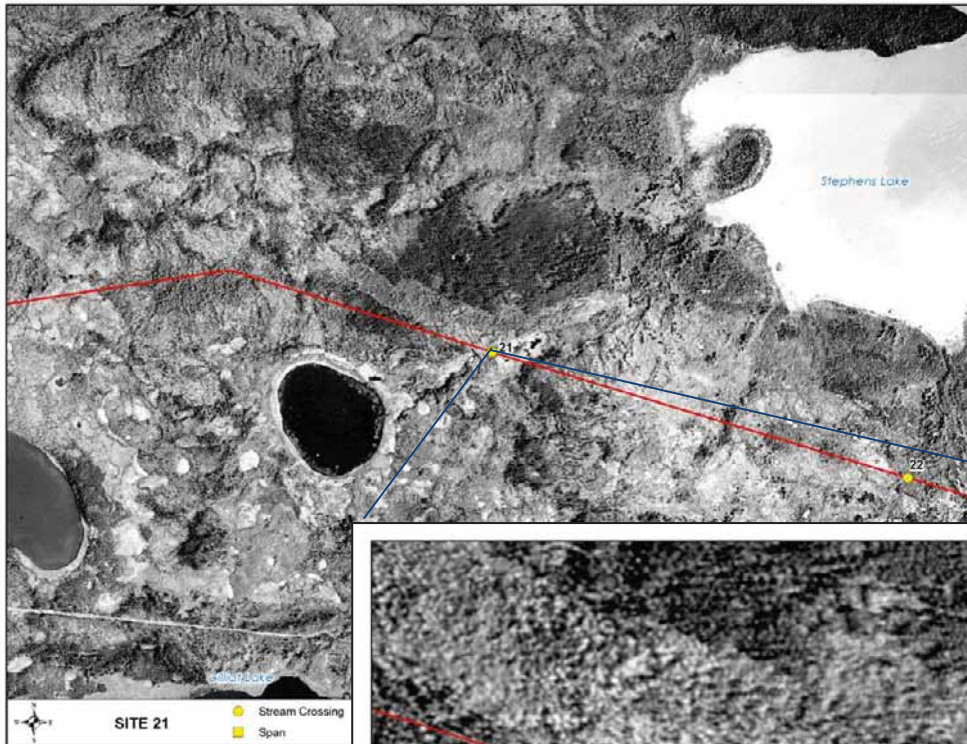
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 371607
Northing: 6244290

Location Depicted Below:

General Morphology

Gen. Description: Wetland/bog drainage
Pattern: -
Confinement: Unconfined
Stage: Moderate
Flow Regime: Perennial
U/S Drainage: 0.6 km²
Receiving Water/Dist.: Stephens Lake/0.8 km



Site Conditions

+ Physical Data

Survey Date: 25 July 2009

Channel Profile

Channel and Flow

Channel Width (m) -
Wetted Width (m) -

Water Depths (m)

Max. ~ 1
Avg. < 1

Banks

Right Bank Height (m): - Shape: - Stability: Stable
Left Bank Height (m): - Shape: - Stability: Stable

Substrate

Substrate Type (%)

Fines 100
Small Gravel -
Large Gravel -
Cobble -
Boulder -

Habitat Type

Habitat Composition (%)

Pool 100
Flat -
Run -
Riffle -

Cover Types

Total Cover Available (%) US DS
30 30

Cover Composition (% of Total)

Large Woody Debris 5 5
Overhanging Vegetation 20 20
Instream Vegetation 75 75
Pool - -
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges Y
Shrubs Y
Conifers -
Deciduous -
Mixed Forest -
Canopy Cover (%) 0

+ Water Quality Data

Surface Temp (°C): - DO (mg/L): -
Specific Conductance (µS/cm): - pH: -
TDS (g/L): - Turbidity (NTU): -
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Spawning **Rearing/Feeding** **Overwintering**

Large-Bodied Fish: Low-Moderate Low Low
Small-Bodied Fish: Moderate Moderate Low

Impediments to Migration: None observed

Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Low



📷 Photograph Documentation



Photo 1. View of crossing Site 21.



Photo 2. Connection to lake upstream of Site 21.

Site 22

Unnamed Tributary of Stephens Lake

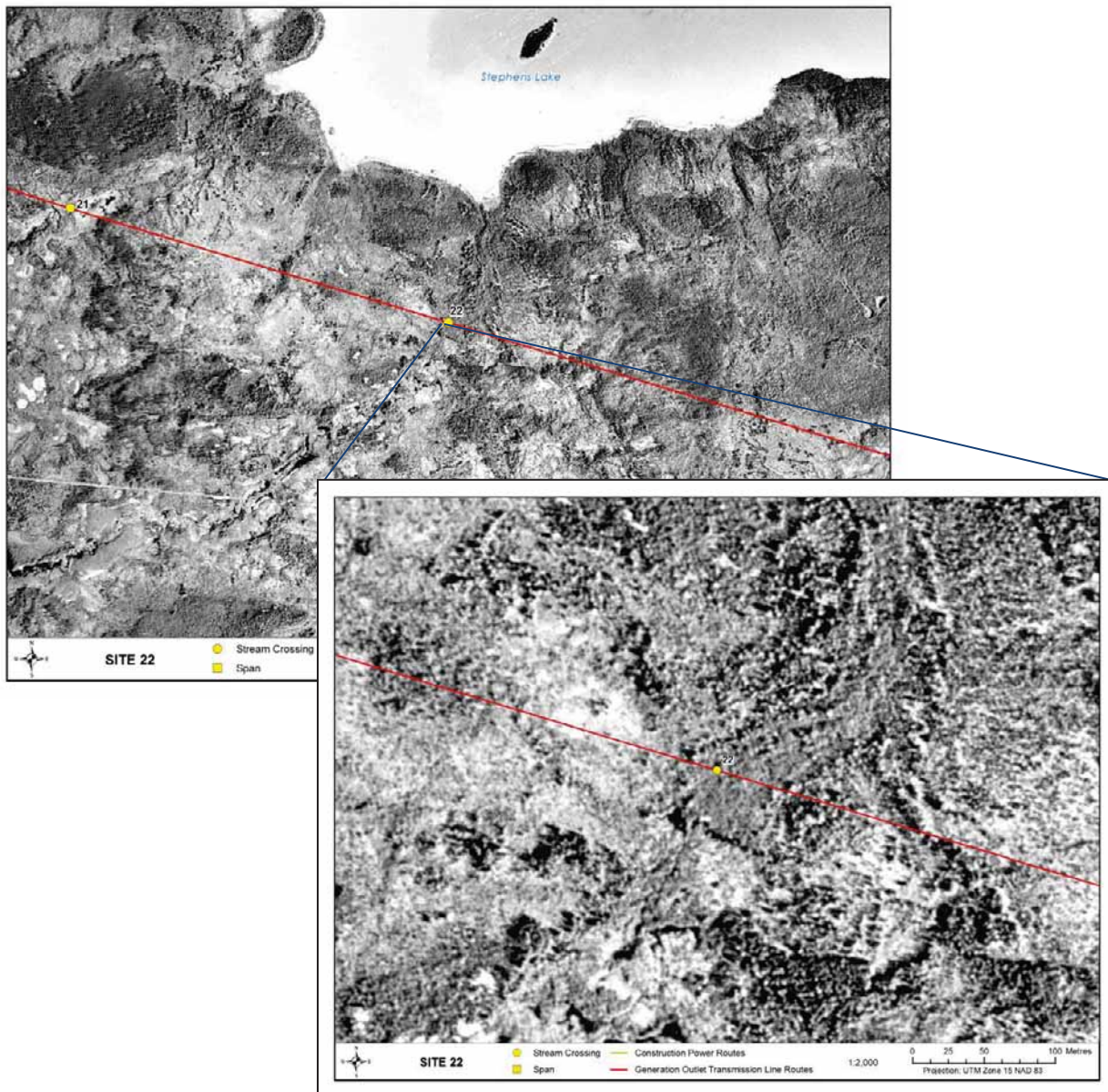
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 372752
Northing: 6243944

Location Depicted Below:

General Morphology

Gen. Description: Wetland/bog drainage
Pattern: -
Confinement: Unconfined
Stage: Moderate
Flow Regime: Perennial
U/S Drainage: 17 km²
Receiving Water/Dist.: Stephens Lake/0.5 km



Site Conditions

+ Physical Data

Survey Date: 25 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	-	Water Depths (m)	Max.	~ 2
Wetted Width (m)	-		Avg.	< 1

Banks

Right Bank Height (m):	-	Shape:	-	Stability:	Stable
Left Bank Height (m):	-	Shape:	-	Stability:	Stable

Substrate

Substrate Type (%)

Fines	100
Small Gravel	-
Large Gravel	-
Cobble	-
Boulder	-

Habitat Type

Habitat Composition (%)

Pool	100
Flat	-
Run	-
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	20	20

Cover Composition (% of Total)

Large Woody Debris	5	5
Overhanging Vegetation	85	85
Instream Vegetation	10	10
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-

Riparian

Riparian Vegetation Type (Y/N)

Moss	-
Grasses/Sedges	Y
Shrubs	Y
Conifers	-
Deciduous	-
Mixed Forest	-
Canopy Cover (%)	0

+ Water Quality Data

Surface Temp (°C):	-	DO (mg/L):	-
Specific Conductance (µS/cm):	-	pH:	-
TDS (g/L):	-	Turbidity (NTU):	-
Salinity (ppt):	-		

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low-Moderate	Low	Low
Small-Bodied Fish:	Moderate	Moderate	Low

Impediments to Migration: None observed

Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Low



Photograph Documentation



Photo 1. View of crossing Site 22.



Photo 2. Downstream view of Site 22.



Photo 3. Upstream view of Site 22.



Photo 4. Gilliat Lake upstream of Site 22.

Site 23

Man-Made Drainage Channel

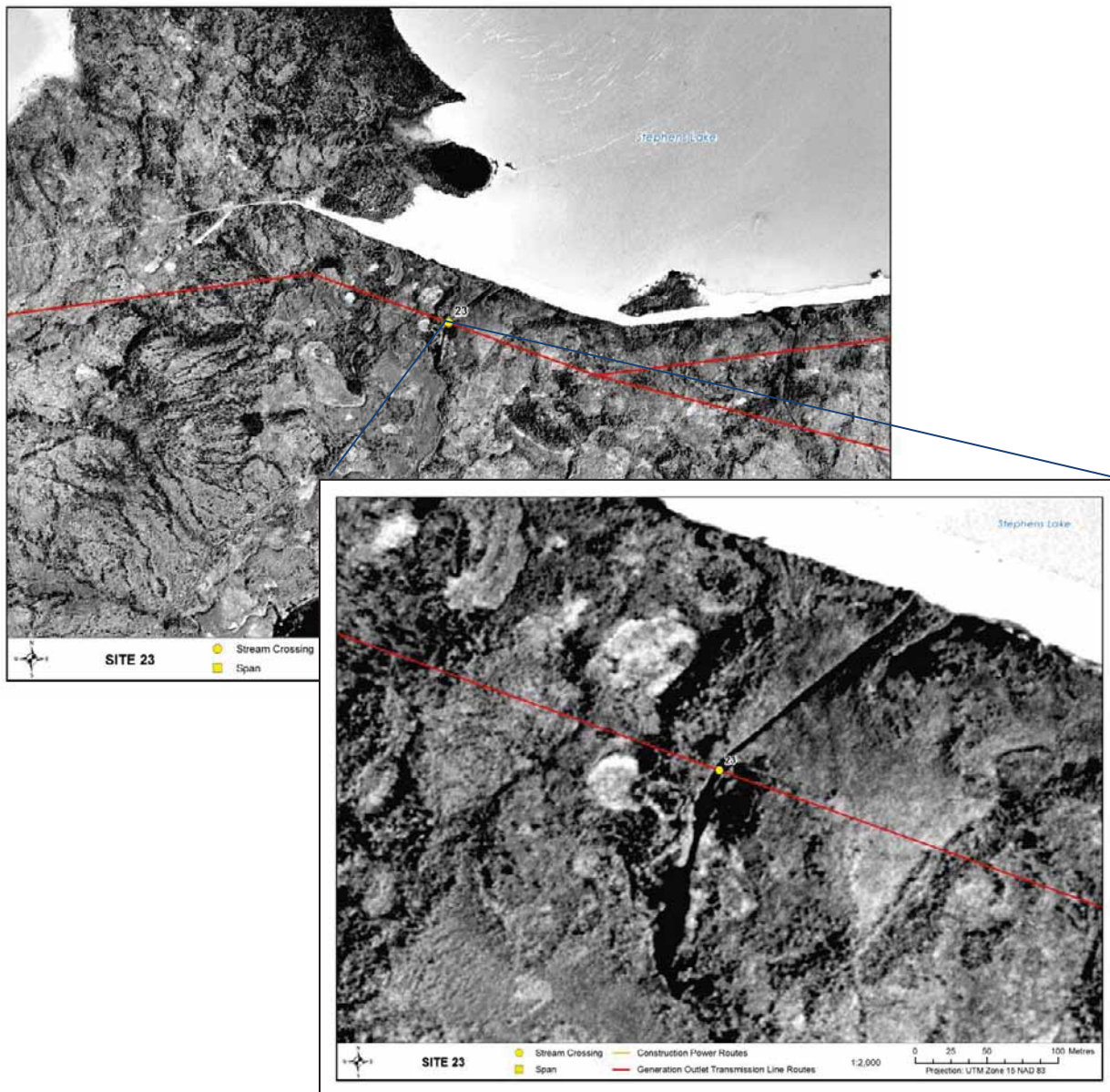
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 376790
Northing: 6243307

Location Depicted Below:

General Morphology

Gen. Description: Man-made drainage
Pattern: -
Confinement: Unconfined
Stage: Moderate
Flow Regime: Perennial
U/S Drainage: 0.008 km²
Receiving Water/Dist.: No outflow



Site Conditions

+ Physical Data

Survey Date: 25 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 2.9-4.9
Wetted Width (m) 3.4-5.6

Water Depths (m)

Max. 1.2
Avg. < 1

Banks

Right Bank Height (m): - Shape: - Stability: Stable
Left Bank Height (m): - Shape: - Stability: Stable

Substrate

Substrate Type (%)

Fines 100
Small Gravel -
Large Gravel -
Cobble -
Boulder -

Habitat Type

Habitat Composition (%)

Pool 100
Flat -
Run -
Riffle -

Cover Types

Total Cover Available (%) US DS
90 90

Cover Composition (% of Total)

Large Woody Debris - -
Overhanging Vegetation 20 20
Instream Vegetation 80 80
Pool - -
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges Y
Shrubs Y
Conifers -
Deciduous -
Mixed Forest -
Canopy Cover (%) 0

+ Water Quality Data

Surface Temp (°C): 12.8 DO (mg/L): 8.33
Specific Conductance (µS/cm): 240 pH: 6.29
TDS (g/L): 0.22 Turbidity (NTU): 5.3
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Low	Low
Small-Bodied Fish:	Low	Low	Low

Impediments to Migration: Butnau dyke

Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Low



Photograph Documentation



Photo 1. Looking towards crossing Site 23 from Butnau dyke.



Photo 2. Looking inland (southwest) from crossing Site 23.



Photo 3. Connection to inland lake near Site 23.



Photo 4. Approximately 50 m further inland from Photo 2 looking the same direction (southwest).

Site 24

Butnau River

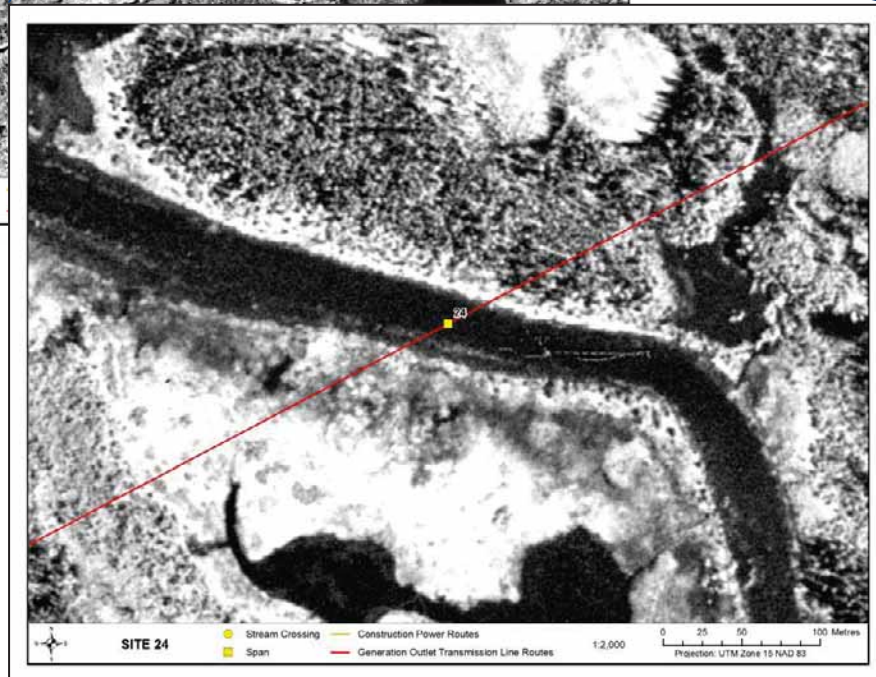
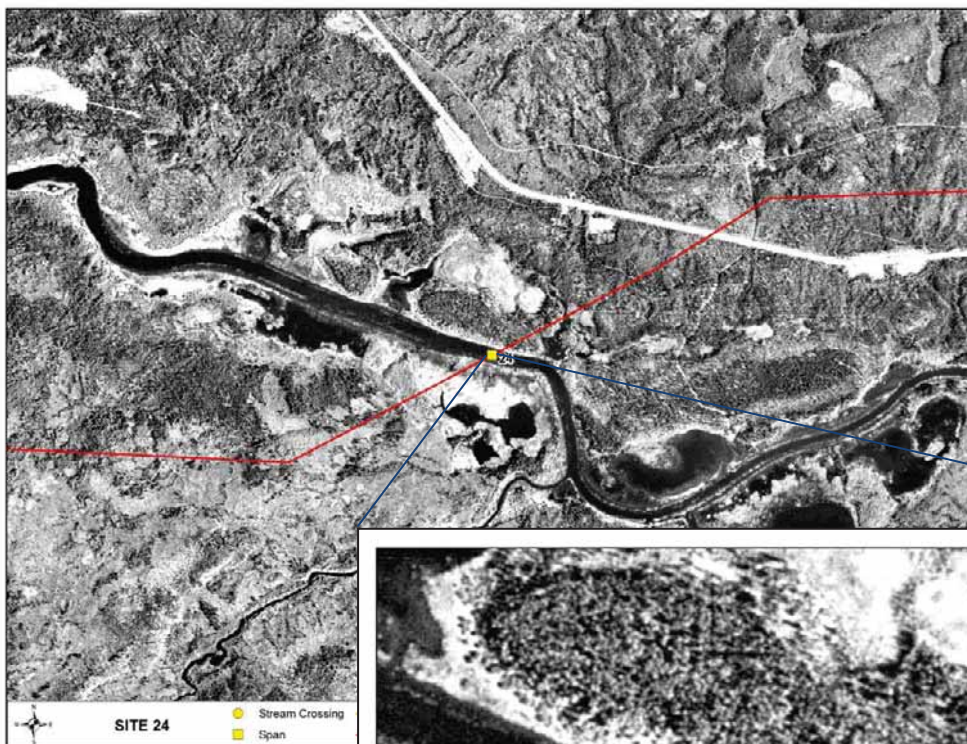
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 381727
Northing: 6243570

Location Depicted Below:

General Morphology

Gen. Description: Backwatered area of river
Pattern: Irregular wandering
Confinement: Confined
Stage: Flood
Flow Regime: Perennial
U/S Drainage: 2 km²
Receiving Water/Dist.: Kettle River/10 km



Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 40
Wetted Width (m) 100-150

Water Depths (m)

Max. ~5
Avg. < 2

Banks

Right Bank Height (m): - Shape: - Stability: -
Left Bank Height (m): - Shape: - Stability: -

Substrate

Substrate Type (%)

Fines -
Small Gravel -
Large Gravel -
Cobble -
Boulder -

Habitat Type

Habitat Composition (%)

Pool 100
Flat -
Run -
Riffle -

Cover Types

Total Cover Available (%)

US 80 DS 80

Cover Composition (% of Total)

Large Woody Debris 5 5
Overhanging Vegetation - -
Instream Vegetation 65 65
Pool 30 30
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges -
Shrubs Y
Conifers -
Deciduous -
Mixed Forest Y
Canopy Cover (%) 0

+ Water Quality Data

Surface Temp (°C): 18.6 DO (mg/L): 5.64
Specific Conductance (µS/cm): 146 pH: 5.39
TDS (g/L): 0.09 Turbidity (NTU): 205
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Spawning Rearing/Feeding Overwintering

Large-Bodied Fish: Moderate High Moderate
Small-Bodied Fish: Moderate High Moderate

Impediments to Migration: None observed

Fish Presence: lake whitefish, longnose sucker, northern pike, walleye, and white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate

📷 Photograph Documentation



Photo 1. Site 24 crossing area.



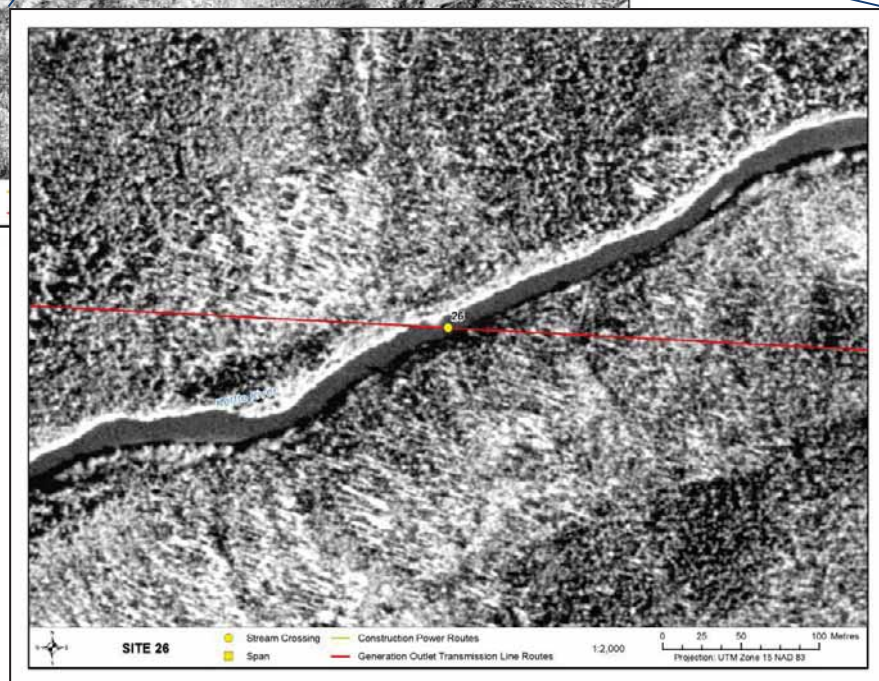
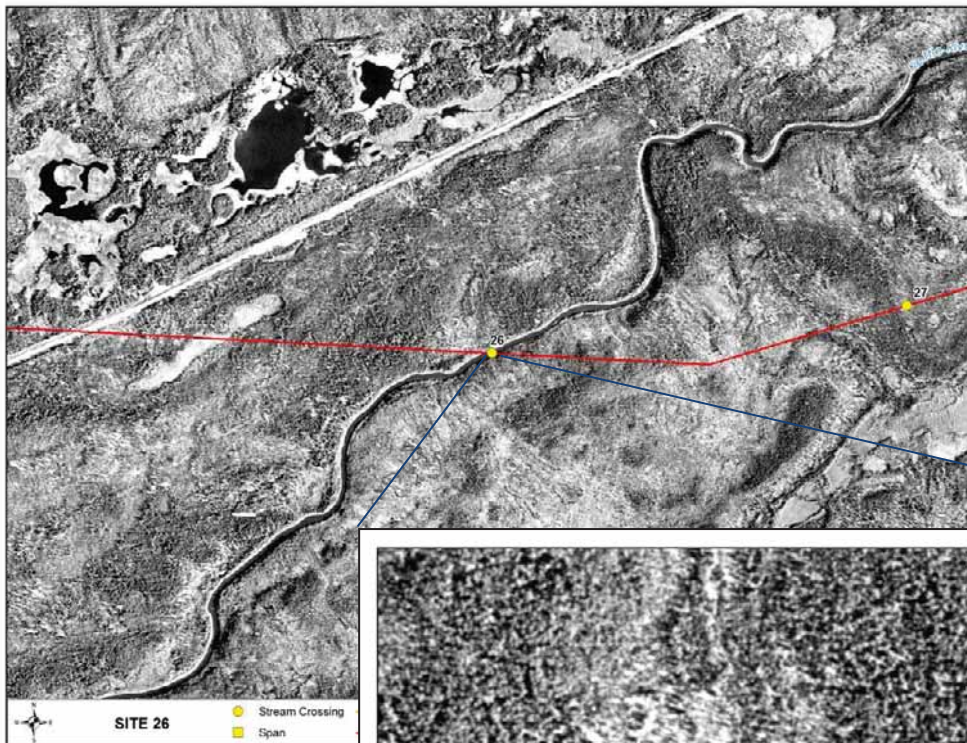
Photo 2. West view of crossing at Site 24.

Location

Datum:	NAD 83	
UTM:	<i>Zone:</i>	15V
	<i>Easting:</i>	390834
	<i>Northing:</i>	6243509
Location Depicted Below:		

General Morphology

Gen. Description:	Medium sized river
Pattern:	Irregular wandering
Confinement:	Confined
Stage:	High
Flow Regime:	Perennial
U/S Drainage:	1,928 km ²
Receiving Water/Dist.:	Nelson River/19 km



Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	12
Wetted Width (m)	12

Water Depths (m)

Max.	-
Avg.	-

Banks

Right Bank Height (m):	~5	Shape: sloped (< 30°)	Stability:	Stable
Left Bank Height (m):	~5	Shape: sloped (< 30°)	Stability :	Stable

Substrate

Substrate Type (%)

Fines	-
Small Gravel	-
Large Gravel	-
Cobble	-
Boulder	-

Habitat Type

Habitat Composition (%)

Pool	-
Flat	-
Run	100
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	5	5

Cover Composition (% of Total)

Large Woody Debris	60	60
Overhanging Vegetation	40	40
Instream Vegetation	-	-
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-

Riparian

Riparian Vegetation Type (Y/N)

Moss	-
Grasses/Sedges	-
Shrubs	Y
Conifers	Y
Deciduous	-
Mixed Forest	-
Canopy Cover (%)	0

+ Water Quality Data

Surface Temp (°C):	-	DO (mg/L):	-
Specific Conductance (µS/cm):	-	pH:	-
TDS (g/L):	-	Turbidity (NTU):	-
Salinity (ppt):	-		

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Moderate	Low	Low
Small-Bodied Fish:	Low	Low	Low

Impediments to Migration: None observed

Fish Presence: brook trout, longnose sucker, northern pike, walleye, white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate-High

📷 Photograph Documentation



Photo 1. View of crossing at Site 26.



Photo 2. Looking downstream at Site 26.

Site 30

Unnamed Tributary of Boots Creek

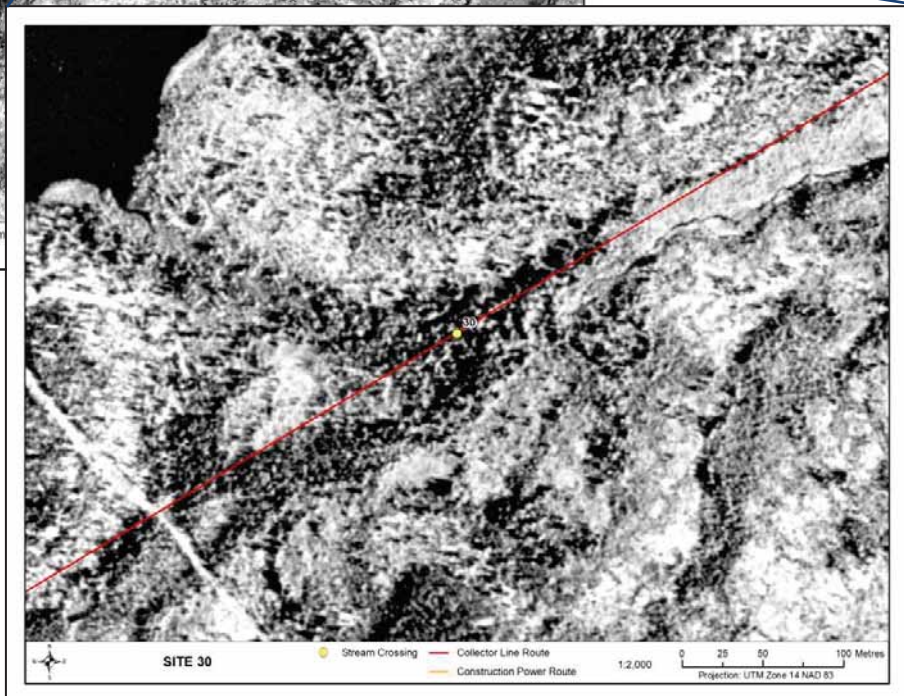
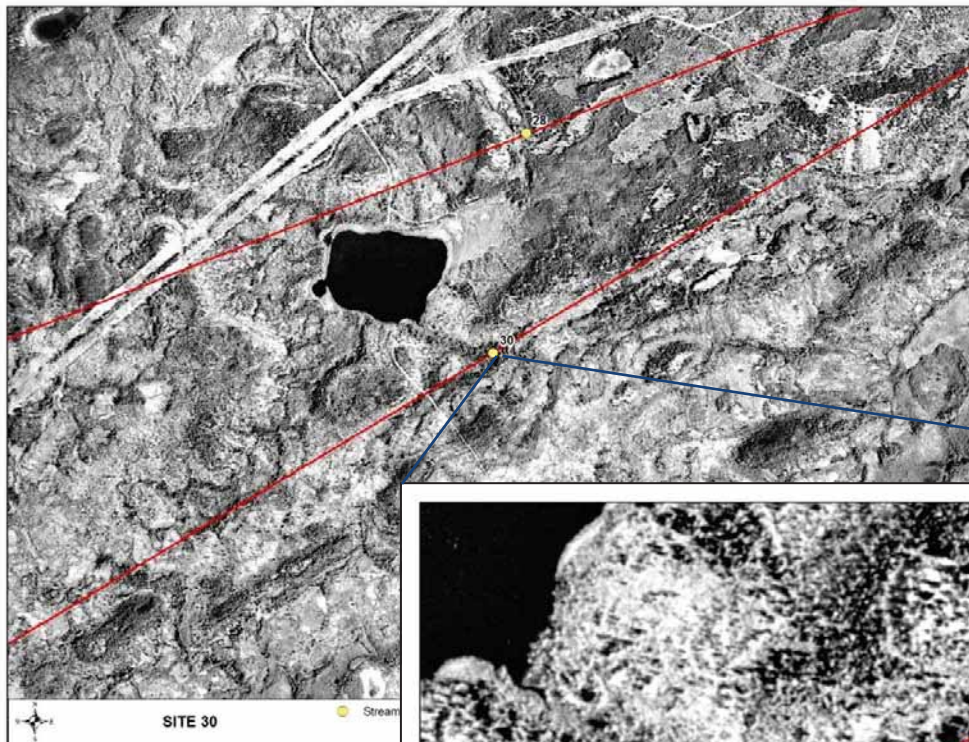
Location

Datum: NAD 83
UTM: *Zone:* 15V
Easting: 394844
Northing: 6243944

Location Depicted Below:

General Morphology

Gen. Description: Wetland/bog drainage
Pattern: -
Confinement: Unconfined
Stage: Flooded
Flow Regime: Perennial
U/S Drainage: 0.5 km²
Receiving Water/Dist.: Nelson River/18 km



Site Conditions

+ Physical Data

Survey Date: 24 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 0.4
Wetted Width (m) 0.8

Water Depths (m)

Max. ~1.0
Avg. 0.5

Banks

Right Bank Height (m): 0 Shape: vertical Stability: Stable
Left Bank Height (m): 0 Shape: vertical Stability: Stable

Substrate

Substrate Type (%)

Fines 5
Small Gravel -
Large Gravel -
Cobble 95
Boulder -

Habitat Type

Habitat Composition (%)

Pool 50
Flat -
Run 50
Riffle -

Cover Types

Total Cover Available (%) US DS
80 80

Cover Composition (% of Total)

Large Woody Debris 50 50
Overhanging Vegetation 10 10
Instream Vegetation 40 40
Pool - -
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges Y
Shrubs Y
Conifers Y
Deciduous -
Mixed Forest -
Canopy Cover (%) 75

+ Water Quality Data

Surface Temp (°C): 19.9 DO (mg/L): 7.48
Specific Conductance (µS/cm): 106 pH: 7.0
TDS (g/L): 0.07 Turbidity (NTU): 190
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Low	Low
Small-Bodied Fish:	Moderate	Moderate	Low

Impediments to Migration: Beaver dam ~110 m upstream of ROW

Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Low



Photograph Documentation



Photo 1. Wetland area downstream of crossing at Site 30.



Photo 2. Upstream view towards Site 30.



Photo 3. Immediately upstream of beaver dam ~110 m upstream of Site 30.



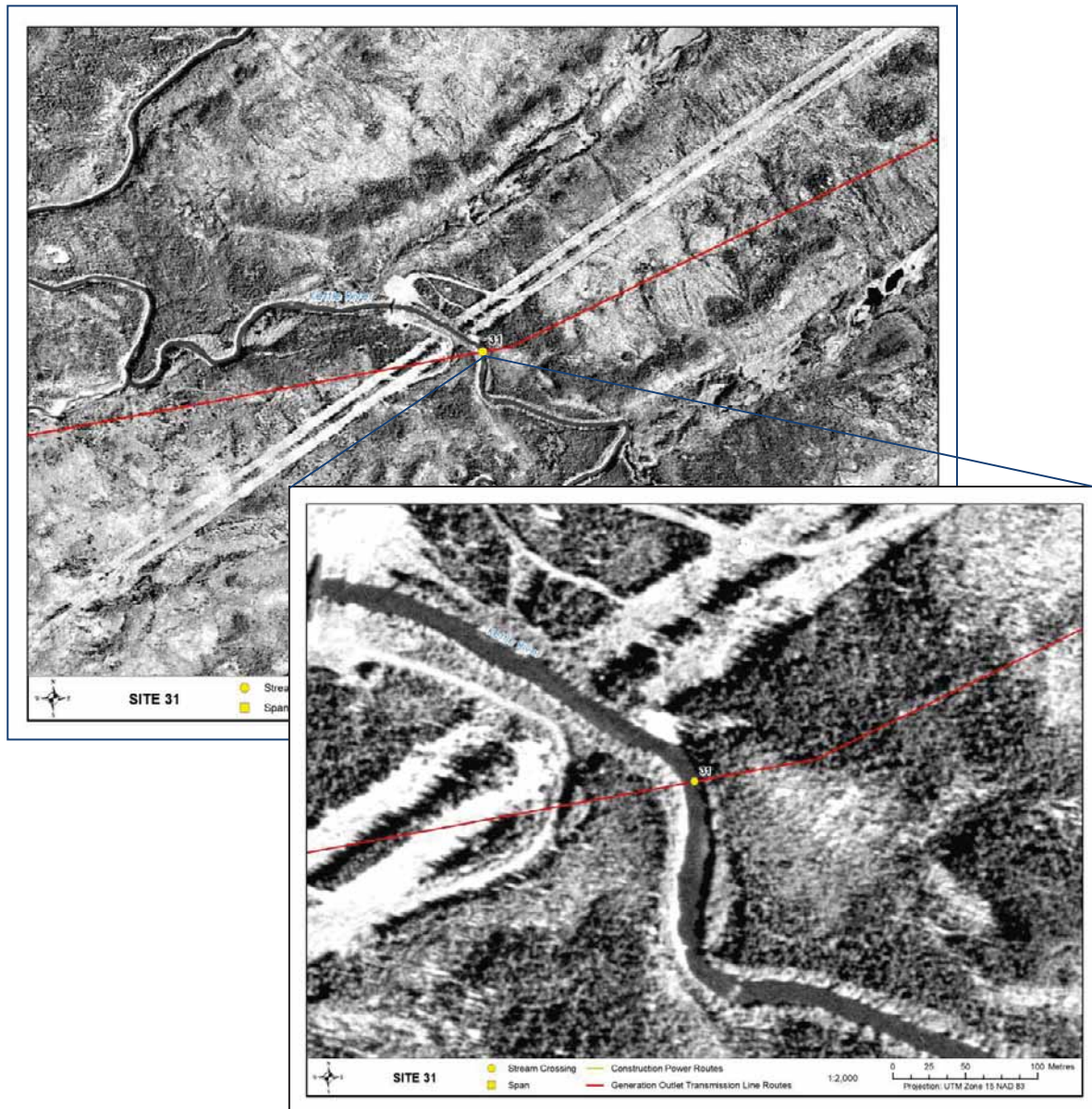
Photo 4. Downstream of dam.

Location

Datum:	NAD 83	
UTM:	<i>Zone:</i>	15V
	<i>Easting:</i>	391094
	<i>Northing:</i>	6242140
Location Depicted Below:		

General Morphology

Gen. Description:	Medium sized river
Pattern:	Irregular meander
Confinement:	Confined
Stage:	High
Flow Regime:	Perennial
U/S Drainage:	696 km ²
Receiving Water/Dist.:	Nelson River/23 km



Site Conditions

+ Physical Data

Survey Date: 24 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	14
Wetted Width (m)	14

Water Depths (m)

Max.	-
Avg.	-

Banks

Right Bank Height (m):	<5	Shape: sloped (< 30°)	Stability:	Stable
Left Bank Height (m):	<5	Shape: sloped (< 30°)	Stability:	Stable

Substrate

Substrate Type (%)

Fines	-
Small Gravel	-
Large Gravel	-
Cobble	-
Boulder	-

Habitat Type

Habitat Composition (%)

Pool	20
Flat	30
Run	50
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	25	25

Cover Composition (% of Total)

Large Woody Debris	-	-
Overhanging Vegetation	40	40
Instream Vegetation	-	-
Pool	60	60
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-

Riparian

Riparian Vegetation Type (Y/N)

Moss	-
Grasses/Sedges	-
Shrubs	Y
Conifers	Y
Deciduous	-
Mixed Forest	-
Canopy Cover (%)	0

+ Water Quality Data

Surface Temp (°C):	-	DO (mg/L):	-
Specific Conductance (µS/cm):	-	pH:	-
TDS (g/L):	-	Turbidity (NTU):	-
Salinity (ppt):	-		

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Moderate	Moderate
Small-Bodied Fish:	Low	Moderate	Moderate

Impediments to Migration: None observed

Fish Presence: brook trout, longnose sucker, northern pike, walleye, white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate

📷 Photograph Documentation



Photo 1. Looking upstream at Site 31.



Photo 2. Looking downstream at Site 31.

Site 32

Butnau River Diversion Channel

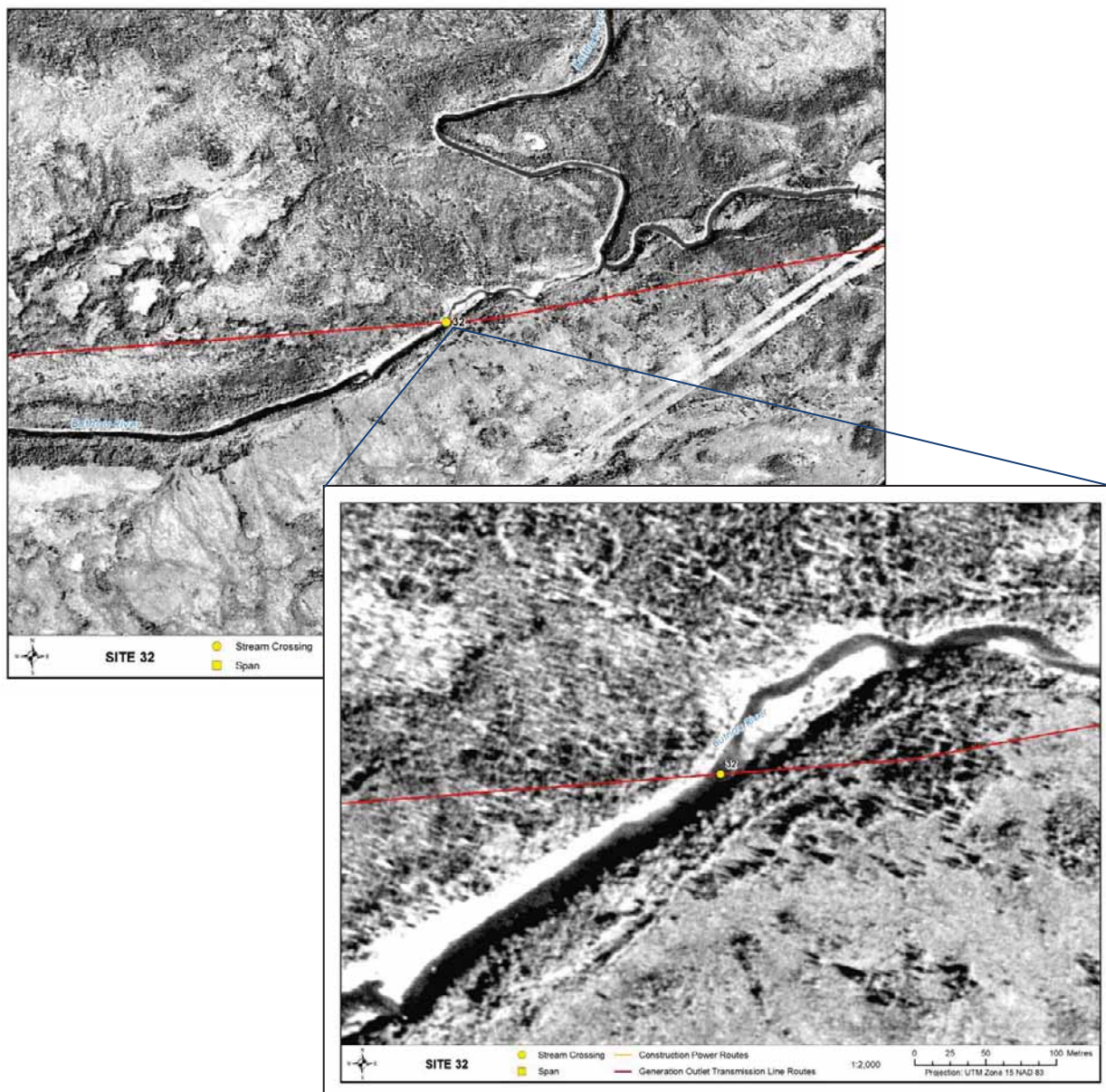
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 389574
Northing: 6241875

Location Depicted Below:

General Morphology

Gen. Description: Man-made channel
Pattern: Straight
Confinement: Confined
Stage: High
Flow Regime: Perennial
U/S Drainage: 862 km²
Receiving Water/Dist.: Kettle River/0.5 km



Site Conditions

+ Physical Data

Survey Date: 24 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	14
Wetted Width (m)	14

Water Depths (m)

Max.	~ 1.0
Avg.	-

Banks

Right Bank Height (m):	~7	Shape: sloped (~ 45°)	Stability:	Stable
Left Bank Height (m):	~5	Shape: sloped (~ 45°)	Stability :	Stable

Substrate

Substrate Type (%)

Fines	10
Small Gravel	-
Large Gravel	25
Cobble	60
Boulder	5

Habitat Type

Habitat Composition (%)

Pool	-
Flat	-
Run	-
Riffle	100

Cover Types

	US	DS
Total Cover Available (%)	25	25

Cover Composition (% of Total)

Large Woody Debris	-	-
Overhanging Vegetation	38	38
Instream Vegetation	2	2
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	60	60

Riparian

Riparian Vegetation Type (Y/N)

Moss	-
Grasses/Sedges	Y
Shrubs	Y
Conifers	Y
Deciduous	-
Mixed Forest	-
Canopy Cover (%)	0

+ Water Quality Data

Surface Temp (°C):	18.9	DO (mg/L):	7.37
Specific Conductance (µS/cm):	119	pH:	6.72
TDS (g/L):	0.08	Turbidity (NTU):	221
Salinity (ppt):	-		

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Moderate	Low	Low
Small-Bodied Fish:	Low	Low	Low

Impediments to Migration: Rapids approximately 250 m downstream

Fish Presence: lake whitefish, longnose sucker, northern pike, walleye, white sucker (Johnson and Barth 2007); small unidentified minnows observed at ROW area during survey

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate-High



Photograph Documentation



Photo 1. View of crossing at Site 32.



Photo 2. Downstream view of Site 32.



Photo 3. 50 m downstream of Site 32 looking downstream.



Photo 4. Upstream view of Site 32.

Site 33

Butnau River Diversion Channel

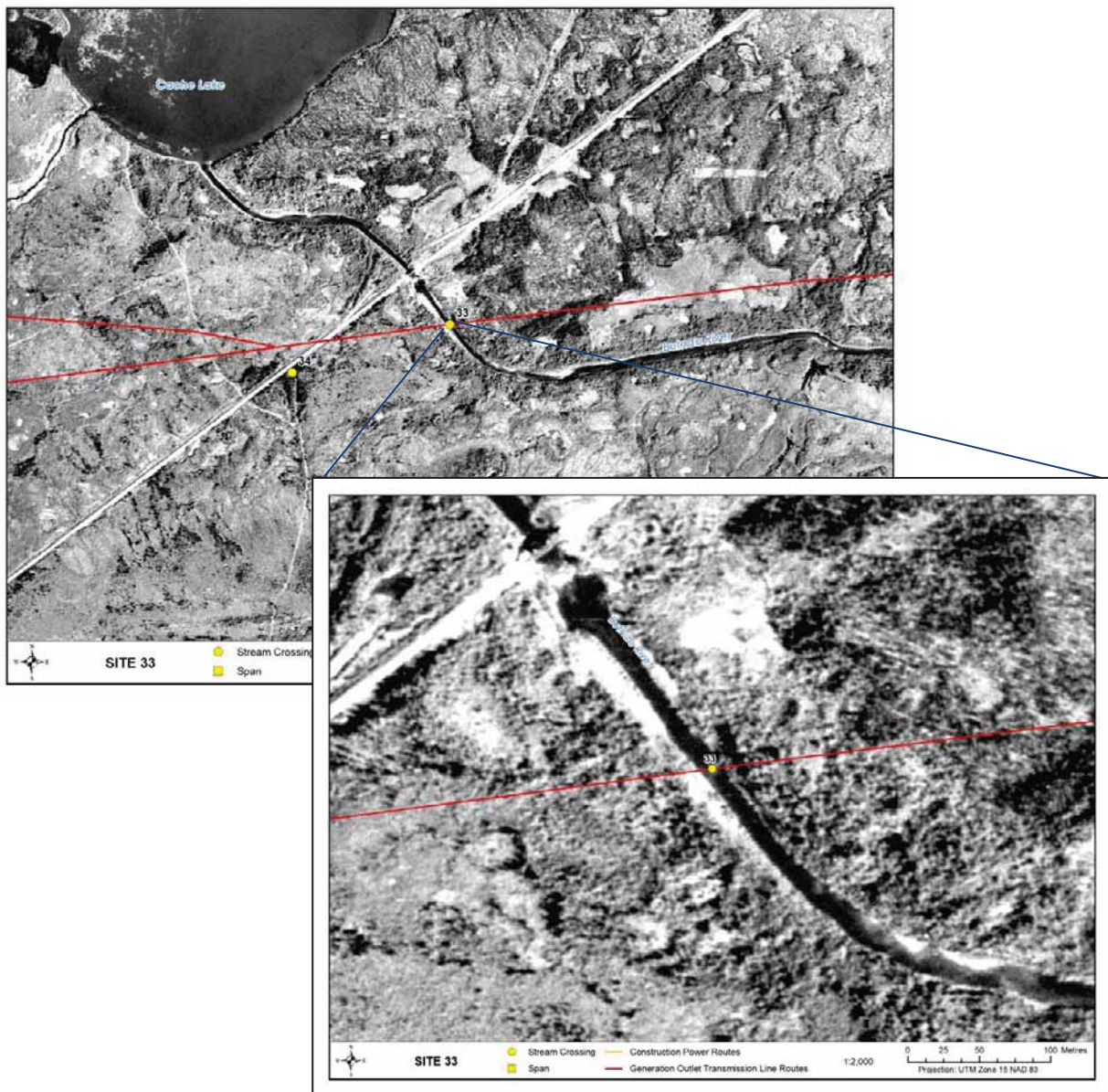
Location

Datum: NAD 83
UTM: Zone: 15V
Easting: 386938
Northing: 6241622

Location Depicted Below:

General Morphology

Gen. Description: Man-made channel
Pattern: Straight
Confinement: Confined
Stage: High
Flow Regime: Perennial
U/S Drainage: 853 km²
Receiving Water/Dist.: Kettle River/3.3 km



Site Conditions

+ Physical Data

Survey Date: 24 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 10-13
Wetted Width (m) 12.5-15

Water Depths (m)

Max. -
Avg. -

Banks

Right Bank Height (m): <5 Shape: sloped (~ 45°) Stability: Stable
Left Bank Height (m): <5 Shape: sloped (~ 45°) Stability: Stable

Substrate

Substrate Type (%)

Fines 94
Small Gravel 5
Large Gravel -
Cobble 1
Boulder -

Habitat Type

Habitat Composition (%)

Pool -
Flat -
Run 100
Riffle -

Cover Types

Total Cover Available (%)

US 5 DS 5

Cover Composition (% of Total)

Large Woody Debris - -
Overhanging Vegetation 50 50
Instream Vegetation 50 50
Pool - -
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges Y
Shrubs Y
Conifers Y
Deciduous -
Mixed Forest -

Canopy Cover (%) 0

+ Water Quality Data

Surface Temp (°C): 18.2 DO (mg/L): 6.76
Specific Conductance (µS/cm): 119 pH: 6.61
TDS (g/L): 0.08 Turbidity (NTU): 166
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Low	Low-Moderate
Small-Bodied Fish:	Low	Low	Low-Moderate

Impediments to Migration: None observed

Fish Presence: lake whitefish, longnose sucker, northern pike, walleye, white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate



▼ Photograph Documentation



Photo 1. Site 33 crossing looking towards right bank.



Photo 2. Upstream view of Site 33.



Photo 3. Downstream view of Site 33.



Photo 4. 100 m upstream of Site 33; looking upstream.

Site 35

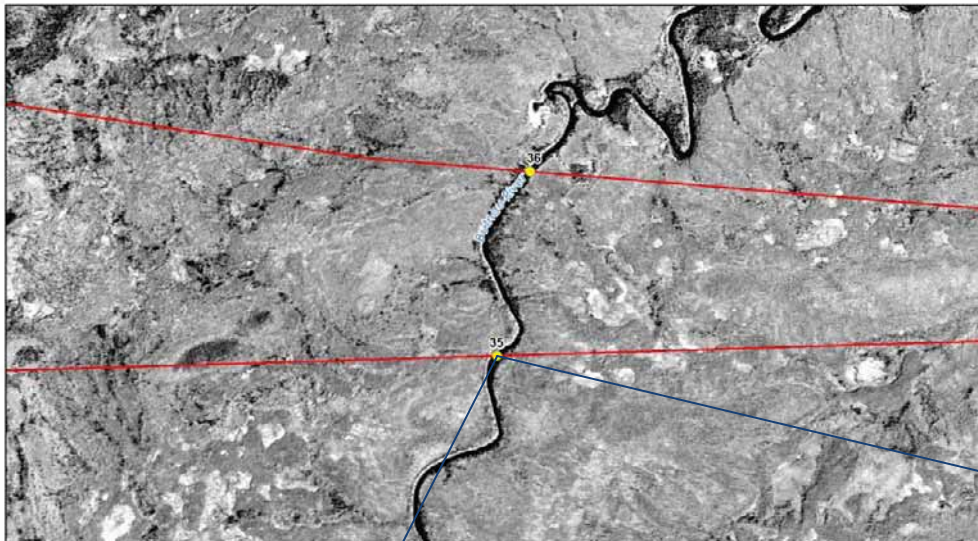
Butnau River

Location

Datum:	NAD 83		
UTM:	<i>Zone:</i>	15V	
	<i>Easting:</i>	383494	
	<i>Northing:</i>	6241310	
Location Depicted Below:			

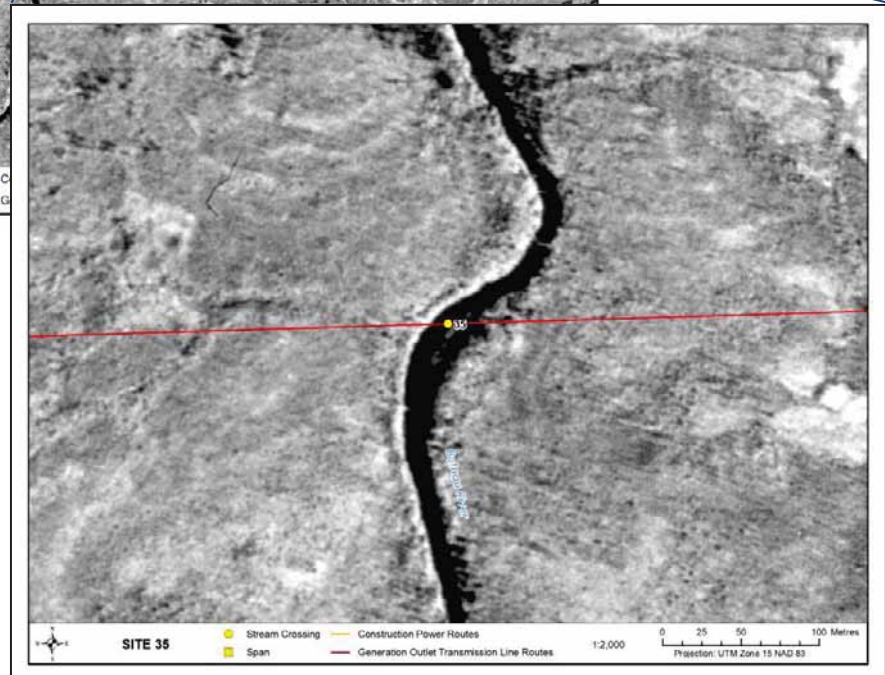
General Morphology

Gen. Description:	Small river
Pattern:	Irregular meander
Confinement:	Confined
Stage:	High
Flow Regime:	Perennial
U/S Drainage:	680 km ²
Receiving Water/Dist.:	Kettle River/11.5 km



SITE 35

- Stream Crossing
- Span
- Construction Power Routes
- Generation Outlet Transmission Line Routes



SITE 35

- Stream Crossing
- Span
- Construction Power Routes
- Generation Outlet Transmission Line Routes

1:2,000 0 25 50 100 Metres
Projection: UTM Zone 15 NAD 83

Site Conditions

+ Physical Data

Survey Date: 24 July 2009

Channel Profile

Channel and Flow

Channel Width (m) 9-11
Wetted Width (m) 11-12

Water Depths (m)

Max. -
Avg. -

Banks

Right Bank Height (m): < 2 m Shape: sloped (< 35°) Stability: Stable
Left Bank Height (m): < 2 m Shape: sloped (< 35°) Stability: Stable

Substrate

Substrate Type (%)

Fines 100
Small Gravel -
Large Gravel -
Cobble -
Boulder -

Habitat Type

Habitat Composition (%)

Pool -
Flat -
Run 100
Riffle -

Cover Types

Total Cover Available (%)

US 5 DS 5

Cover Composition (% of Total)

Large Woody Debris 5 5
Overhanging Vegetation 45 45
Instream Vegetation 50 50
Pool - -
Boulder - -
Undercut Bank - -
Surface Turbulence - -

Riparian

Riparian Vegetation Type (Y/N)

Moss -
Grasses/Sedges -
Shrubs Y
Conifers Y
Deciduous -
Mixed Forest -
Canopy Cover (%) 0

+ Water Quality Data

Surface Temp (°C): 17.7 DO (mg/L): 7.37
Specific Conductance (µS/cm): 124 pH: 4.73
TDS (g/L): 0.08 Turbidity (NTU): 263
Salinity (ppt): -

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Moderate	Low
Small-Bodied Fish:	Low	Moderate	Low

Impediments to Migration: None observed

Fish Presence: lake whitefish, longnose sucker, northern pike, walleye, white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate



Photograph Documentation



Photo 1. View of crossing at Site 35.



Photo 2. Downstream view of Site 35.



Photo 3. Upstream view of Site 35.



Photo 4. Downstream view of Site 35.