Appendix C

Transmission Line Detailed Stream Crossing Fish Habitat Assessments Booklets

Site 1

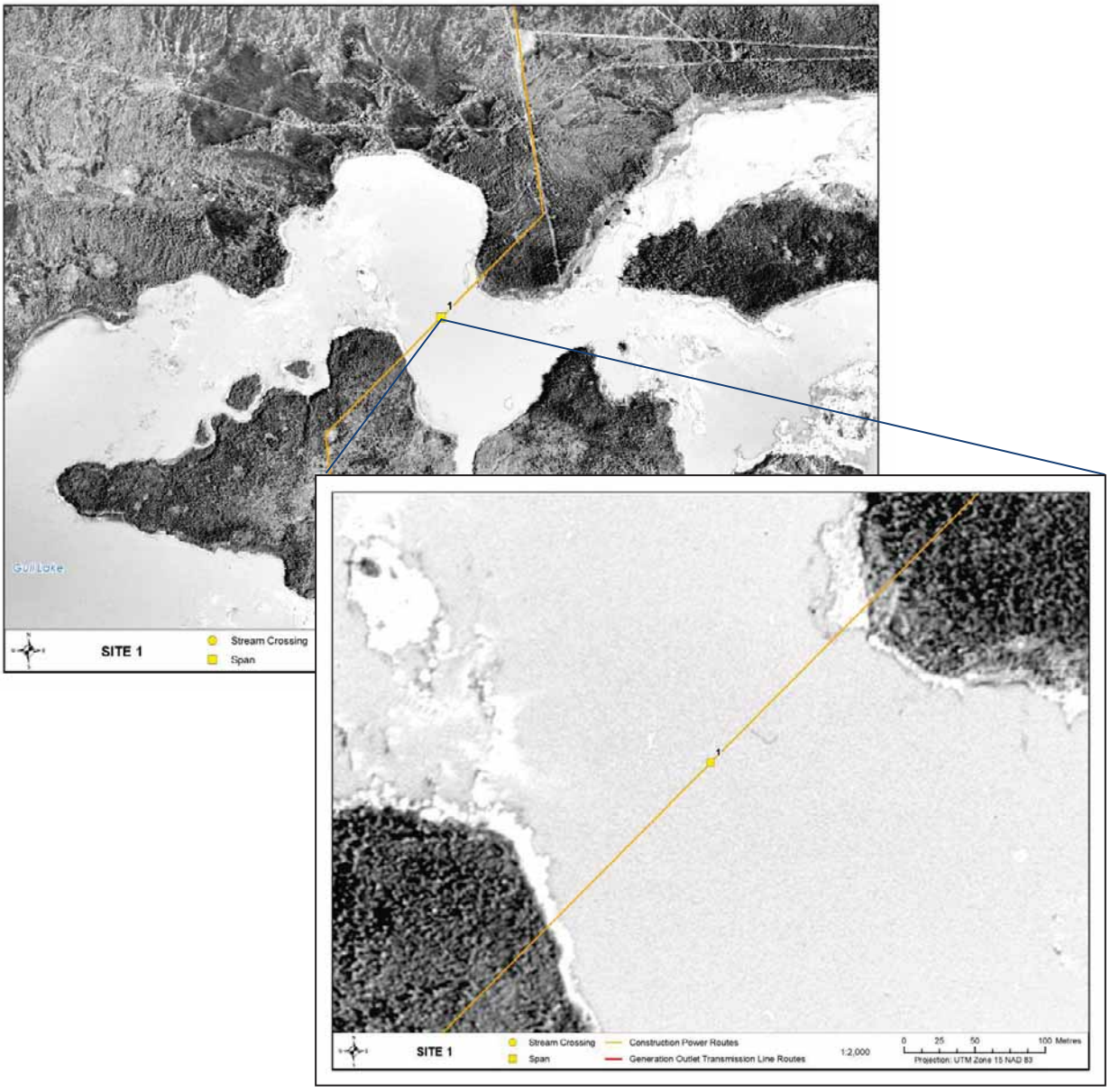
Nelson River

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	361949
	Northing:	6246916
Location Depicted Below:		

General Morphology

Gen. Description:	Large river
Pattern:	Sinuous
Confinement:	Confined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1,376,546 km^2
Receiving Water/Dist.:	Stephens Lake/6 km



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Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	325
Wetted Width (m)	325

Water Depths (m)

Max.	-
Avg.	<5

Banks

Right Bank Height (m):	~5	Shape:	~45°	Stability:	stable
Left Bank Height (m):	~5	Shape:	~45°	Stability :	stable

Substrate

Substrate Type (%)

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

Habitat Type

Habitat Composition (%)

Pool	-
Flat	-
Run	40
Riffle	60

Cover Types

	US	DS
Total Cover Available (%)	-	-
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):	-	**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:	High	Moderate	Low
Small-Bodied Fish:	Low	Low	Low

Impediments to Migration: Rapids immediately downstream

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 1.

Photo 2. Upstream view of Site 1.

Photo 3. Downstream view of Site 1.

*Dashed red line indicates proposed crossing location

Site 2

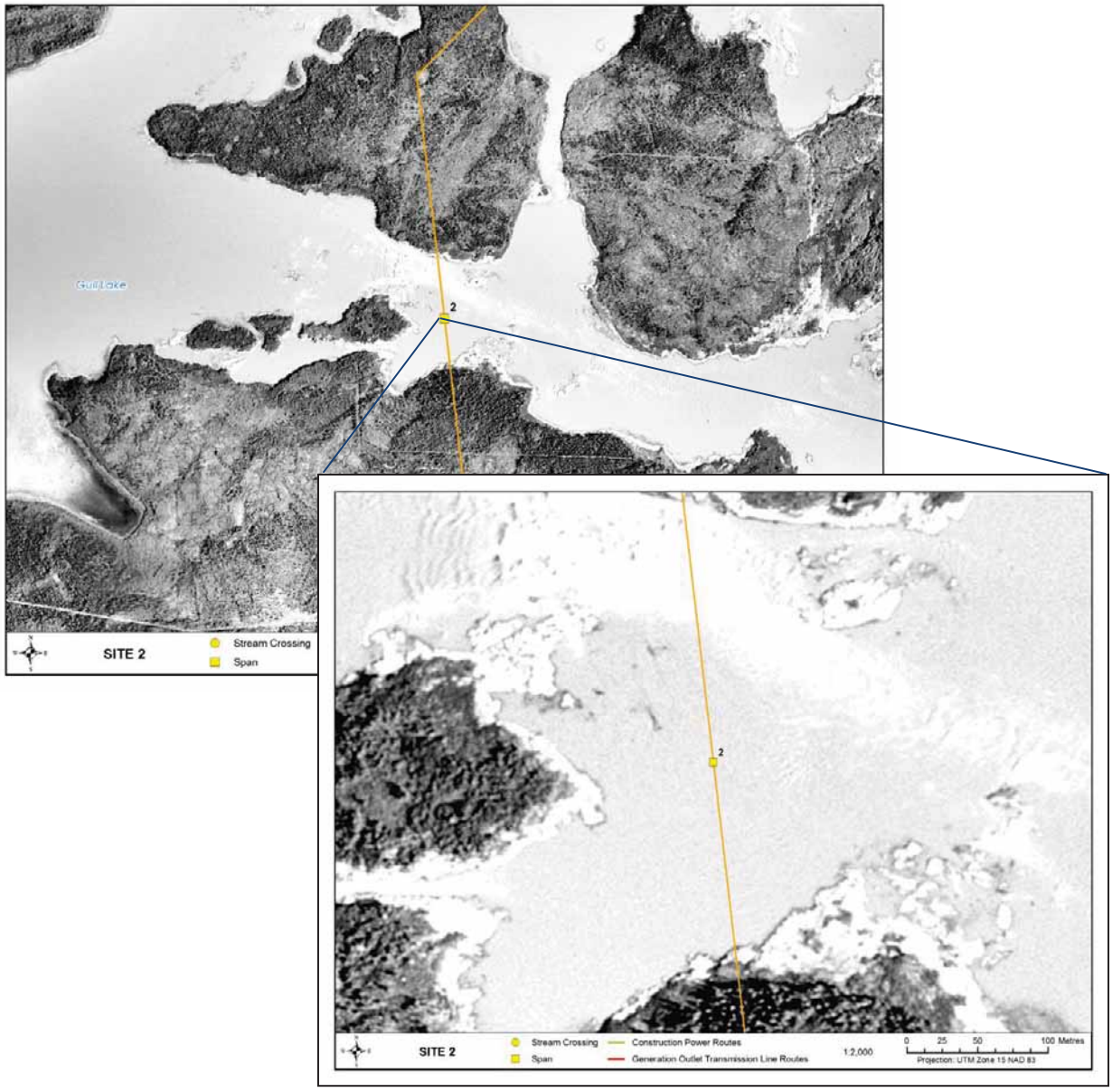
Nelson River

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	361680
	Northing:	6245817
Location Depicted Below:		

General Morphology

Gen. Description:	Large river
Pattern:	Sinuous
Confinement:	Confined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1,376,546 km^2
Receiving Water/Dist.:	Stephens Lake/7 km



Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	300
Wetted Width (m)	300

Water Depths (m)

Max.	-
Avg.	<5

Banks

Right Bank Height (m):	~5	Shape:	~45°	Stability:	stable
Left Bank Height (m):	~5	Shape:	~45°	Stability :	stable

Substrate

Substrate Type (%)

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

Habitat Type

Habitat Composition (%)

Pool	-
Flat	-
Run	20
Riffle	80

Cover Types

	US	DS
Total Cover Available (%)	-	-
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):	-	**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	Low	Low
Small-Bodied Fish:	Low	Low	Low

Impediments to Migration: Rapids immediately downstream

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 (due to proximity of moderate-high valued fish habitats downstream)

Photograph Documentation

Photo 1. View of crossing at Site 2.

Photo 2. Upstream view of Site 2.

*Dashed red line indicates proposed crossing location

Site 3

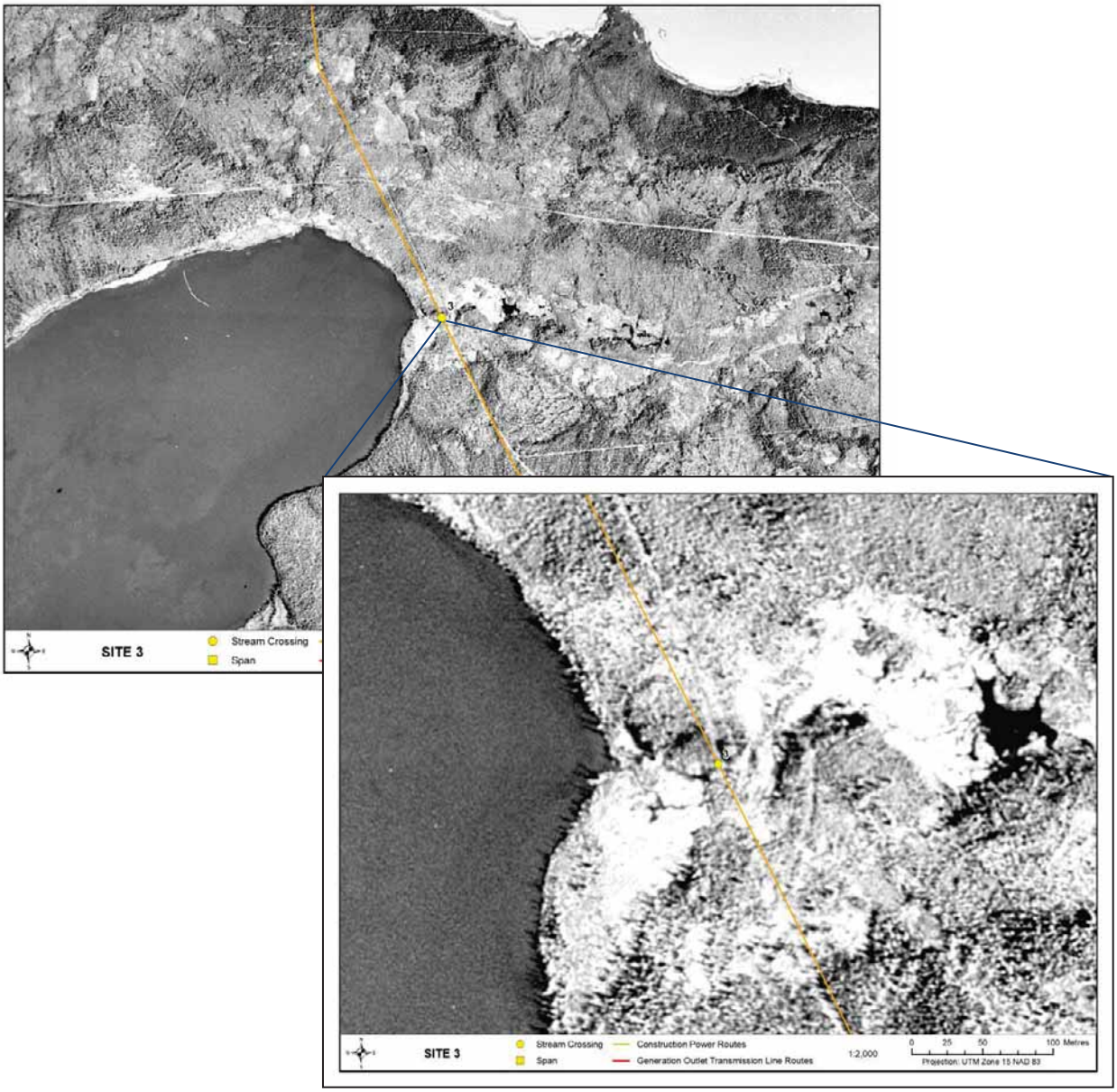
Gull Rapids Creek

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	362118
	Northing:	6244522
Location Depicted Below:		

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	Sinuous
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	6.5 km^2
Receiving Water/Dist.:	Nelson River/2.5 km



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Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	7.3-15.5
Wetted Width (m)	7.3-15.5

Water Depths (m)

Max.	1.0
Avg.	0.5

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	-
Flat	50
Run	50
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	70	70
Cover Composition (% of Total)		
Large Woody Debris	1	5
Overhanging Vegetation	-	95
Instream Vegetation	99	-
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-

Riparian

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

+ Water Quality Data

Surface Temp (°C):	17.2	**DO (mg/L):**	4.14
Specific Conductance (µS/cm):	62	**pH:**	5.56
TDS (g/L):	0.04	**Turbidity (NTU):**	947
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. Downstream view of crossing at Site 3.

Photo 2. Upstream view of Site 3.

Photo 3. Site 3 fed by a lake upstream of crossing.

Photo 4. Aerial view of Site 3 looking downstream.

Site 4

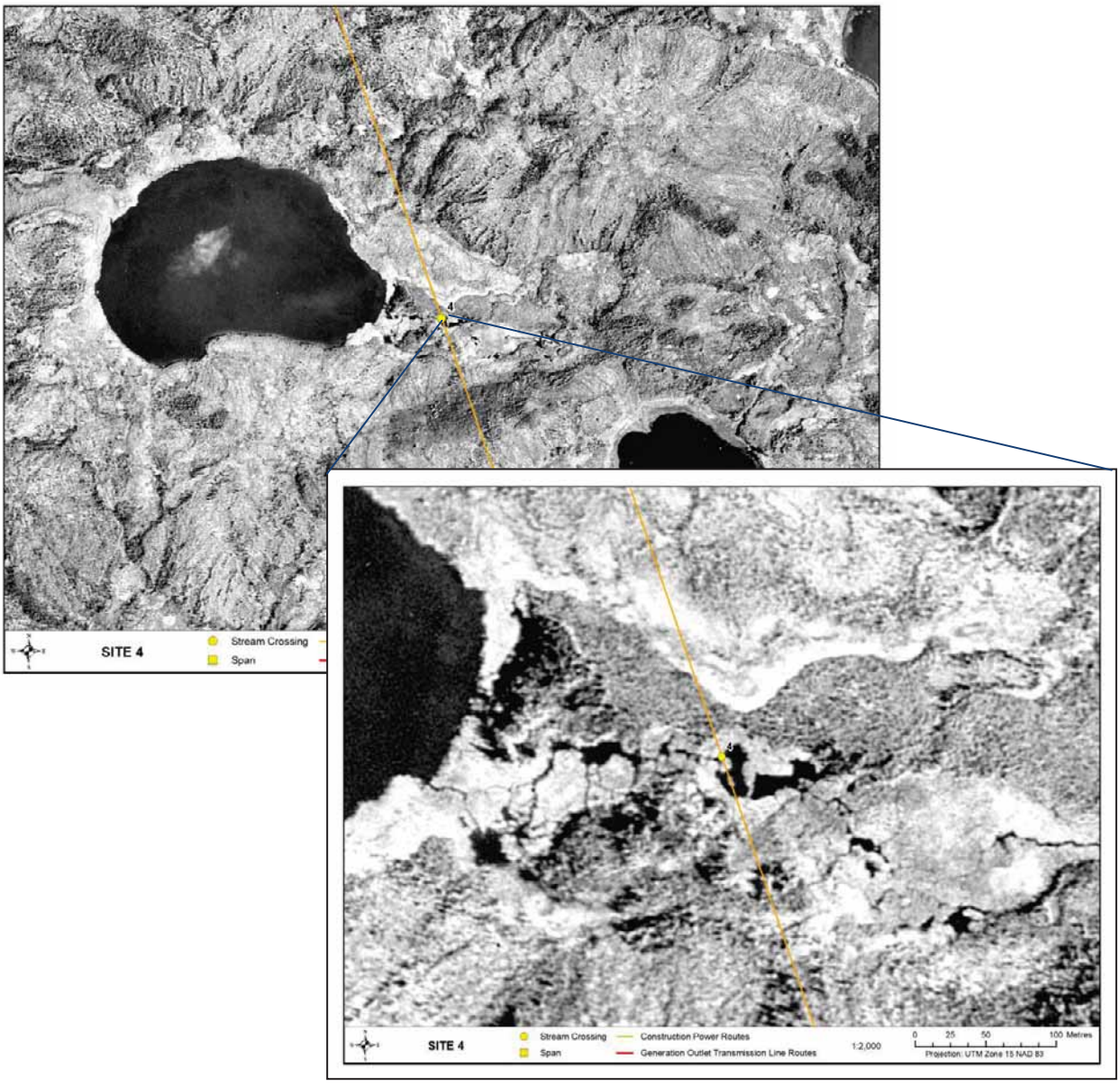
Unnamed Watercourse

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	363081
	Northing:	6242215
Location Depicted Below:		

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1.85 km^2
Receiving Water/Dist.:	Butnau River/38 km



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Site Conditions

+ Physical Data

Survey Date: 21 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	135
Wetted Width (m)	135

Water Depths (m)

Max.	-
Avg.	-

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 (%)	-	-
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	Y
Shrubs	Y
Conifers	-
Deciduous	-
Mixed Forest	Y
Canopy Cover (%)	-

+ Water Quality Data

Surface Temp (°C):	14.8	**DO (mg/L):**	5.19
Specific Conductance (µS/cm):	79	**pH:**	5.4
TDS (g/L):	0.05	**Turbidity (NTU):**	2.92
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	Low

Impediments to Migration: Low water during summer and fall might restrict fish movement in the ROW area
Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Low

Photograph Documentation

Photo 1. Looking upstream towards Site 4.

Photo 2. Aerial view of Site 4.

Site 5

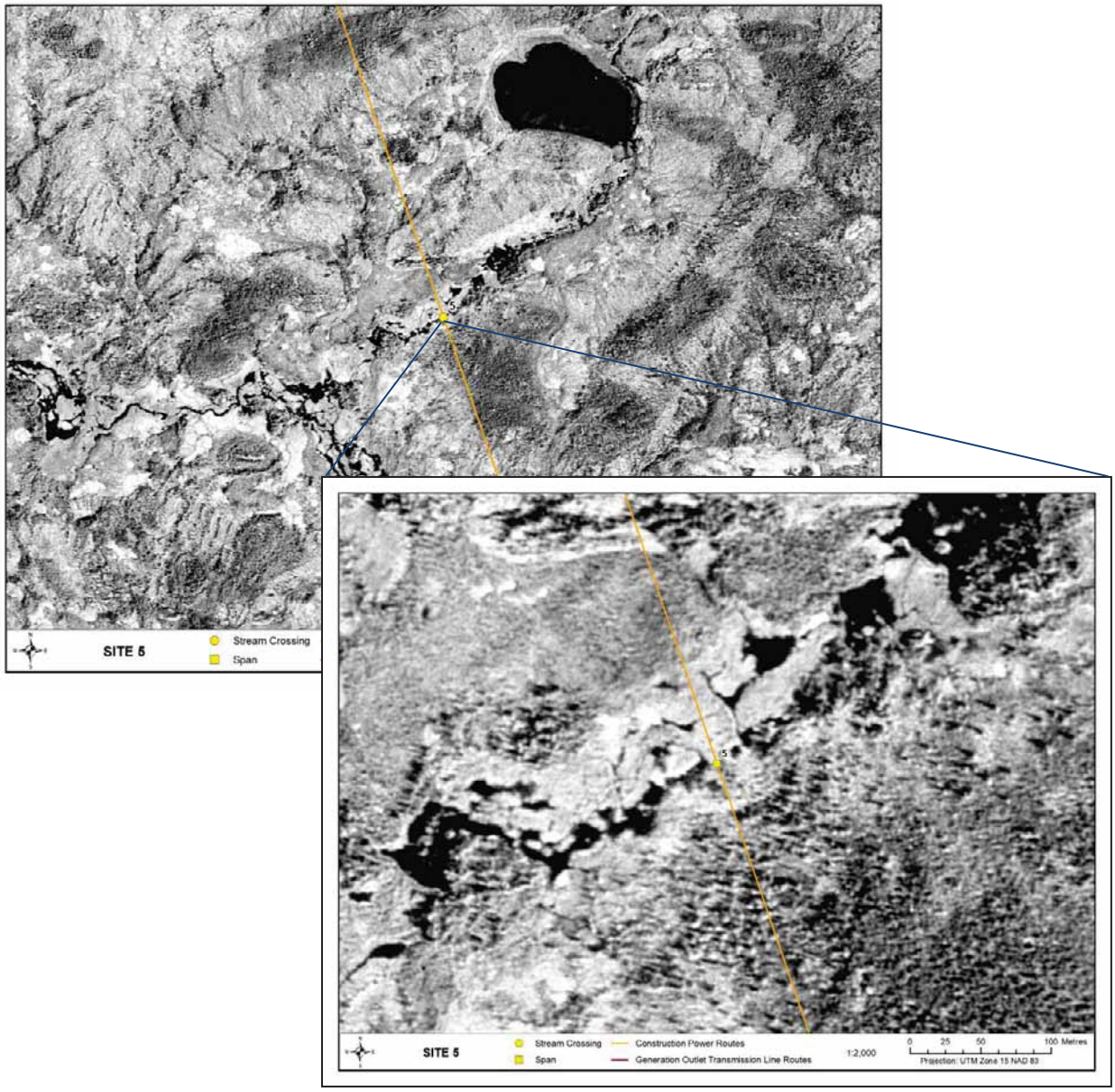
Unnamed Watercourse

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	363467
	Northing:	6241084
Location Depicted Below:		

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	5 km^2
Receiving Water/Dist.:	Stephens Lake/36 km



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Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

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

Water Depths (m)

Max.	~1.5
Avg.	-

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 (%)	50	50
Cover Composition (% of Total)		
Large Woody Debris	1	1
Overhanging Vegetation	-	-
Instream Vegetation	99	99
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-

Riparian

Riparian Vegetation Type (Y/N)

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

+ 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	Moderate	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. Looking upstream towards Site 5.

Photo 2. Aerial view of Site 5.

Photo 3. Downstream view of Site 5.

Photo 4. Lake upstream from Site 5.

Site 6

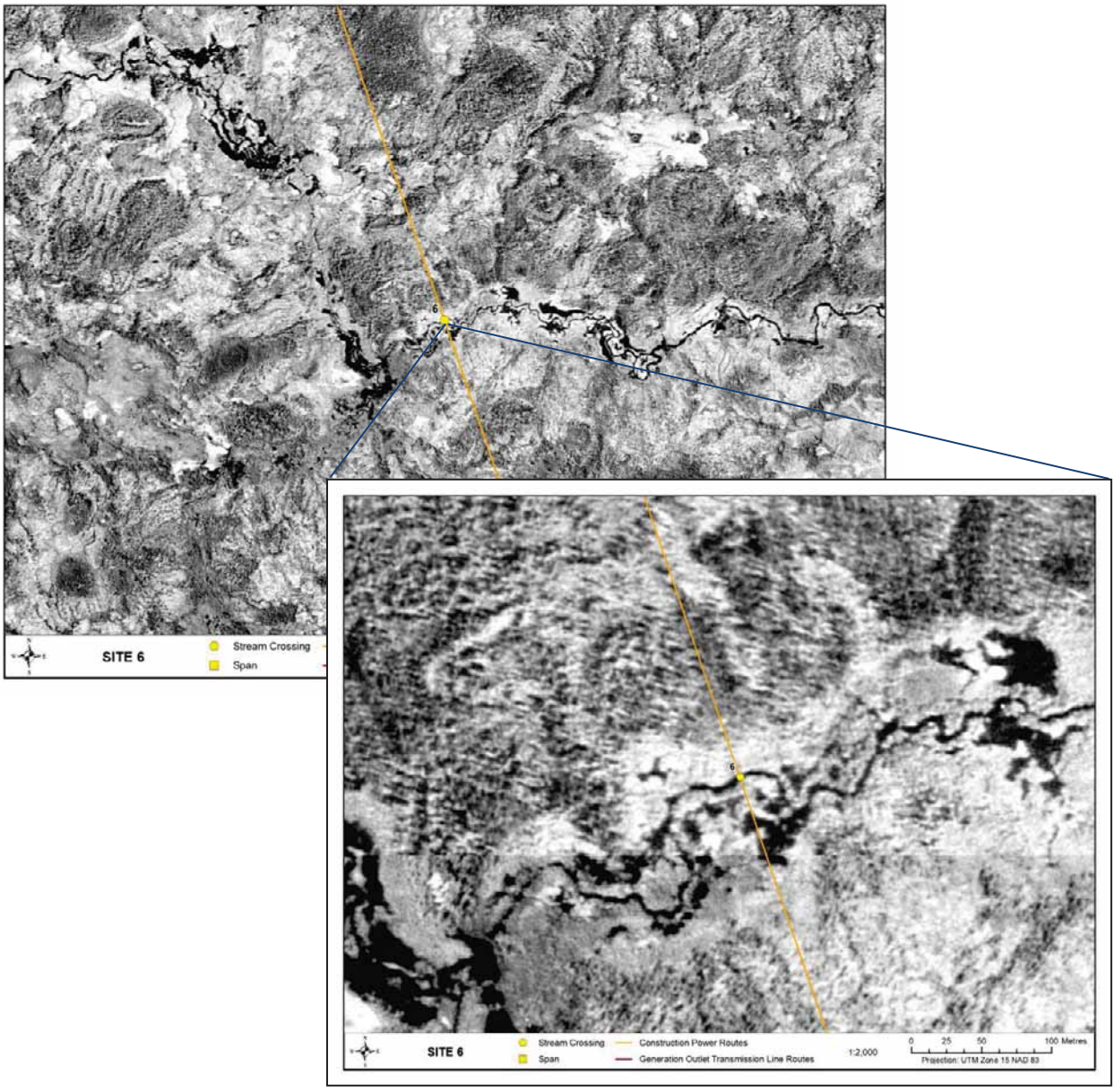
Unnamed Tributary of Joslin Lake

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	363818
	Northing:	6240056
Location Depicted Below:		

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	51 km^2
Receiving Water/Dist.:	Butnau River/33 km



Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

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

Water Depths (m)

Max.	~1.5
Avg.	-

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 (%)	60	60
Cover Composition (% of Total)		
Large Woody Debris	1	1
Overhanging Vegetation	-	-
Instream Vegetation	99	99
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 (%)	-

+ 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	Moderate	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. Looking downstream towards Site 6.

Photo 2. Aerial view of Site 6.

Photo 3. Joslin Lake is located approximately 2.3 km downstream of Site 6.

Site 8

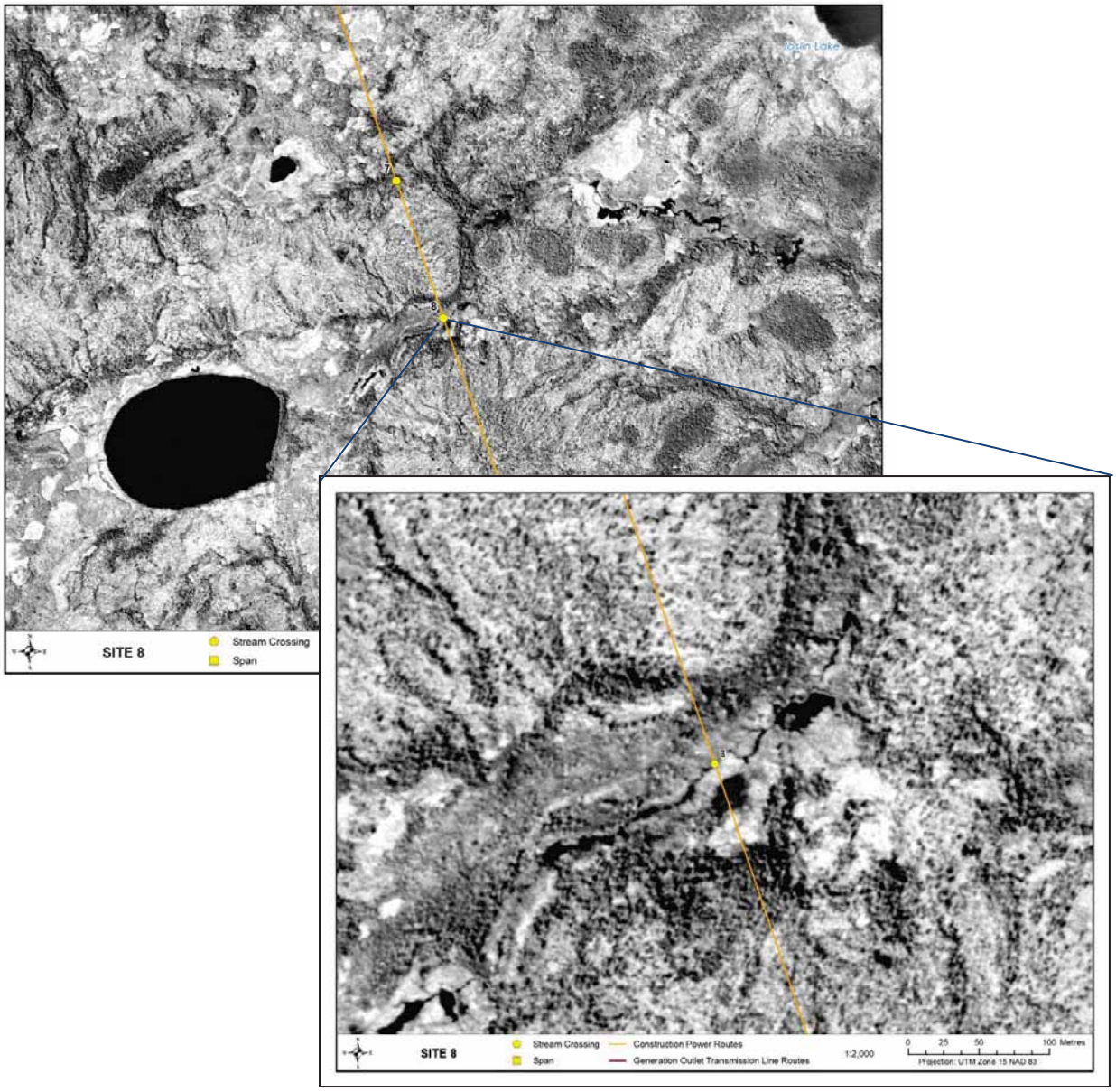
Unnamed Watercourse

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	364530
	Northing:	6237968
Location Depicted Below:		

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	Irregular
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1.77 km^2
Receiving Water/Dist.:	Stephens Lake/32 km



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Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

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

Water Depths (m)

Max.	~1.0
Avg.	-

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 (%)	60	60
Cover Composition (% of Total)		
Large Woody Debris	-	-
Overhanging Vegetation	10	10
Instream Vegetation	90	90
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 (%)	-

+ 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-Moderate	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. West view of crossing at Site 8.

Photo 2. East view of crossing Site 8.

Site 9

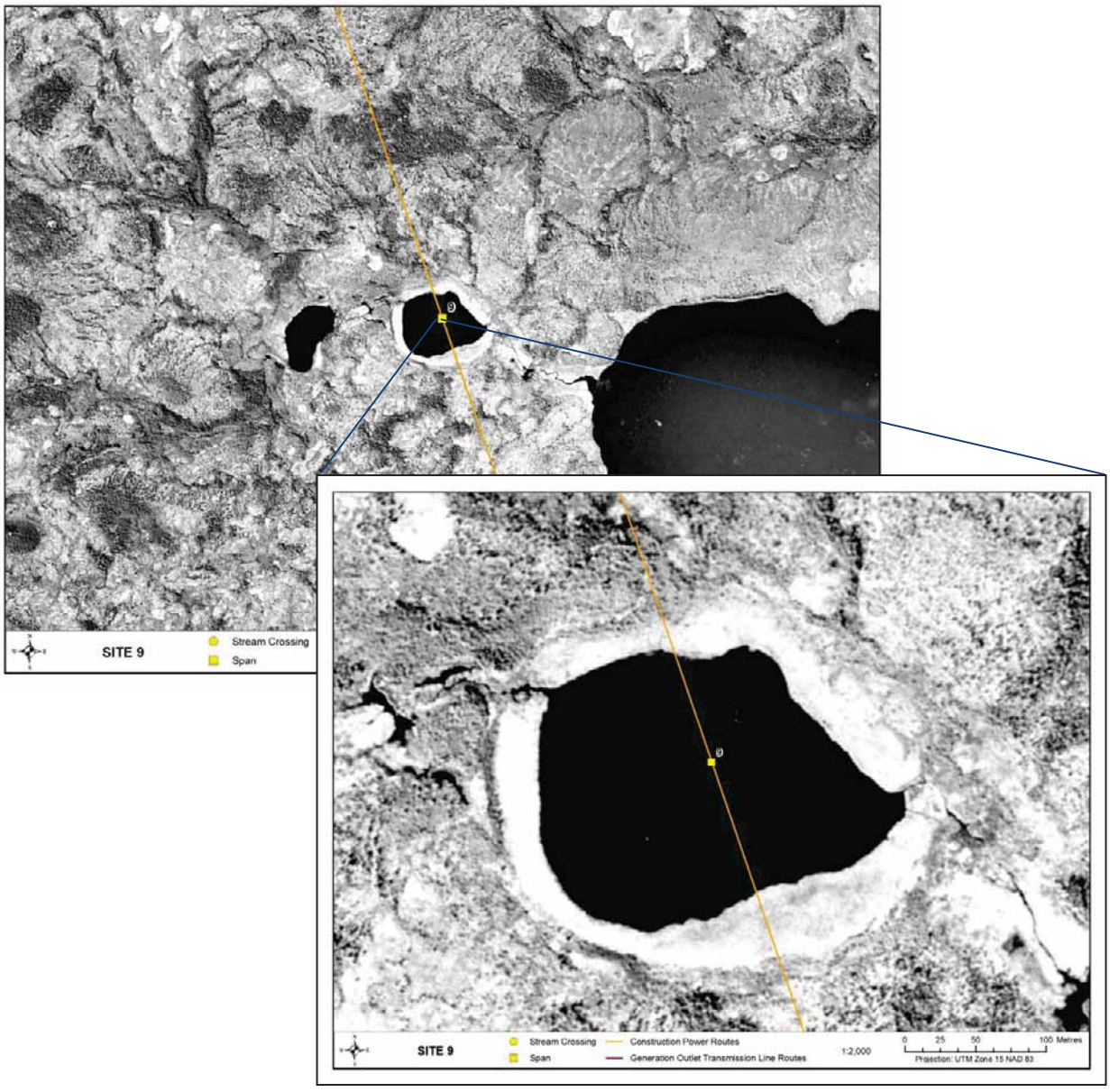
Unnamed Lake

Location

Datum:	NAD 83	
UTM:	*Zone:*	15v
	Easting:	365102
	Northing:	6236293
Location Depicted Below:		

General Morphology

Gen. Description:	Small shallow lake
Pattern:	-
Confinement:	-
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	0.7 km^2
Receiving Water/Dist.:	Butnau River/34 km



Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

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

Water Depths (m)

Max.	<5 m
Avg.	-

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 (%)	-	-
Cover Composition (% of Total)		
Large Woody Debris	-	-
Overhanging Vegetation	-	-
Instream Vegetation	-	-
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-

Riparian

Riparian Vegetation Type (Y/N)

None	-
Grasses/Sedges	Y
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	Low-Moderate
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. Downstream view towards the Site 9 lake (looking southeast).

Photo 2. Downstream view towards the Site 9 lake (looking east).

Photo 3. Lake upstream of the Site 9 lake (looking northwest).

Photo 4. Downstream view towards the Site 9 lake (looking southeast).

Site 10

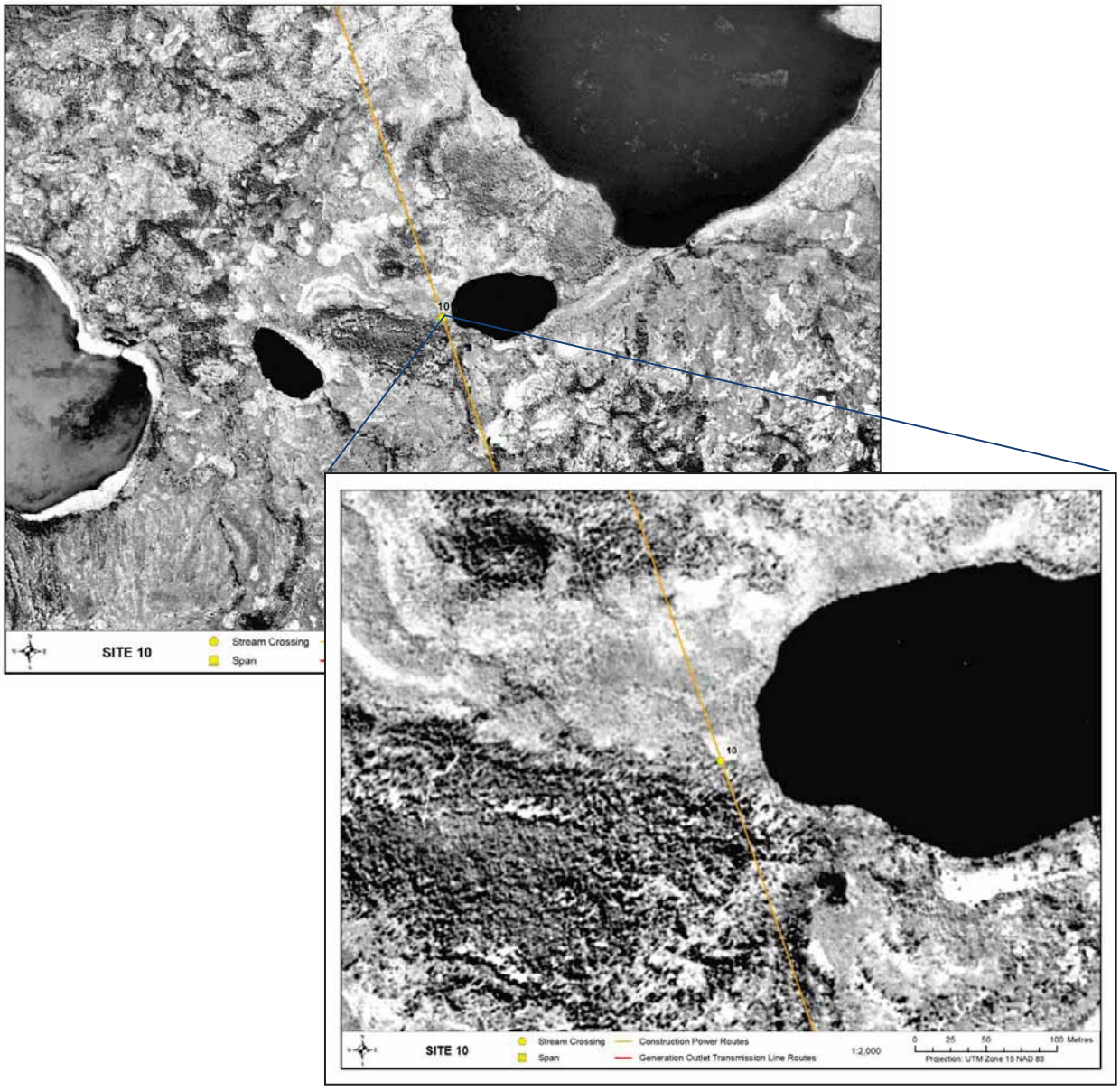
Unnamed Creek

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	365611
	Northing:	6234902
Location Depicted Below:		

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Flooded
Flow Regime:	Perennial
U/S Drainage:	0.07 km^2
Receiving Water/Dist.:	Butnau River/33.5 km



Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	5-10
Wetted Width (m)	10-20

Water Depths (m)

Max.	~1.0
Avg.	-

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	90
Flat	10
Run	-
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	30	30
Cover Composition (% of Total)		
Large Woody Debris	2	2
Overhanging Vegetation	28	28
Instream Vegetation	70	70
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 (%)	-

+ Water Quality Data

Surface Temp (°C):	14.7	**DO (mg/L):**	6.05
Specific Conductance (µS/cm):	82	**pH:**	6.18
TDS (g/L):	0.05	**Turbidity (NTU):**	3.78
Salinity (ppt):	-		

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Moderate	Low-Moderate	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 Site 6 crossing.

Photo 2. Upstream view from crossing at Site 10.

Photo 3. Site 10's downstream connection to unnamed lake.

Photo 4. Downstream view 50 m from Site 10.

Site 11

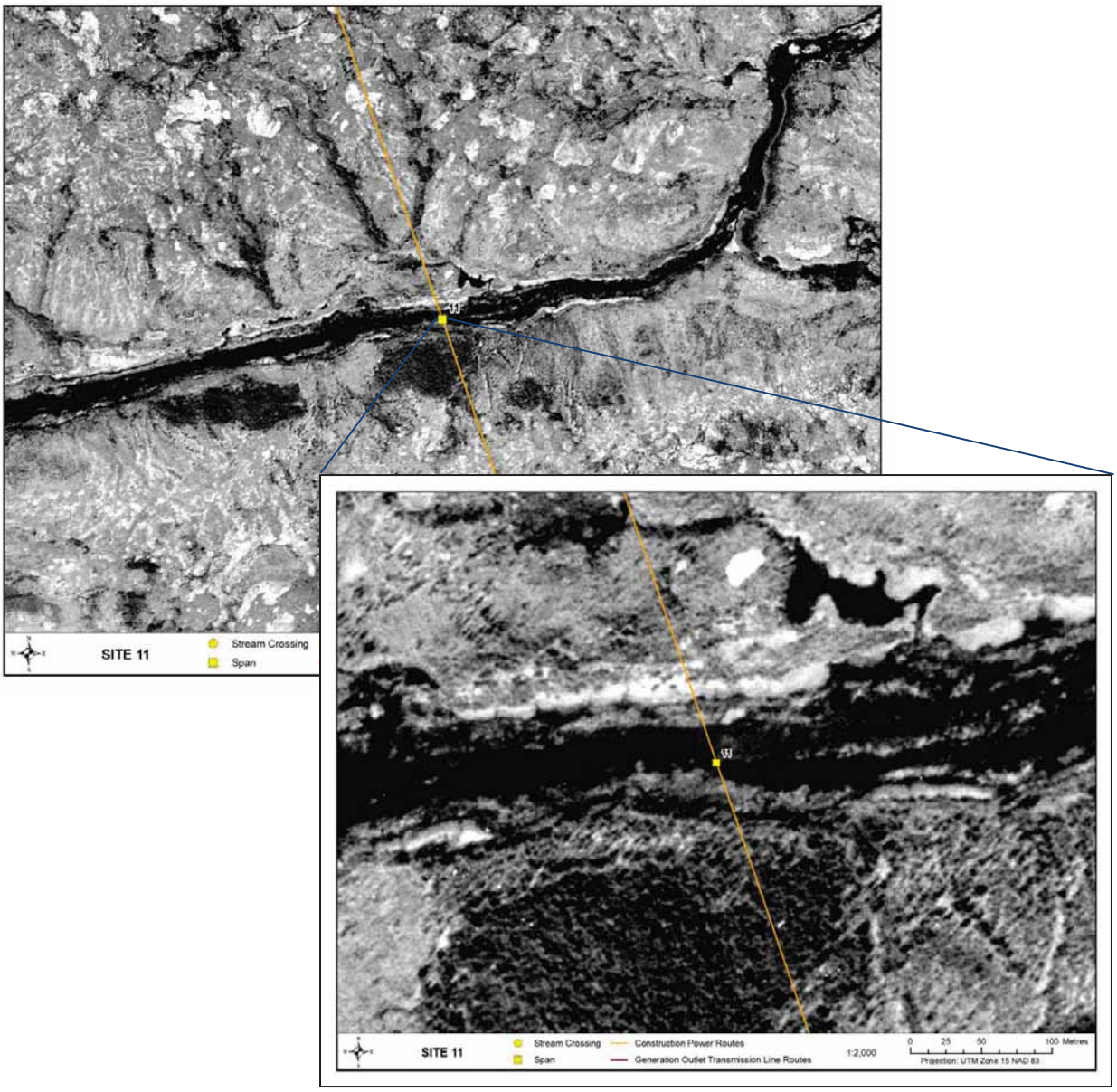
Butnau River

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	366641
	Northing:	6231782
Location Depicted Below:		

General Morphology

Gen. Description:	Small river
Pattern:	Sinuous
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	579 km^2
Receiving Water/Dist.:	Kettle River/42 km



North/South Consultants Inc.
Aquatic Environment Specialists

Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	80
Wetted Width (m)	80

Water Depths (m)

Max.	-
Avg.	-

Banks

Right Bank Height (m):	~4	Shape:	<45°	Stability:	stable
Left Bank Height (m):	~3	Shape:	~45°	Stability :	stable

Substrate

Substrate Type (%)

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

Habitat Type

Habitat Composition (%)

Pool	50
Flat	50
Run	-
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	30	30
Cover Composition (% of Total)		
Large Woody Debris	-	-
Overhanging Vegetation	30	30
Instream Vegetation	70	70
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 (%)	-

+ 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	Moderate	Moderate
Small-Bodied Fish:	Moderate	Moderate	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. View of Site 11 crossing.

Photo 2. Downstream view of crossing Site 11.

Photo 3. Flooded and instream vegetation on south shore at Site 11.

Site 13

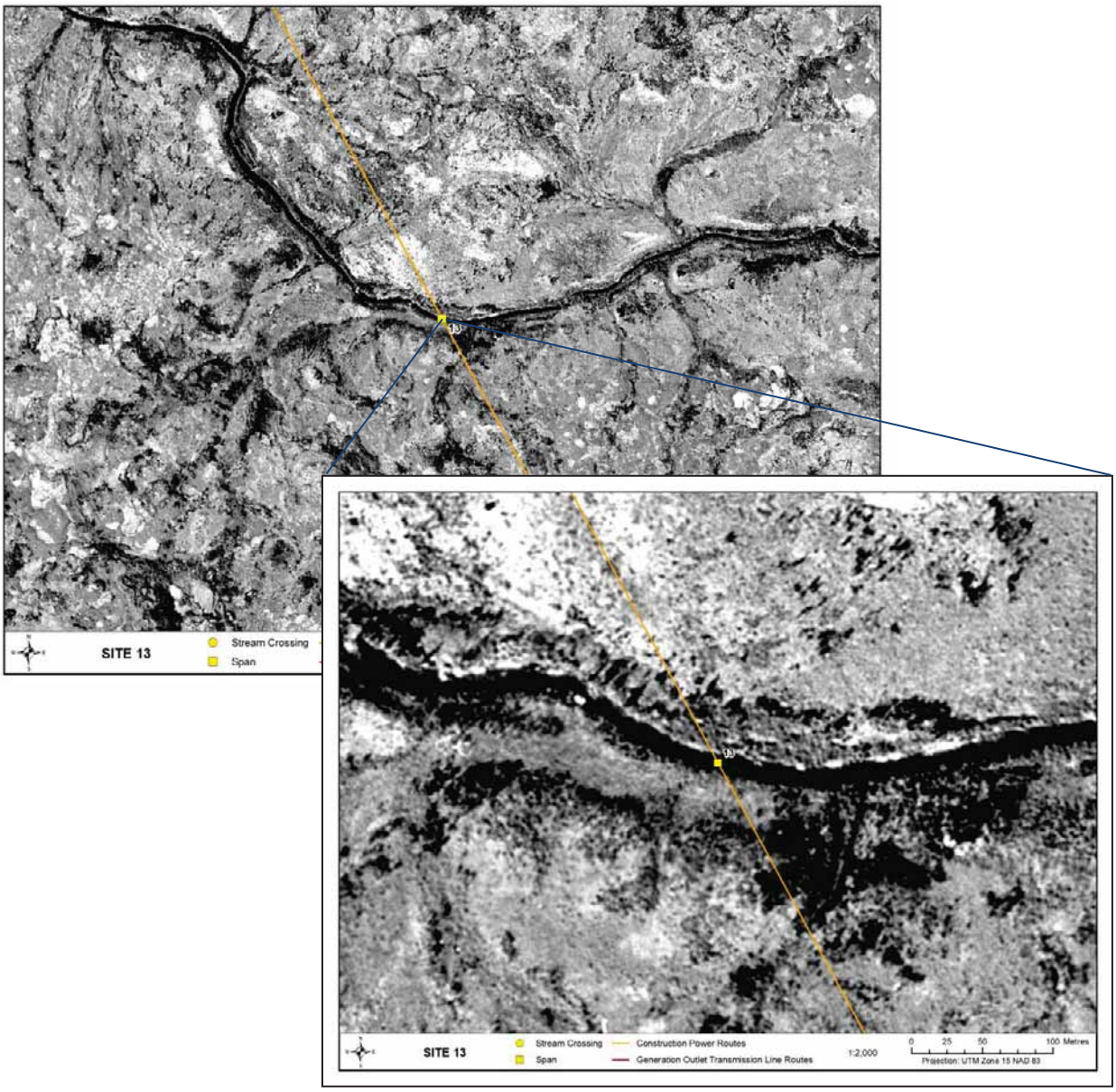
Butnau River

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	371885
	Northing:	6233701
Location Depicted Below:		

General Morphology

Gen. Description:	Small river
Pattern:	Sinuous
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	619 km^2
Receiving Water/Dist.:	Kettle River/34 km



North/South Consultants Inc.
Aquatic Environment Specialists

Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	20
Wetted Width (m)	20

Water Depths (m)

Max.	-
Avg.	-

Banks

Right Bank Height (m):	<5	Shape:	rounded	Stability:	Stable
Left Bank Height (m):	<3	Shape:	rounded	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 (%)	10	10
Cover Composition (% of Total)		
Large Woody Debris	-	-
Overhanging Vegetation	50	50
Instream Vegetation	25	25
Pool	-	-
Boulder	-	-
Undercut Bank	25	25
Surface Turbulence	-	-

Riparian

Riparian Vegetation Type (Y/N)

Moss	-
Grasses/Sedges	-
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
Small-Bodied Fish:	Low	Moderate	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. Upstream view of crossing at Site 13.

Photo 2. Downstream view of crossing at Site 13

Site 15

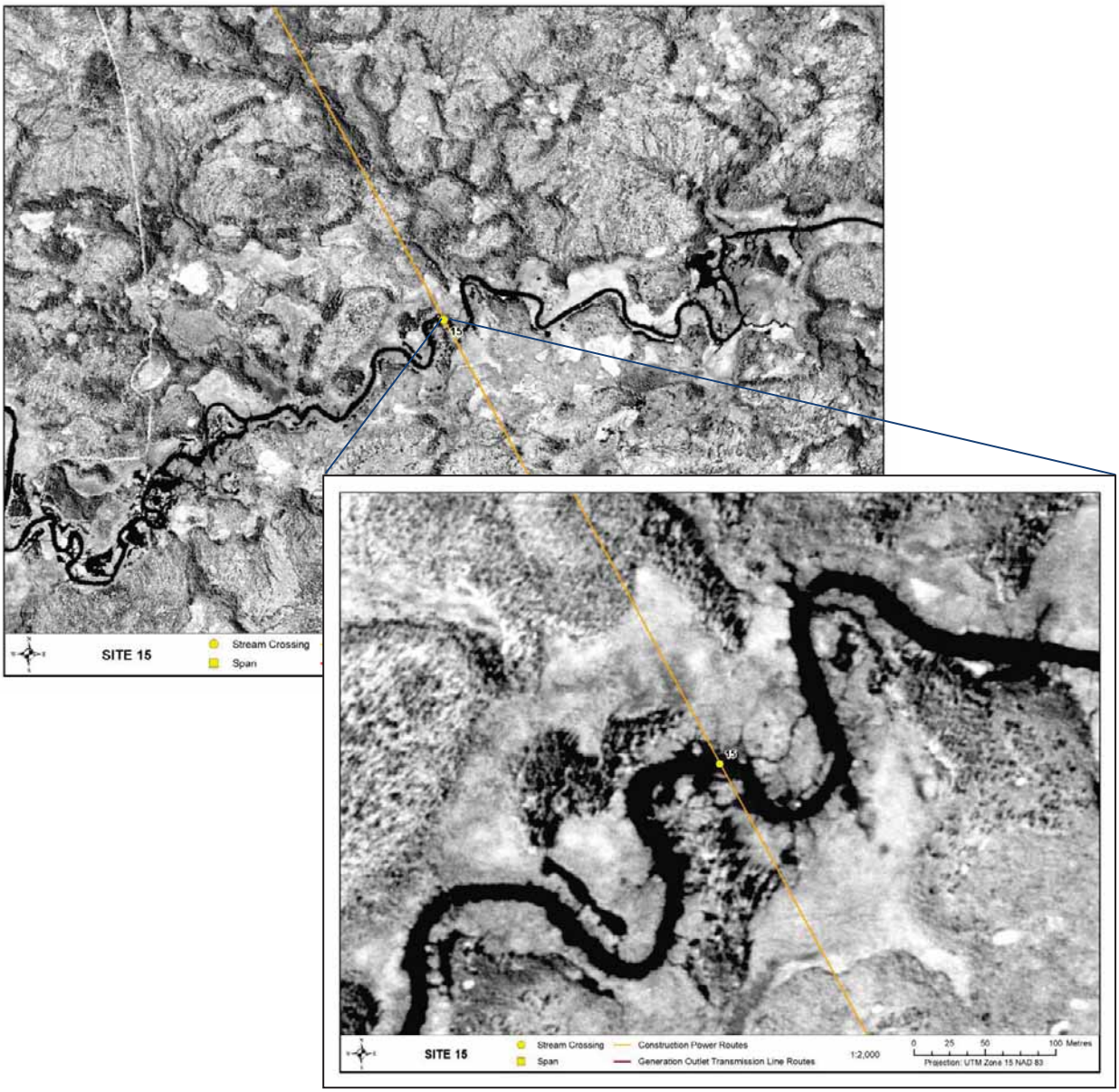
Unnamed Tributary of Butnau River

Location

Datum:	NAD 83	
UTM:	*Zone:*	15V
	Easting:	369262
	Northing:	6238537
Location Depicted Below:		

General Morphology

Gen. Description:	low gradient boreal stream
Pattern:	Regular meander
Confinement:	Unconfined
Stage:	High/Flood
Flow Regime:	Perennial
U/S Drainage:	90 km^2
Receiving Water/Dist.:	Butnau River/16.5 km



Site Conditions

+ Physical Data

Survey Date: 22 July 2009

Channel Profile

Channel and Flow

Channel Width (m)	10
Wetted Width (m)	10

Water Depths (m)

Max.	~1.5
Avg.	~1.0

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	-
Flat	50
Run	50
Riffle	-

Cover Types

	US	DS
Total Cover Available (%)	30	30
Cover Composition (% of Total)		
Large Woody Debris	30	30
Overhanging Vegetation	10	10
Instream Vegetation	60	60
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):	-	**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	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. Upstream view of Site 15.

Photo 2. Upstream connection to Joslin Lake near Site 15.

Photo 3. Downstream view of Site 15.