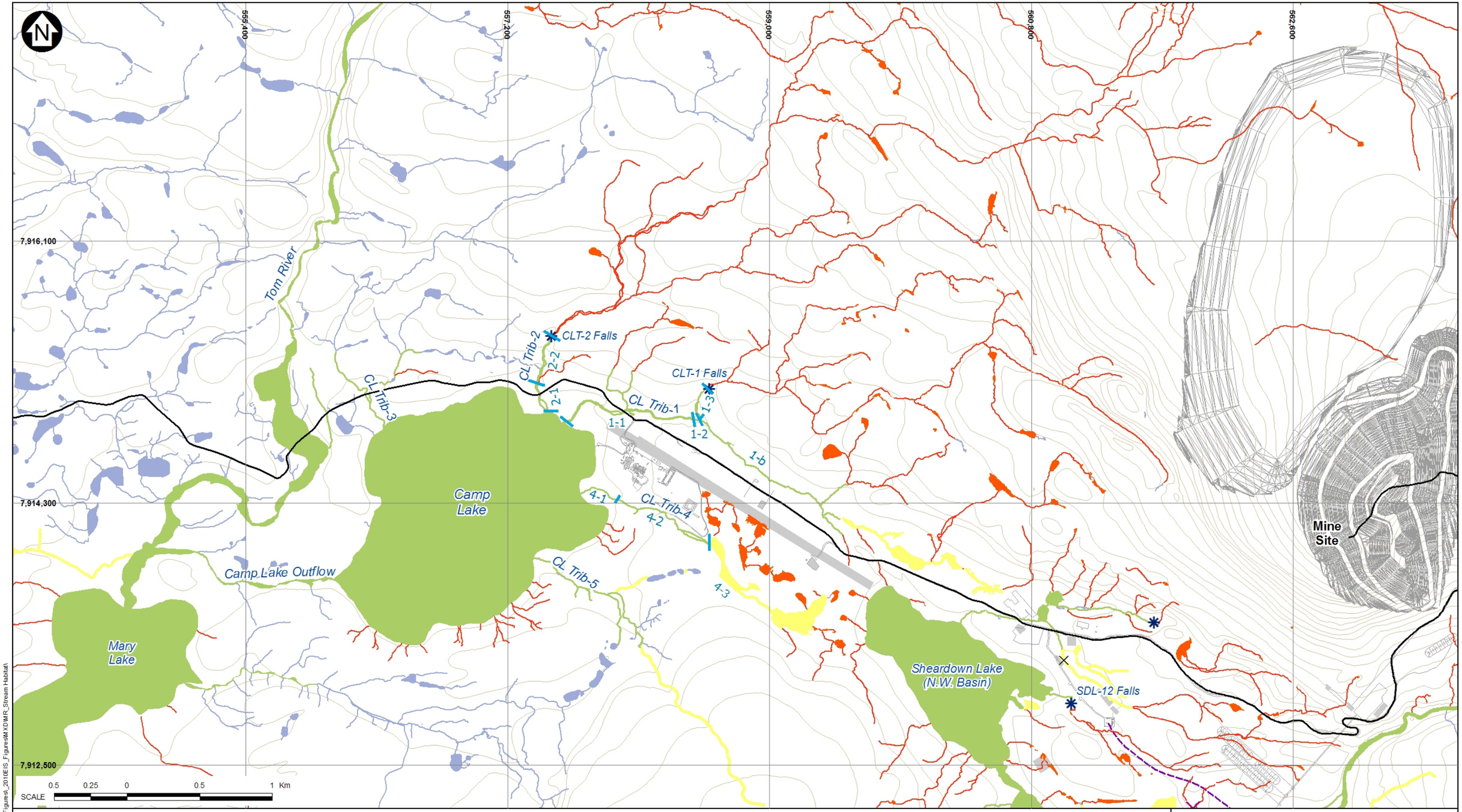
# APPENDIX 4.1-1.

# DETAILED AQUATIC HABITAT ASSESSMENTS FOR WATERBODIES IN THE MINE AREA BY STREAM AND REACH.




**LEGEND:**

**STATUS OF ARCTIC CHAR**

- PRESENT
- PROBABLE
- NOT PRESENT
- UNKNOWN

- FISH BARRIER
- FALLS
- REACH BOUNDARIES
- MILNE INLET TOTE ROAD (EXISTING)
- CONSTRUCTION ACCESS ROAD (PROPOSED)
- INFRASTRUCTURE (PROPOSED FOR CONSTRUCTION AND OPERATIONS PERIOD)

| REV | DD/MMM/10 | ISSUED FOR --- | - | - | - | - |
|---|---|---|---|---|---|---|
| REV | 01/09/2010 | DESCRIPTION | DESIGNED | DRAWN | CHK'D | APP'D |

**NOTES:**

1. BASE MAP: (1:50,000) © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PROPOSED RAILWAY ALIGNMENT PROVIDED BY CANRAIL CONSULTANTS INC.
4. MINE SITE INFRASTRUCTURE PROVIDED BY AMEC DRAWING NO.: MINE SITE - CONSTRUCTION PHASE - 01-MAR 09 2009.dwg
5. CONTOUR INTERVAL IS 50 M AND IS IN METRES.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

# PRESENCE AND ABSENCE OF ARCTIC CHAR IN CAMP LAKE TRIBUTARIES

North/South Consultants Inc.
Aquatic Environment Specialists

| P/A NO. | REF NO. |
|---|---|
| - | - |
| DATE: 01/09/2010 | REV - |

Path: G:\MARYRIV_GDB\EIS_GDB\EIS_Figures_2010EIS_Figures\MXD\MR_Stream Habitat\

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Camp Lake Tributary #1
**Site:** Reach 1
**UTM:** 17W 557645 7914878
**Dates Surveyed:** 6-Aug-07, 4-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 5.54 | 5.54 |
| **Wetted Width (m):** | NA | 5.54 | 5.50 |
| **Riffle-Crest Depth (m):** | NA | 0.20 | 0.12 |
| **Pool Depth (m):** | NA | 0.23 | 0.24 |
| **D (m):** | NA | 0.03 | 0.03 |
| **$D_{95}$ (m):** | NA | 0.66 | 0.66 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | 0.64 | 0.70 |
| **Pool:** | NA | 0.05 | 0.19 |
| **Behind a rock:** | NA | 0.01 | 0.03 |

### Stream/Riparian Habitat

**Channel Morphology:** 90% riffle, 10% pool

**Substrate Composition:** 90% cobble, 5% sand, 5% boulder

**Stream Cover:** 80% undercut banks, 5% boulders

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, wildflowers

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | 0.18/0.18 | 0.25/0.25 |
| **Bank Stability:** | NA | Mod | Mod |
| **Erosion Potential:** | NA | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 134.0 | 208.0 |
| **TDS (g/l):** | NA | 0.09 | 0.14 |
| **DO (mg/l)** | NA | 11.38 | 11.98 |
| **%DO:** | NA | 101.5 | 100.3 |
| **Water Temp (˚C):** | NA | 10.4 | 3.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - M | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - M | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - M | ARCH - H<br>NNST - M |

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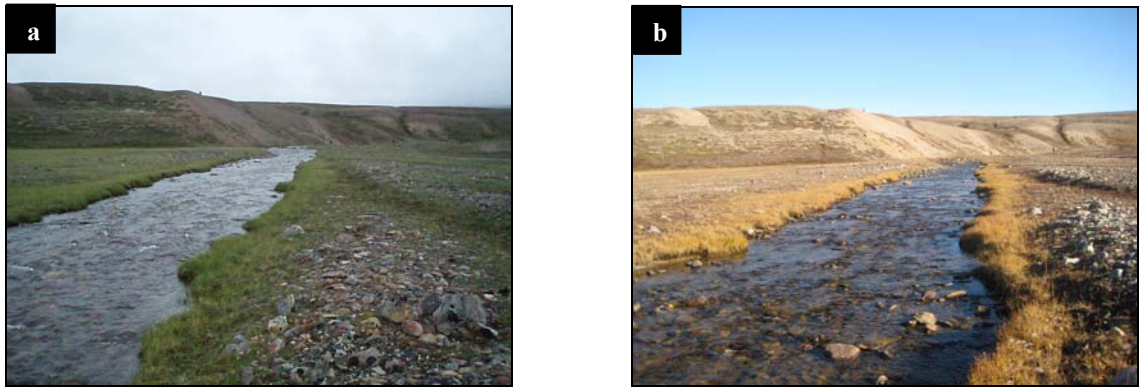


Figure 1.View upstream from habitat assessment in reach 1 of Camp Lake Tributary 1 during summer (a) and fall (b).


Figure 2.View downstream from habitat assessment in reach 1 of Camp Lake Tributary 1 during summer (a) and fall (b).

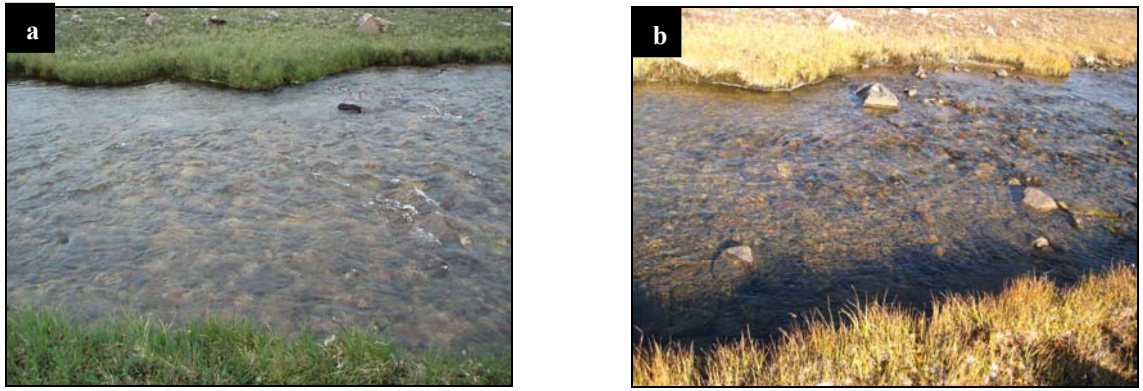


Figure 3.View across the habitat assessment site in reach 1 of Camp Lake Tributary 1 during summer (a) and fall (b).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Camp Lake Tributary #1
**Site:** Reach 2
**UTM:** 17W 558487 7914876
**Dates Surveyed:** 6-Aug-07, 4-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 3.12 | 3.12 |
| **Wetted Width (m):** | NA | 3.12 | 3.00 |
| **Riffle-Crest Depth (m):** | NA | 0.25 | 0.16 |
| **Pool Depth (m):** | NA | 0.68 | 0.60 |
| **D (m):** | NA | 0.06 | 0.06 |
| **$D_{95}$ (m):** | NA | 0.38 | 0.38 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | 0.83 | 0.65 |
| **Pool:** | NA | 0.24 | 0.06 |
| **Behind a rock:** | NA | 0.02 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 85% riffle, 15% pool

**Substrate Composition:** 90% cobble, 10% boulder

**Stream Cover:** 100% undercut banks, 10% boulder, 5% deep pool

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Moss, grasses, willows

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | 0.45/0.45 | 0.40/0.40 |
| **Bank Stability:** | NA | Mod | Mod |
| **Erosion Potential:** | NA | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 124.0 | 210.0 |
| **TDS (g/l):** | NA | 0.08 | NM |
| **DO (mg/l)** | NA | 11.90 | 12.45 |
| **%DO:** | NA | 101.5 | 100.0 |
| **Water Temp (˚C):** | NA | 8.5 | 5.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N | ARCH - H<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment



Figure 1.View upstream from habitat assessment in reach 2 of Camp Lake Tributary 1 during summer (a) and fall (b).



Figure 2.View downstream from habitat assessment in reach 2 of Camp Lake Tributary 1 during summer (a) and fall (b).



Figure 3.View across the habitat assessment site in reach 2 of Camp Lake Tributary 1 during summer (a) and fall (b).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Camp Lake Tributary #1
**Site:** Reach 3
**UTM:** 17W 558504 7915022
**Dates Surveyed:** 6-Aug-07, 4-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Confined

**Channel Gradient:** 2.5˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 18.83 | 18.83 |
| **Wetted Width (m):** | NA | 9.13 | 7.40 |
| **Cascade-Crest Depth (m):** | NA | 0.21 | 0.18 |
| **Pool Depth (m):** | NA | 0.33 | 0.16 |
| **D (m):** | NA | 0.06 | 0.03 |
| **$D_{95}$ (m):** | NA | 0.74 | 0.74 |
| **Point Velocities (m/s)** | | | |
| **Cascade:** | NA | 1.02 | 1.26 |
| **Pool:** | NA | 0.02 | 0.05 |
| **Behind a rock:** | NA | 0.01 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 60% cascade, 40% pool

**Substrate Composition:** 60% cobble, 35% boulder, 5% sand

**Stream Cover:** 35% boulder, 5% deep pool

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, willow, wildflowers

**Barriers Present (Y/N):** Y
**Location:** US ~ 50m

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | UD | UD |
| **Bank Stability:** | NA | NM | NM |
| **Erosion Potential:** | NA | NM | NM |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 118.0 | 169.0 |
| **TDS (g/l):** | NA | 0.08 | NM |
| **DO (mg/l)** | NA | 11.93 | 12.58 |
| **%DO:** | NA | 100.9 | 98.7 |
| **Water Temp (˚C):** | NA | 8.1 | 4.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N | ARCH - H<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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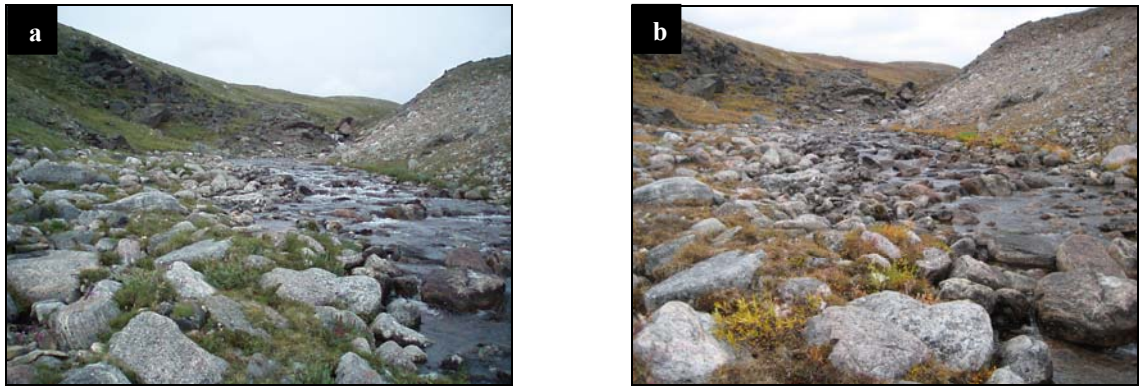


Figure 1.View upstream from habitat assessment in reach 3 of Camp Lake Tributary 1 during summer (a) and fall (b).

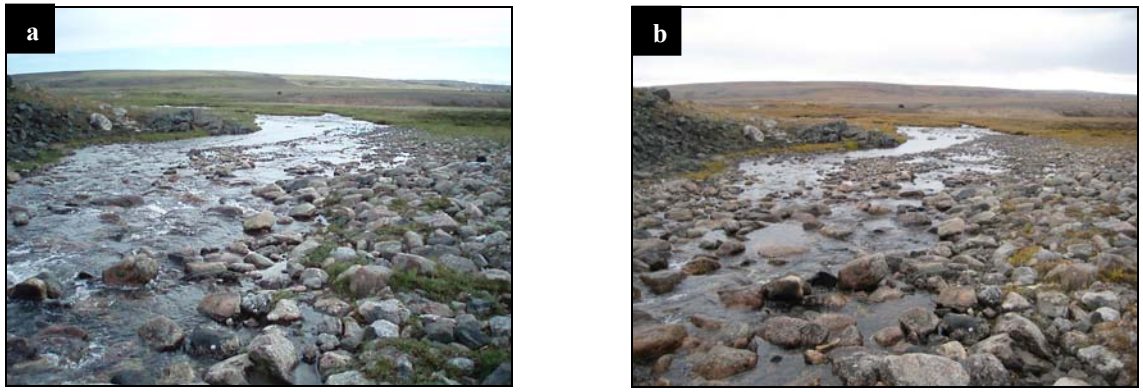


Figure 2.View downstream from habitat assessment in reach 3 of Camp Lake Tributary 1 during summer (a) and fall (b).


Figure 3.View across the habitat assessment site in reach 3 of Camp Lake Tributary 1 during summer (a) and fall (b).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Camp Lake Tributary #2
**Site:** Reach 1
**UTM:** 17W 557466 7914969
**Dates Surveyed:** 4-Aug-07, 2-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 18.28 | 18.28 |
| **Wetted Width (m):** | NA | 10.10 | 8.40 |
| **Riffle-Crest Depth (m):** | NA | 0.07 | 0.12 |
| **Pool Depth (m):** | NA | 0.45 | 0.32 |
| **D (m):** | NA | 0.01 | 0.01 |
| **$D_{95}$ (m):** | NA | 0.23 | 0.23 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | 0.74 | 0.27 |
| **Pool:** | NA | 0.08 | 0.07 |
| **Behind rock:** | NA | NM | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 50% riffle, 50% pool

**Substrate Composition:** 35% cobble, 35% gravel, 30% sand

**Stream Cover:** 20% undercut, 10% deep pool

**Aquatic Vegetation:** Periphyton, submerged RV

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | 0.30/0.30 | 0.42/0.42 |
| **Bank Stability:** | NA | Mod | Mod |
| **Erosion Potential:** | NA | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 173.0 | 239.0 |
| **TDS (g/l):** | NA | NM | 0.16 |
| **DO (mg/l)** | NA | 11.26 | 12.33 |
| **%DO:** | NA | 102.1 | 103.1 |
| **Water Temp (˚C):** | NA | 11.0 | 5.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - M | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - H | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |

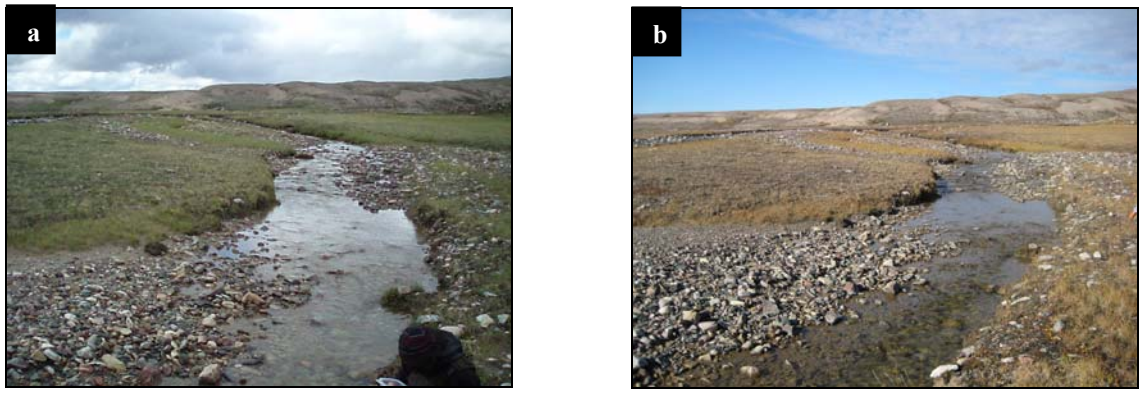


Figure 1.View upstream from habitat assessment in reach 1 (right channel) of Camp Lake Tributary 2 during summer (a) and fall (b).

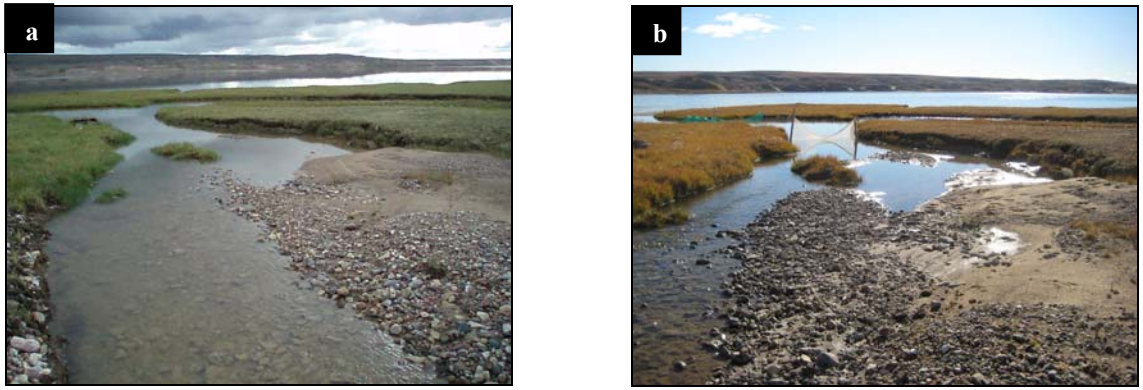


Figure 2.View downstream from habitat assessment in reach 1 (right channel) of Camp Lake Tributary 2 during summer (a) and fall (b).

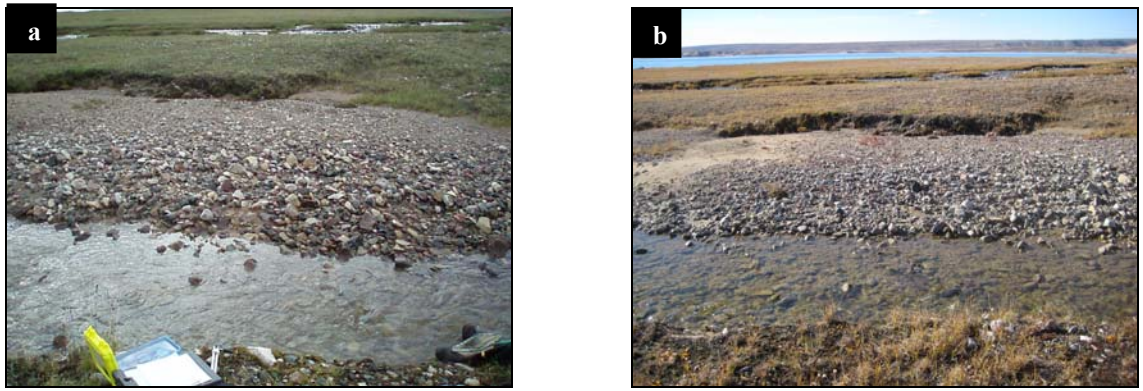


Figure 3.View across the habitat assessment site in reach 1 (right channel) of Camp Lake Tributary 2 during summer (a) and fall (b).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Camp Lake Tributary #2
**Site:** Reach 2
**UTM:** 17W 557454 7915246
**Dates Surveyed:** 4-Aug-07, 2-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 8.5˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 17.37 | 17.37 |
| **Wetted Width (m):** | NA | 17.37 | 10.70 |
| **Riffle-Crest Depth (m):** | NA | 0.15 | 0.10 |
| **Pool Depth (m):** | NA | 0.20 | 0.10 |
| **D (m):** | NA | 0.03 | 0.03 |
| **$D_{95}$ (m):** | NA | 0.72 | 0.72 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | 0.96 | 0.71 |
| **Pool:** | NA | 0.34 | 0.29 |
| **Behind rock:** | NA | 0.01 | 0.01 |

### Stream/Riparian Habitat

**Channel Morphology:** 50% pool, 25% riffle, 25% cascade

**Substrate Composition:** 65% cobble, 20% boulder, 10% gravel, 5% sand

**Stream Cover:** 20% boulder 5% deep pool

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, willows, wildflowers

**Barriers Present (Y/N):** Y
**Location:** US ~ 100m

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | 0.40/0.40 | NM |
| **Bank Stability:** | NA | Mod | Mod |
| **Erosion Potential:** | NA | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 97.5 | 178.0 |
| **TDS (g/l):** | NA | NM | NM |
| **DO (mg/l)** | NA | 10.99 | 12.40 |
| **%DO:** | NA | 101.1 | 99.0 |
| **Water Temp (˚C):** | NA | 11.6 | 8.5 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N | ARCH - H<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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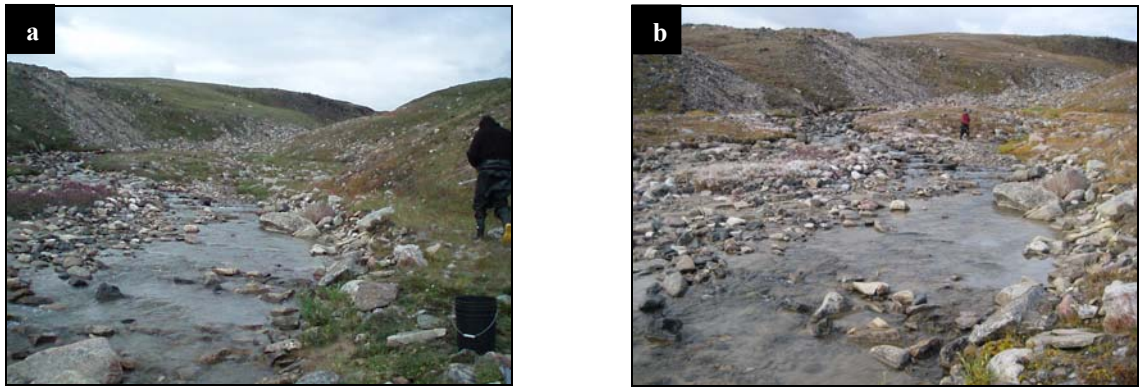


Figure 1.View upstream from habitat assessment in reach 2 of Camp Lake Tributary 2 during summer (a) and fall (b).

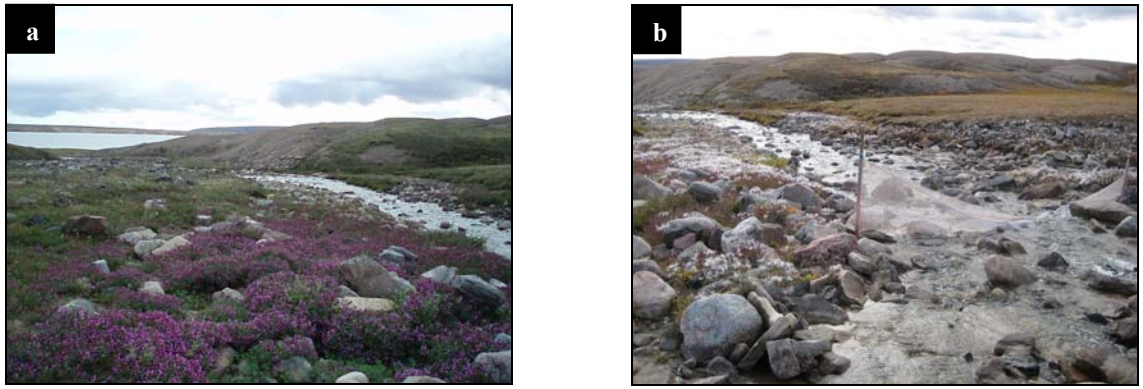


Figure 2.View downstream from habitat assessment in reach 2 of Camp Lake Tributary 2 during summer (a) and fall (b).

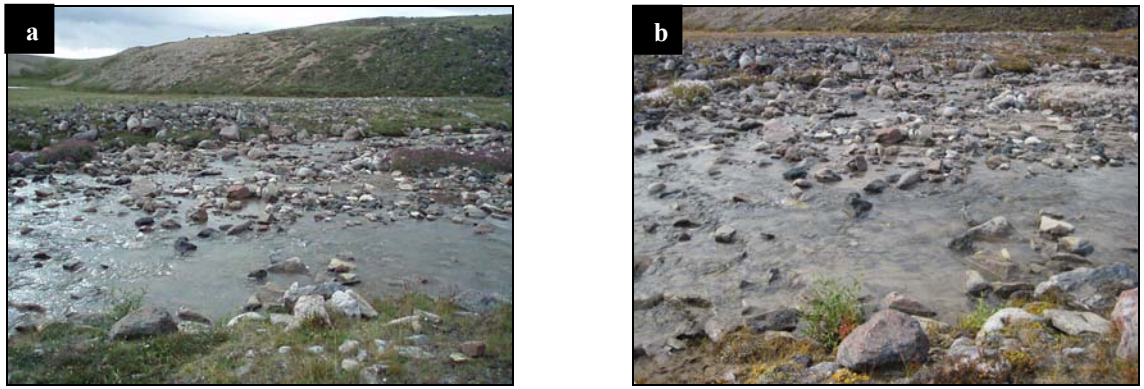


Figure 3.View across the habitat assessment site in reach 2 of Camp Lake Tributary 2 during summer (a) and fall (b).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Camp Lake Tributary #3 | **UTM:** | 17W 556342 7914864 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 22-Jun-08, 28-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Confined

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 13.00 | 17.00 |
| **Wetted Width (m):** | 4.50 | 7.00 |
| **Riffle-Crest Depth (m):** | 0.1-0.17 | 0.15 |
| **Pool Depth (m):** | 0.10 | 0.08 |
| **D (m):** | 0.10-0.50 | 0.10-0.50 |
| **$D_{95}$ (m):** | 0.80 | 0.80 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.83 | 0.45 |
| **Pool:** | NM | 0.00 |
| **Behind a rock:** | 0.78 | 0.03 |

### Stream/Riparian Habitat

**Channel Morphology:** 90% riffle, 10% pool (spring); 70% riffle, 30% pool (summer)

**Substrate Composition:** 50% cobble, 30% sand, 20% gravel

**Stream Cover:** 5% 1g cobble

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses, moss, wildflower

**Barriers Present (Y/N):** Y
**Location:** US ~ 1.0 km

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.18/indef | 0.08/undef |
| **Bank Stability:** | Low | High |
| **Erosion Potential:** | High | Low |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 90.00 | 23.8 |
| **TDS (g/l):** | 0.06 | 0.15 |
| **DO (mg/l)** | 13.63 | 12.00 |
| **%DO:** | 101.50 | NM |
| **Water Temp (˚C):** | 3.10 | 7.7 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - L |
| **Feeding:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - L |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 1 of Camp Lake Tributary 3 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Camp Lake Tributary 3 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Camp Lake Tributary 3 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Camp Lake Tributary #3 | **UTM:** | 17W 556105 7915146 |
| **Site:** | Reach 2 | **Dates Surveyed:** | 22-Jun-08, 28-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial - confined

**Channel Gradient:** 3˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 9.30 | 9.00 |
| **Wetted Width (m):** | 9.30 | 9.00 |
| **Riffle-Crest Depth (m):** | 0.06 | 0.10 |
| **Pool Depth (m):** | 0.10 | 0.05 |
| **D (m):** | 0.60 | 0.60 |
| **$D_{95}$ (m):** | 1.50 | 1.50 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.43 | 0.36 |
| **Pool:** | 0.09 | 0.00 |
| **Behind a rock:** | NM | 0.02 |
| **Chute:** | 1.97 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 95% riffle, 5% pool

**Substrate Composition:** 70% cobble, 15% gravel, 15% sand

**Stream Cover:** 10% 1g cobble

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, wildflower, willow

**Barriers Present (Y/N):** Y
**Location:** US ~ 600m

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.28/Undef | 0.15/Und |
| **Bank Stability:** | Low-High | Low-High |
| **Erosion Potential:** | Low-Mod | Low-Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 83.00 | 23.60 |
| **TDS (g/l):** | 0.05 | 0.15 |
| **DO (mg/l)** | 13.91 | 11.93 |
| **%DO:** | 102.60 | NM |
| **Water Temp (˚C):** | 2.30 | 7.60 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - L |

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**Mary River Project**

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# Mine Site Aquatic Habitat Assessment



Figure 1.View upstream from habitat assessment in reach 2 of Camp Lake Tributary 3 during spring (a) and summer (b) 2008.



Figure 2.View downstream from habitat assessment in reach 2 of Camp Lake Tributary 3 during spring (a) and summer (b) 2008.



Figure 3. View across from habitat assessment in reach 2 of Camp Lake Tributary 3 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Camp Lake Tributary #4 | **UTM:** | 17W 557731 7914380 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 21-Jun-08, 24-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 1.90 | 1.90 |
| **Wetted Width (m):** | 1.40 | 1.15 |
| **Riffle-Crest Depth (m):** | 0.05 | 0.17 |
| **Pool Depth (m):** | 0.02 | 0.07 |
| **D (m):** | 0.01-0.05 | 0.01-0.05 |
| **$D_{95}$ (m):** | 0.19 | 0.19 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.64 | 0.50 |
| **Pool:** | 0.07 | 0.22 |
| **Behind a rock:** | NM | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 70% riffle, 20% pool, 10% cascade (spring); 90% riffle, 10% pool (summer)

**Substrate Composition:** 70% cobble, 25% sand, 5% gravel

**Stream Cover:** 20% lg cobble, 5% UC

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses, moss, wildflowers

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.34/0.34 | 0.15/0.15 |
| **Bank Stability:** | Mod-High | Mod-High |
| **Erosion Potential:** | Low-Mod | Low-Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 100.00 | 20.00 |
| **TDS (g/l):** | 0.10 | 0.13 |
| **DO (mg/l)** | 12.14 | 12.55 |
| **%DO:** | 98.40 | NM |
| **Water Temp (˚C):** | 6.30 | 7.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - M |
| **Feeding:** | ARCH - H<br>NNST - H | ARCH - H<br>NNST - M |
| **Migration:** | ARCH - M<br>NNST - L | ARCH - M<br>NNST - L |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in Reach 1 of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in Reach 1 of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in Reach 1 of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Camp Lake Tributary #4
**Site:** Reach 2
**UTM:** 17W 557953 7914316
**Dates Surveyed:** 21-Jun-08, 24-Jul-08

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 2.5˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 10.00 | 10.00 |
| **Wetted Width (m):** | 1.95 | 3.40 |
| **Riffle-Crest Depth (m):** | 0.07 | 0.11 |
| **Pool Depth (m):** | <0.05 | 0.07 |
| **D (m):** | 0.01-0.05 | 0.01-0.05 |
| **$D_{95}$ (m):** | 0.19 | 0.19 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.37 | 0.50 |
| **Pool:** | 0.00 | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 95% riffle, 5% pool

**Substrate Composition:** 65% sand, 20% gravel, 15% cobble

**Stream Cover:** 5% lg cobble

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses, moss, wildflowers

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | None | None |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 15.30 | 19.00 |
| **TDS (g/l):** | 0.10 | 0.13 |
| **DO (mg/l)** | 12.80 | 12.72 |
| **%DO:** | 103.00 | NM |
| **Water Temp (˚C):** | 6.00 | 7.0 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - N | ARCH - M<br>NNST - N |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - L<br>NNST - N |

# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in Reach 2 of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in Reach 2 of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.


Figure 3. View across from habitat assessment in Reach 2 of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Camp Lake Tributary #4 | **UTM:** | 17W 558600 7914023 |
| **Site:** | Upstream Pond | **Dates Surveyed:** | 21-Jun-08, 24-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | NM | NM |
| **Wetted Width (m):** | 110 x 100 | 110 x 100 |
| **Riffle-Crest Depth (m):** | NA | NA |
| **Pool Depth (m):** | 0.50 | 0.50 |
| **D (m):** | NA | NA |
| **$D_{95}$ (m):** | NA | NA |
| **Point Velocities (m/s)** | | |
| **Riffle:** | NA | NA |
| **Pool:** | NA | NA |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% pool

**Substrate Composition:** 100% sm cobble

**Stream Cover:** None

**Aquatic Vegetation:** Periphyton,

**Riparian Vegetation:** Grasses and willows

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Camp L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | NM | NM |
| **Bank Stability:** | Mod | Mod |
| **Erosion Potential:** | Mod | Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 97.00 | NM |
| **TDS (g/l):** | 0.10 | NM |
| **DO (mg/l)** | 12.17 | NM |
| **%DO:** | 101.3 | NM |
| **Water Temp (˚C):** | 7.00 | NM |

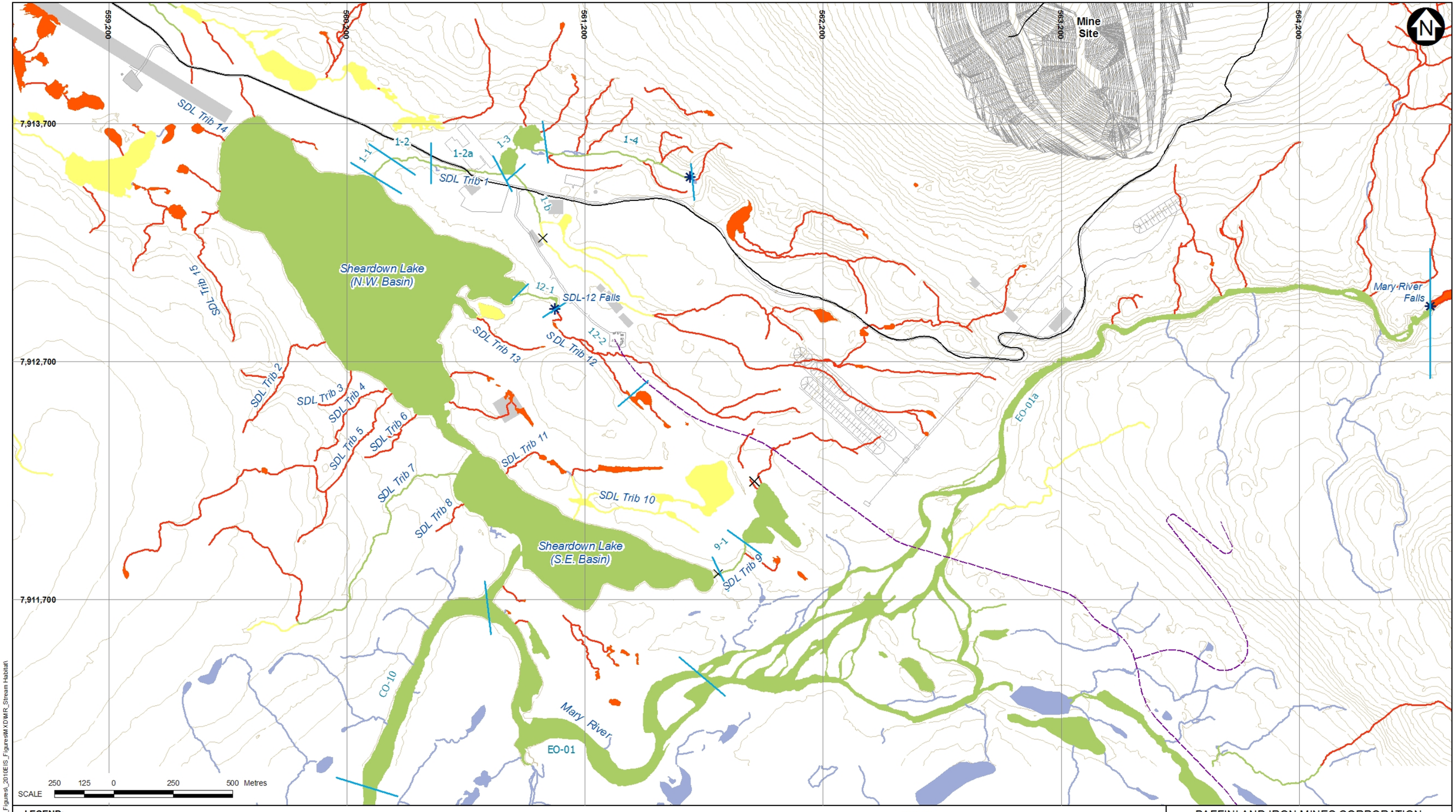
### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - L<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - L<br>NNST - N |


Figure 1.View northeast from habitat assessment in upstream pond of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.


Figure 2.View ESE from habitat assessment in upstream pond of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.


Figure 3. View SE from habitat assessment in upstream pond of Camp Lake Tributary 4 during spring (a) and summer (b) 2008.




**LEGEND:**

**STATUS OF ARCTIC CHAR**

- PRESENT
- PROBABLE
- NOT PRESENT
- UNKNOWN

- FISH BARRIER
- FALLS
- REACH BOUNDARIES
- MILNE INLET TOTE ROAD (EXISTING)
- CONSTRUCTION ACCESS ROAD (PROPOSED)
- INFRASTRUCTURE (PROPOSED FOR CONSTRUCTION AND OPERATIONS PERIOD)

| REV | DD/MMM/10 | DESCRIPTION | DESIGNED | DRAWN | CHK'D | APP'D |
|---|---|---|---|---|---|---|
| - | 01/09/2010 | ISSUED FOR --- | - | - | - | - |

**NOTES:**

1. BASE MAP: (1:50,000) © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PROPOSED RAILWAY CONSTRUCTION ACCESS ROAD ALIGNMENT PROVIDED BY CANRAIL CONSULTANTS INC. DRAWING NO.: RAILWAY ALIGNMENT AND CONSTRUCTION ACCESS RD - MARY RIVER STEENSBY 2010 - 12AUG2010.dwg
4. MINE SITE INFRASTRUCTURE PROVIDED BY AMEC DRAWING NO.: MINE SITE - CONSTRUCTION PHASE - 01 - MAR 09 2009.dwg
5. CONTOUR INTERVAL IS 50 M AND IS IN METRES.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

# PRESENCE AND ABSENCE OF ARCTIC CHAR IN SHEARDOWN LAKE BASIN TRIBUTARIES

North/South Consultants Inc.
Aquatic Environment Specialists

| P/A NO. | REF NO. |
|---|---|
| - | - |

DATE: 01/09/2010 REV -

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# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Sheardown Lake Tributary #1
**Site:** Reach 1
**UTM:** 17W 560305 7913483
**Dates Surveyed:** 25-Jun-07, 30-Jul-07, 1-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 8.43 | 8.43 | 8.43 |
| **Wetted Width (m):** | 6.60 | 6.60 | 5.10 |
| **Riffle-Crest Depth (m):** | 0.24 | 0.10 | 0.20 |
| **Pool Depth (m):** | NA | 0.10 | 0.10 |
| **D (m):** | 0.02 | 0.02 | 0.02 |
| **$D_{95}$ (m):** | 0.74 | 0.74 | 0.74 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 0.33 | 0.23 | 0.46 |
| **Pool:** | NA | NA | NA |
| **Behind a rock:** | < 0.01 | NM | 0.07 |

### Stream/Riparian Habitat

**Channel Morphology:** 100% riffle

**Substrate Composition:** 80% cobble, 15% boulder, 5% gravel

**Stream Cover:** 15% boulders

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.30/0.30 | 0.25/0.25 | 0.25/0.25 |
| **Bank Stability:** | High | High | High |
| **Erosion Potential:** | Low | Low | Low |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 93.7 | 164.6 | 188 |
| **TDS (g/l):** | 0.06 | 0.11 | NM |
| **DO (mg/l)** | 13.53 | 11.10 | 12.40 |
| **%DO:** | 109.3 | 99.7 | 101.0 |
| **Water Temp (˚C):** | 5.0 | 10.5 | 6.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - L | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - M<br>NNST - M | ARCH - H<br>NNST - H | ARCH - H<br>NNST - H |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 1 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment in reach 1 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site in reach 1 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Sheardown Lake Tributary #1
**Site:** Reach 2
**UTM:** 17W 560383 7913550
**Dates Surveyed:** 26-Jun-07, 29-Jul-07, 31-Aug-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 11.88 | 11.88 | 11.88 |
| **Wetted Width (m):** | 3.36 | 0.94 | 1.20 |
| **Riffle-Crest Depth (m):** | 0.20 | 0.20 | 0.20 |
| **Pool Depth (m):** | 0.40 | 0.31 | 0.36 |
| **D (m):** | 0.02 | 0.02 | 0.02 |
| **$D_{95}$ (m):** | 0.44 | 0.44 | 0.44 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 0.85 | 0.36 | 0.38 |
| **Pool:** | 0.34 | 0.16 | 0.16 |
| **Behind a rock:** | 0.06 | NM | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 65% riffle, 35% pool

**Substrate Composition:** 40% sand, 20% gravel, 20% cobble, 20% boulder

**Stream Cover:** 20% boulder, 10% undercut banks, 10% deep pools

**Aquatic Vegetation:** Periphyton, submerged RV

**Riparian Vegetation:** Grasses and willows

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.10/0.10 | 0.05/0.05 | 0.05/0.05 |
| **Bank Stability:** | Mod | Mod | Mod |
| **Erosion Potential:** | Mod | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 90.0 | 163.0 | 187.0 |
| **TDS (g/l):** | 0.58 | 0.11 | NM |
| **DO (mg/l)** | 13.62 | 10.82 | 12.35 |
| **%DO:** | 105.8 | 101.5 | 100.3 |
| **Water Temp (˚C):** | 4.5 | 9.9 | 7.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - H | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - M | ARCH - H<br>NNST - H | ARCH - H<br>NNST - M |
| **Migration:** | ARCH - M<br>NNST - M | ARCH - H<br>NNST - M | ARCH - H<br>NNST - M |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 2 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment in reach 2 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site in reach 2 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #1 | **UTM:** | 17W 560891 7913500 |
| **Site:** | Reach 3 | **Dates Surveyed:** | 26-Jun-07, 29-Jul-07, 31-Aug-07 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 35.65 | 35.65 | 35.65 |
| **Wetted Width (m):** | 35.65 | 25.32 | 29.25 |
| **Riffle-Crest Depth (m):** | NA | NA | NA |
| **Pool Depth (m):** | 0.49 | 0.37 | 0.56 |
| **D (m):** | < 0.01 | < 0.01 | < 0.01 |
| **$D_{95}$ (m):** | 0.93 | 0.93 | 0.93 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | NA | NA |
| **Pool:** | < 0.01 | < 0.01 | 0.01 |
| **Behind a rock:** | NA | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% pool

**Substrate Composition:** 90% silt, 5% sand, 5% boulder

**Stream Cover:** 5% boulder

**Aquatic Vegetation:** Periphyton, submerged RV

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.10/0.10 | 0.20/0.20 | 0.10/0.10 |
| **Bank Stability:** | Low | Low | Low |
| **Erosion Potential:** | High | High | High |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 87.4 | 156.0 | 201.0 |
| **TDS (g/l):** | 0.06 | 0.10 | NM |
| **DO (mg/l)** | 12.50 | 11.67 | 12.93 |
| **%DO:** | 108.6 | 113.7 | 105.5 |
| **Water Temp (˚C):** | 8.0 | 9.9 | 8.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - H | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - M | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 3 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment in reach 3 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site in reach 3 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Sheardown Lake Tributary #1
**Site:** Reach 4
**UTM:** 17W 561653 7913452
**Dates Surveyed:** 26-Jun-07, 29-Jul-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 9.14 | 9.14 | NA |
| **Wetted Width (m):** | 4.26 | 4.55 | NA |
| **Riffle-Crest Depth (m):** | 0.09 | 0.08 | NA |
| **Pool Depth (m):** | 0.25 | 0.08 | NA |
| **D (m):** | 0.02 | < 0.01 | NA |
| **$D_{95}$ (m):** | 1.12 | 1.12 | NA |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 0.25 | NM | NA |
| **Pool:** | 0.09 | NM | NA |
| **Behind a rock:** | 0.08 | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 50% pool (spr), 50% riffle (spr) Under boulders (sum)

**Substrate Composition:** 50% boulder, 30% cobble, 10% gravel, 10% silt

**Stream Cover:** 50% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** Y
**Location:** US ~ 25m

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.17/0.17 | 0.40/0.40 | NA |
| **Bank Stability:** | Low | Low | NA |
| **Erosion Potential:** | High | High | NA |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 57.5 | 113.0 | NA |
| **TDS (g/l):** | 0.36 | 0.07 | NA |
| **DO (mg/l)** | 14.26 | 12.02 | NA |
| **%DO:** | 110.6 | 96.0 | NA |
| **Water Temp (˚C):** | 4.5 | 5.0 | NA |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - L<br>NNST - N | ARCH - N<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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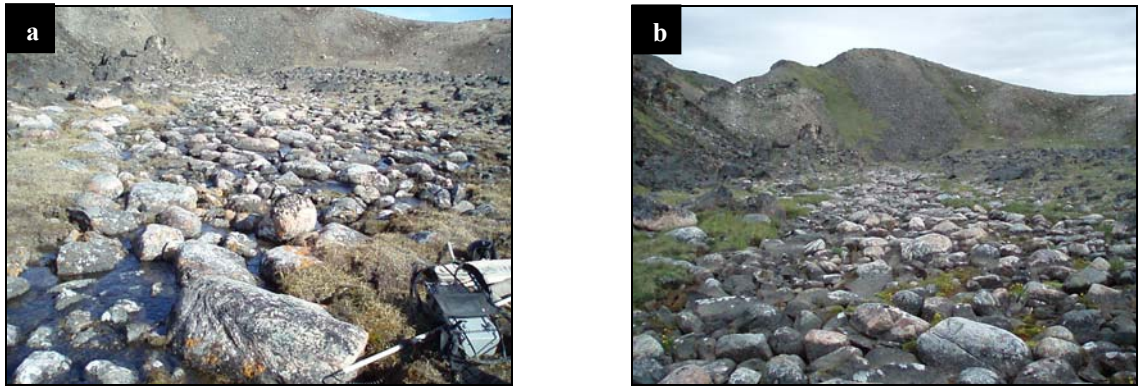


Figure 1.View upstream from habitat assessment in reach 4 of Sheardown Lake Tributary 1 during spring (a) and summer (b).

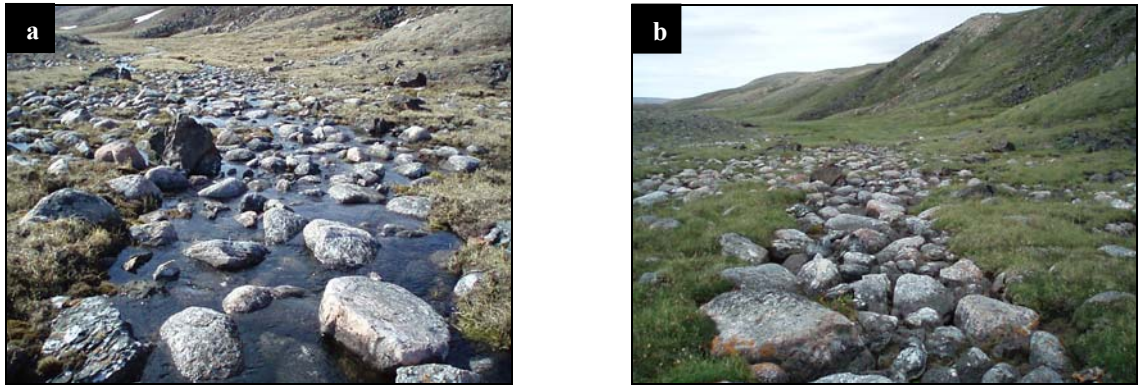


Figure 2.View downstream from habitat assessment in reach 4 of Sheardown Lake Tributary 1 during spring (a) and summer (b).

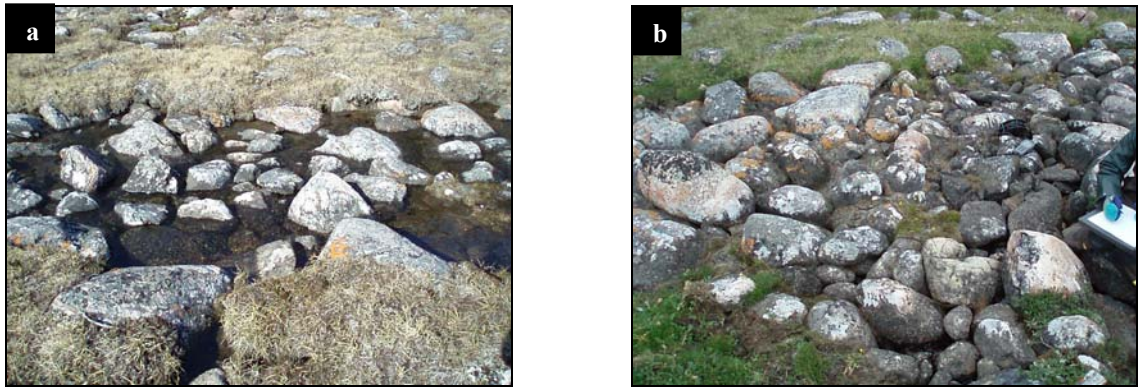


Figure 3.View across the habitat assessment site in reach 4 of Sheardown Lake Tributary 1 during spring (a) and summer (b).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #1 | **UTM:** | 17W 561568 7913498 |
| **Site:** | Reach 4b | **Dates Surveyed:** | 29-Jul-07, 31-Aug-07 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 1.10 | 1.10 |
| **Wetted Width (m):** | NA | 0.50 | 0.60 |
| **Riffle-Crest Depth (m):** | NA | 0.07 | 0.08 |
| **Pool Depth (m):** | NA | 0.26 | 0.23 |
| **D (m):** | NA | 0.02 | 0.02 |
| **$D_{95}$ (m):** | NA | 1.12 | 1.12 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | 0.55 | 0.25 |
| **Pool:** | NA | 0.06 | 0.15 |
| **Behind a rock:** | NA | < 0.01 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 60% riffle, 40% pool

**Substrate Composition:** 70% cobble, 20% boulder, 10% gravel

**Stream Cover:** 20% boulder, 80% undercut banks

**Aquatic Vegetation:** Periphyton, submerged RV

**Riparian Vegetation:** Grasses, mosses, wildflowers, willows

**Barriers Present (Y/N):** Y
**Location:** US ~ 75m

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | 0.12/0.12 | 0.16/0.08 |
| **Bank Stability:** | NA | Low | Low |
| **Erosion Potential:** | NA | High | High |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 113.0 | 150.0 |
| **TDS (g/l):** | NA | 0.07 | NM |
| **DO (mg/l)** | NA | 12.02 | 12.60 |
| **%DO:** | NA | 96.0 | 97.0 |
| **Water Temp (˚C):** | NA | 5.3 | 5.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - M<br>NNST - N | ARCH - L<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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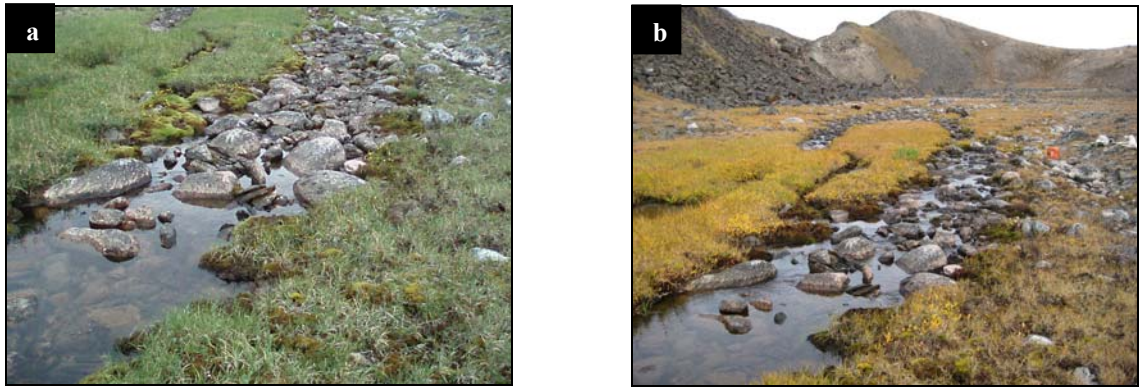


Figure 1.View upstream from habitat assessment in reach 4b of Sheardown Lake Tributary 1 during summer (a) and fall (b).

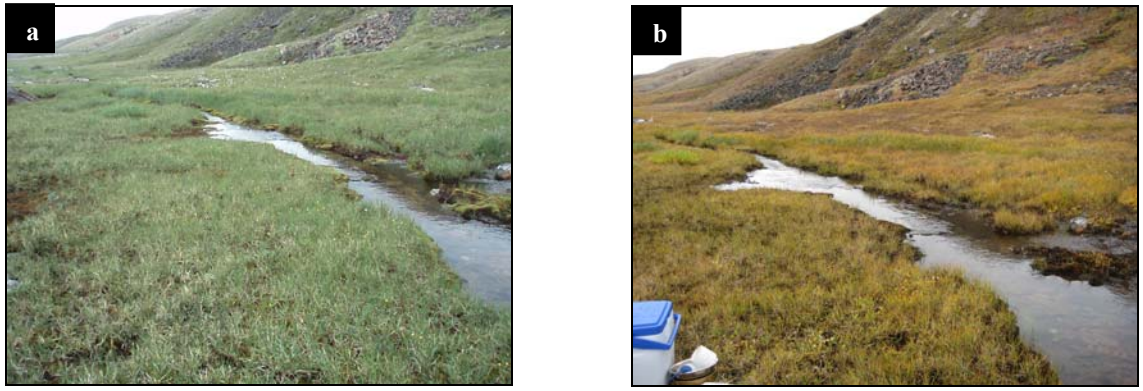


Figure 2.View downstream from habitat assessment in reach 4b of Sheardown Lake Tributary 1 during summer (a) and fall (b).

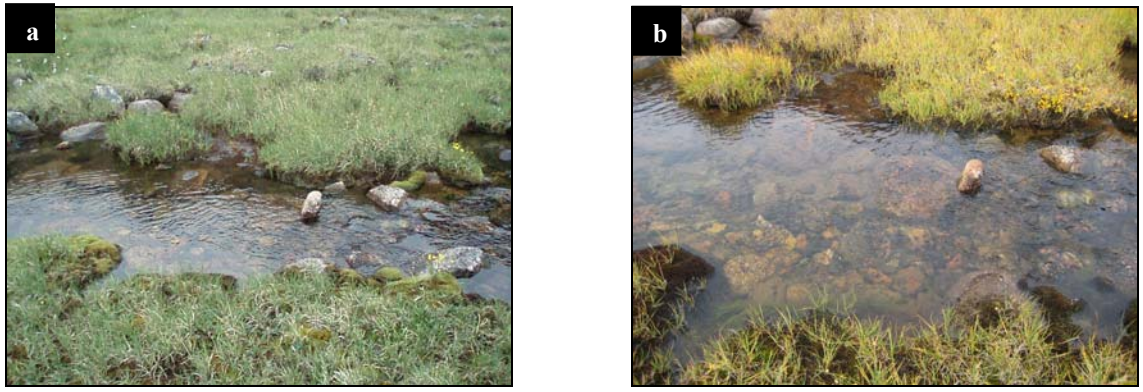


Figure 3.View across the habitat assessment site in reach 4b of Sheardown Lake Tributary 1 during summer (a) and fall (b).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #7 | **UTM:** | 17W 560643 7912229 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 19-Jun-08, 28-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 0.53 | 1.40 |
| **Wetted Width (m):** | 0.53 | 1.40 |
| **Riffle-Crest Depth (m):** | 0.05 | 0.13 |
| **Pool Depth (m):** | 0.07 | 0.06 |
| **D (m):** | 0.01 | 0.01 |
| **$D_{95}$ (m):** | 0.38 | 0.38 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 1.16 | 0.33 |
| **Pool:** | 0.29 | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 50% riffle, 50% pool (spring); 80% riffle, 20% pool (summer)

**Substrate Composition:** 60% sand, 25% FT, 10% gravel, 5% cobble

**Stream Cover:** FT

**Aquatic Vegetation:** Periphyton, reeds

**Riparian Vegetation:** Grasses, moss, willow

**Barriers Present (Y/N):** Y
**Location:** ~ 100 m US

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.02/0.05 | Undef |
| **Bank Stability:** | Mod | Mod |
| **Erosion Potential:** | Mod | Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 83.00 | 27.60 |
| **TDS (g/l):** | 0.05 | 0.18 |
| **DO (mg/l)** | 11.61 | 11.53 |
| **%DO:** | 98.30 | NM |
| **Water Temp (˚C):** | 8.10 | 8.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - H |
| **Feeding:** | ARCH - H<br>NNST - H | ARCH - H<br>NNST - H |
| **Migration:** | ARCH - M<br>NNST - L | ARCH - M<br>NNST - L |

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Figure 1.View upstream from habitat assessment in reach 1 of Sheardown Lake Tributary #7 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Sheardown Lake Tributary #7 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Sheardown Lake Tributary #7 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #7 | **UTM:** | 17W 560555 7912224 |
| **Site:** | Reach 2 | **Dates Surveyed:** | 19-Jun-08, 28-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 3.5˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 2.30 | 1.60 |
| **Wetted Width (m):** | 1.05 | 0.90 |
| **Riffle-Crest Depth (m):** | 0.25 | 0.10 |
| **Pool Depth (m):** | 0.20 | 0.02 |
| **D (m):** | 0.01-0.05 | 0.01-0.05 |
| **$D_{95}$ (m):** | 0.80 | 0.80 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.65 | 0.26 |
| **Pool:** | 0.14 | 0.00 |
| **Behind a rock:** | NM | 0.00 |

### Stream/Riparian Habitat

**Channel Morphology:** 50% cascade, 50% pool

**Substrate Composition:** 40% cobble, 25% gravel, 20% FT, 15% sand

**Stream Cover:** 1% 1g cobble

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, wildflower, willow

**Barriers Present (Y/N):** Y
**Location:** ~ 10 m US

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.05/0.20 | 0.12/0.12 |
| **Bank Stability:** | Low-Mod | Low-Mod |
| **Erosion Potential:** | Mod-High | Mod-High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 80.00 | 29.30 |
| **TDS (g/l):** | 0.05 | 0.18 |
| **DO (mg/l)** | 11.88 | 12.20 |
| **%DO:** | 99.90 | NM |
| **Water Temp (˚C):** | 7.80 | 6.70 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - N | ARCH - M<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 2 of Sheardown Lake Tributary #7 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 2 of Sheardown Lake Tributary #7 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 2 of Sheardown Lake Tributary #7 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #9 | **UTM:** | 17W 561739 7911810 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 28-Jun-07, 31-Jul-07 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 4˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 1.14 | 1.14 | NA |
| **Wetted Width (m):** | 1.14 | DRY | NA |
| **Riffle-Crest Depth (m):** | 0.08 | NA | NA |
| **Pool Depth (m):** | 0.29 | NA | NA |
| **D (m):** | 0.02 | NA | NA |
| **$D_{95}$ (m):** | 0.14 | NA | NA |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 0.35 | NA | NA |
| **Pool:** | 0.23 | NA | NA |
| **Behind a rock:** | NA | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 80% cascade, 20% pool

**Substrate Composition:** 60% cobble, 20% gravel, 20% sand

**Stream Cover:** 5% undercut banks

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and willow

**Barriers Present (Y/N):** Y

**Location:** Cascades are barriers for small juveniles

**Lakes Present (Y/N):** Y

**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.13/0.13 | DRY | NA |
| **Bank Stability:** | Mod | NA | NA |
| **Erosion Potential:** | Mod | NA | NA |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 113.8 | NA | NA |
| **TDS (g/l):** | 0.07 | NA | NA |
| **DO (mg/l)** | 14.14 | NA | NA |
| **%DO:** | 105.9 | NA | NA |
| **Water Temp (˚C):** | 3.0 | NA | NA |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | DRY | NA |
| **Feeding:** | ARCH - M<br>NNST - N | DRY | NA |
| **Migration:** | ARCH - L<br>NNST - N | DRY | NA |

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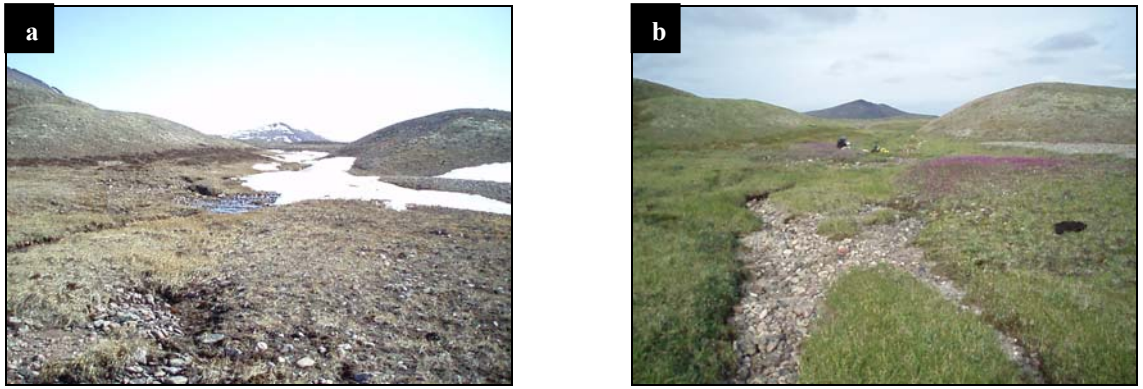


Figure 1.View upstream from habitat assessment in reach 1 of Sheardown Lake Tributary 9 during spring (a) and summer (b).

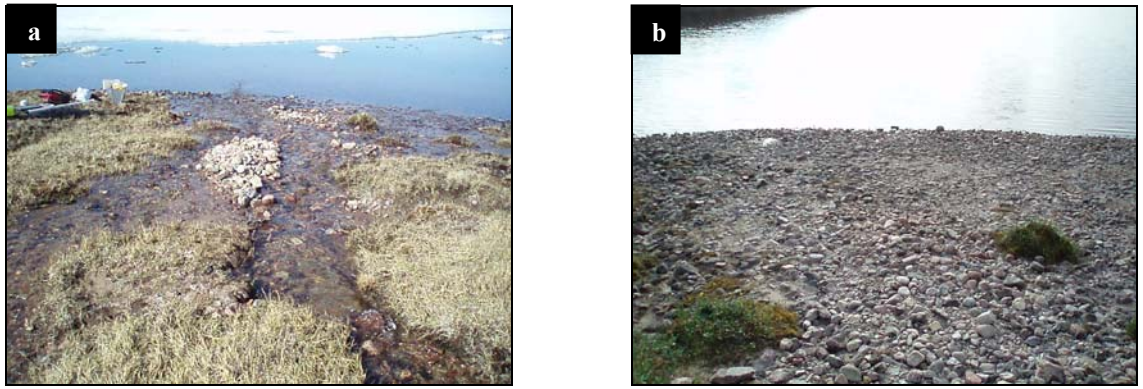


Figure 2.View downstream from habitat assessment in reach 1 of Sheardown Lake Tributary 9 during spring (a) and summer (b).

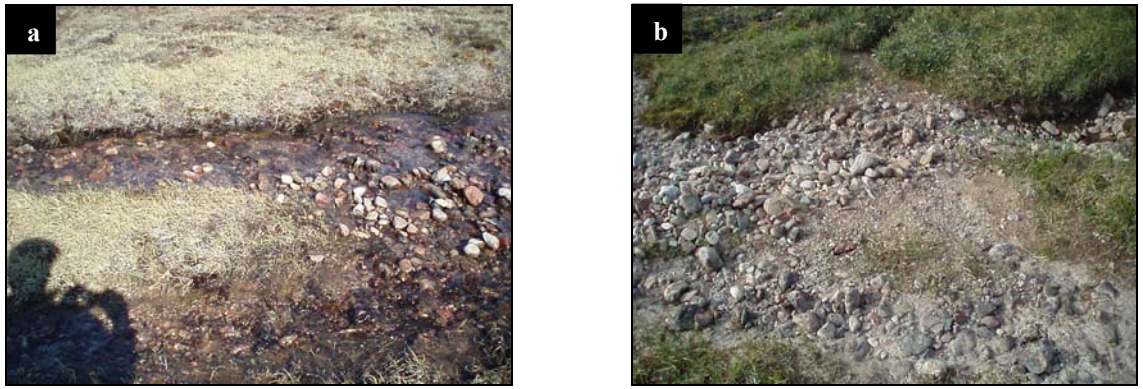


Figure 3.View across the habitat assessment site in reach 1 of Sheardown Lake Tributary 9 during spring (a) and summer (b).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Sheardown Lake Tributary #9
**Site:** Reach 1b
**UTM:** 17W 561770 7911810
**Dates Surveyed:** 31-Jul-07, 1-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 4˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | 1.10 | 1.10 |
| **Wetted Width (m):** | NA | 0.38 | 0.75 |
| **Riffle-Crest Depth (m):** | NA | 0.03 | 0.08 |
| **Pool Depth (m):** | NA | 0.05 | 0.08 |
| **D (m):** | NA | 0.02 | 0.02 |
| **$D_{95}$ (m):** | NA | 0.14 | 0.14 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | 0.03 | 0.13 |
| **Pool:** | NA | NM | NM |
| **Behind a rock:** | NA | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 75% pool, 20% riffle, 5% cascade

**Substrate Composition:** 60% cobble, 20% gravel, 20% sand

**Stream Cover:** 5% undercut banks

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and willow

**Barriers Present (Y/N):** Y
**Location:** Cascades represent barriers to smaller juveniles

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | 0.18/0.18 | 0.05/0.05 |
| **Bank Stability:** | NA | Mod | Mod |
| **Erosion Potential:** | NA | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | 167.0 | 164.0 |
| **TDS (g/l):** | NA | 0.11 | 0.11 |
| **DO (mg/l)** | NA | 10.73 | 12.04 |
| **%DO:** | NA | 91.0 | 97.6 |
| **Water Temp (˚C):** | NA | 8.0 | 8.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | NA | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | NA | ARCH - M<br>NNST - L | ARCH - M<br>NNST - L |
| **Migration:** | NA | ARCH - L<br>NNST - N | ARCH - L<br>NNST - N |

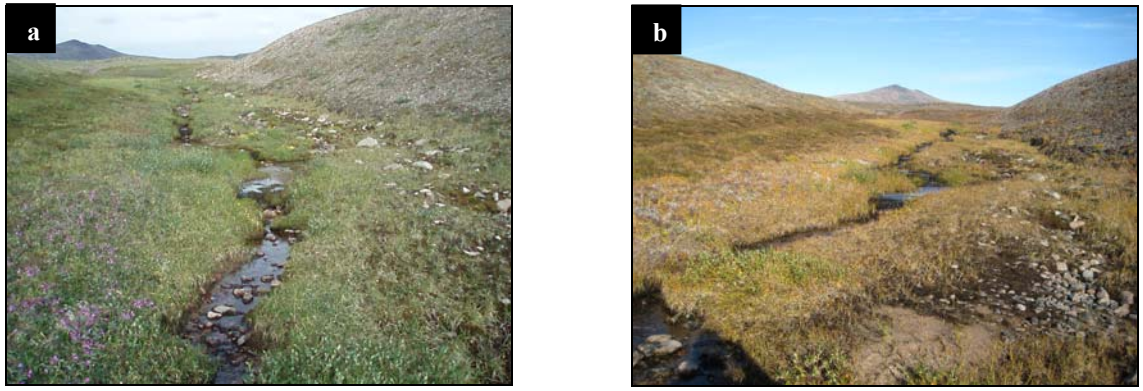


Figure 1.View upstream from habitat assessment in reach 1b of Sheardown Lake Tributary 9 during summer (a) and fall (c).


Figure 2.View downstream from habitat assessment in reach 1b of Sheardown Lake Tributary 9 during summer (a) and fall (c).

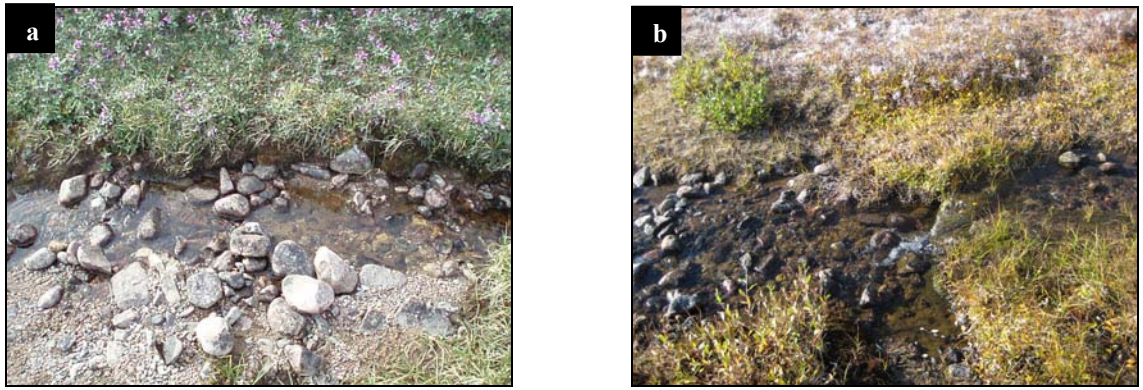


Figure 3.View across the habitat assessment site in reach 1b of Sheardown Lake Tributary 9 during summer (a) and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #12 | **UTM:** | 17W 560959 7912997 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 25-Jun-07, 28-Jul-07, 1-Sep-07 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 9˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 25.00 | 25.00 | 25.00 |
| **Wetted Width (m):** | 25.00 | 3.80 | 5.00 |
| **Riffle-Crest Depth (m):** | 0.18 | 0.01 | 0.05 |
| **Pool Depth (m):** | 0.32 | 0.36 | 0.34 |
| **D (m):** | 0.01 | < 0.01 | 0.01 |
| **$D_{95}$ (m):** | 0.86 | 0.86 | 0.86 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 1.25 | 0.08 | 0.13 |
| **Pool:** | 0.05 | 0.01 | 0.01 |
| **Behind a rock:** | 0.06 | < 0.01 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 60% cascade (spr), 40% pool (spr), 95% pool (sum, fall), 5% riffle (sum, fall)

**Substrate Composition:** 45% cobble, 45% boulder, 10% gravel

**Stream Cover:** 45% boulders

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Moss, grasses, willow

**Barriers Present (Y/N):** Y
**Location:** US ~ 200m

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.45/0.45 | 0.18/0.18 | 0.25/0.25 |
| **Bank Stability:** | High | High | High |
| **Erosion Potential:** | Low | Low | Low |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 48.2 | 196.0 | 228.0 |
| **TDS (g/l):** | 0.03 | 0.13 | 0.15 |
| **DO (mg/l)** | 14.77 | 11.09 | 12.36 |
| **%DO:** | 106.7 | 95.9 | 97.5 |
| **Water Temp (˚C):** | 1.0 | 7.8 | 5.5 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - L<br>NNST - N | ARCH - L<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 1 of Sheardown Lake Tributary 12 during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment in reach 1 of Sheardown Lake Tributary 12 during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site in reach 1 of Sheardown Lake Tributary 12 during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Sheardown Lake Tributary #12 | **UTM:** | 17W 561102 7912835 |
| **Site:** | Reach 2 | **Dates Surveyed:** | 25-Jun-07, 28-Jul-07, 1-Sep-07 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 18.28 | 18.28 | 18.28 |
| **Wetted Width (m):** | 18.28 | 0.90 | 1.75 |
| **Riffle-Crest Depth (m):** | 0.20 | 0.03 | 0.10 |
| **Pool Depth (m):** | 0.74 | 0.31 | 0.22 |
| **D (m):** | NM | < 0.01 | < 0.01 |
| **$D_{95}$ (m):** | 0.50 | 0.50 | 0.50 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 0.68 | 0.08 | 0.16 |
| **Pool:** | 0.02 | < 0.01 | 0.06 |
| **Behind a rock:** | NM | NM | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 70% pool (spr), 30% riffle (spr) 95% pool (sum, fall), 5% riffle (sum, fall)

**Substrate Composition:** 90% silt, 5% cobble, 5% boulder

**Stream Cover:** 15% deep pool, 10% undercut banks, 5% boulder

**Aquatic Vegetation:** Periphyton, submerged RV

**Riparian Vegetation:** Grasses and willow

**Barriers Present (Y/N):** Y
**Location:** DS ~ 50m

**Lakes Present (Y/N):** Y
**Location:** DS – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.12/0.12 | 0.13/0.13 | 0.18/0.18 |
| **Bank Stability:** | Mod | Mod | Mod |
| **Erosion Potential:** | Mod | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 51.7 | 197.0 | 185.0 |
| **TDS (g/l):** | 0.03 | 0.13 | NM |
| **DO (mg/l)** | 13.77 | 10.80 | 12.13 |
| **%DO:** | 98.0 | 101.4 | 100.1 |
| **Water Temp (˚C):** | 2.0 | 9.5 | 9.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 2 of Sheardown Lake Tributary 12 during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment in reach 2 of Sheardown Lake Tributary 12 during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site in reach 2 of Sheardown Lake Tributary 12 during spring (a), summer (b), and fall (c).

550,500
554,000
557,500
7,911,000
7,907,500
7,904,000
7,900,500

ML-North-Trib 2
2-1
ML-North-Trib 6
ML-North-Trib 7
ML-North-Trib 8
ML-North-Trib 3
3-3
3-2
3-1
ML-North-Trib 4
4-1
Camp Lake
ML-North-Trib 1
1-1
1-2
ML-North-Trib 5
Sheardown Lake (N.W. Basin)
CO-10
CO-05
ML-South-Trib 1
1-1
ML-South-Trib 11
Mary River
CO-01
ML-South-Trib 12
Mary 1
ML-South-Trib 2
2-2
2-1
Mary Lake
ML-South-Trib 10
ML-South-Trib 9
ML-South-Trib 8
ML-South-Trib 3
3-1
ML-South-Trib 4
ML-South-Trib 5
ML-South-Trib 6
ML-South-Trib 7
Mary River
AO-01

0.5 0.25 0 0.5 1 km
SCALE

**LEGEND:**

**STATUS OF ARCTIC CHAR**

- PRESENT
- PROBABLE
- NOT PRESENT
- UNKNOWN

- REACH BOUNDARIES
- MILNE INLET TOTE ROAD (EXISTING)
- INFRASTRUCTURE (PROPOSED FOR CONSTRUCTION AND OPERATIONS PERIOD)

**NOTES:**

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. CONTOUR INTERVAL IS 50 M AND IS IN METRES.

| REV | DDMMM'10 | ISSUED FOR | - | - | - | - |
|---|---|---|---|---|---|---|
| REV | 01/09/2010 | DESCRIPTION | DESIGNED | DRAWN | CHK'D | APP'D |

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

**PRESENCE AND ABSENCE OF ARCTIC CHAR IN MARY LAKE TRIBUTARIES**

North/South Consultants Inc.
Aquatic Environment Specialists

| P/A NO. | REF NO. |
|---|---|
| - | - |
| DATE: 27/09/2010 | REV 1 |

Path: \\terastation\GIS\Projects\Other\Mary River Freshwater\2010\Gen\td_Data\Report_Maps\20100830_Overview_Steensby2Milne_cp.mxd

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – North Tributary #1 | **UTM:** | 17W 554983 7913060 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 17-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** <1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 14.00 | 14.00 |
| **Wetted Width (m):** | 14.00 | 14.00 |
| **Flat/Pool Depth (m):** | 0.18 | 0.38 |
| **Flat Depth 2 (m):** | 0.06 | NA |
| **D (m):** | 0.01 | 0.01 |
| **$D_{95}$ (m):** | 0.10C | 0.10C |
| **Point Velocities (m/s)** | | |
| **Flat/Pool:** | 0.08 | 0.00 |
| **Flat2:** | 0.28 | NA |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 40% flat, 40% riffle, 20% pool (spring), 100% pool (summer)

**Substrate Composition:** 90% sand, 10% gravel

**Stream Cover:** None

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses, moss, flowers

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.23/0.23 | None |
| **Bank Stability:** | Low-Mod | Low-Mod |
| **Erosion Potential:** | Mod-High | Mod-High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 52.00 | 4.00 |
| **TDS (g/l):** | 0.03 | 0.02 |
| **DO (mg/l)** | 13.67 | 12.00 |
| **%DO:** | 100.00 | NM |
| **Water Temp (˚C):** | 2.50 | 6.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - L |
| **Feeding:** | ARCH - N<br>NNST - L | ARCH - L<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - L |

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Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – North Tributary #1 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – North Tributary #1 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – North Tributary #1 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – North Tributary #1 | **UTM:** | 17W 555336 7913098 |
| **Site:** | Reach 2 | **Dates Surveyed:** | 17-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 9.50 | 9.50 |
| **Wetted Width (m):** | 4.50 | 4.20 |
| **Riffle-Crest Depth (m):** | 0.22 | 0.16 |
| **Pool Depth (m):** | 0.30 | 0.32 |
| **D (m):** | 0.05C | 0.05C |
| **$D_{95}$ (m):** | 2.42C | 2.42C |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.98 | 0.78 |
| **Pool:** | 0.00 | 0.02 |
| **Behind a rock:** | 0.03 | 0.17 |

### Stream/Riparian Habitat

**Channel Morphology:** 50% riffle, 50% pool

**Substrate Composition:** 35% cobble, 35% sand, 20% boulder, 10% gravel

**Stream Cover:** 20% boulder, 15% lg cobble, 10% UC banks

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grass, moss, willows

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.20/0.17 | 0.30/0.26 |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 53.00 | 17.40 |
| **TDS (g/l):** | 0.03 | 0.11 |
| **DO (mg/l)** | 13.72 | 11.87 |
| **%DO:** | 100.00 | NM |
| **Water Temp (˚C):** | 2.30 | 5.90 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - L<br>NNST - N |

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**Mary River Project**

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 2 of Mary Lake – North Tributary #1 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 2 of Mary Lake – North Tributary #1 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 2 of Mary Lake – North Tributary #1 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – North Tributary #2 | **UTM:** | 17W 554208 7913853 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 17-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** <1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 19.90 | 19.90 |
| **Wetted Width (m):** | 12.00 | 12.00 |
| **Flat/Riffle Depth (m):** | 0.02 | 0.08 |
| **Pool Depth (m):** | NA | NA |
| **D (m):** | 0.01 | 0.01 |
| **$D_{95}$ (m):** | NA | NA |
| **Point Velocities (m/s)** | | |
| **Flat/Riffle:** | 0.10 | 0.22 |
| **Pool:** | NA | NA |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% flat/riffle

**Substrate Composition:** 100% sand

**Stream Cover:** None

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses, moss, willow

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.15/0.15 | 0.15/0.15 |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 24.00 | Too Shallow |
| **TDS (g/l):** | 0.02 | - |
| **DO (mg/l)** | 14.25 | - |
| **%DO:** | 101.30 | - |
| **Water Temp (˚C):** | 1.50 | 4.50 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - L | ARCH - N<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – North Tributary #2 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – North Tributary #2 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – North Tributary #2 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary Lake – North Tributary #3
**Site:** Reach 1
**UTM:** 17W 553084 7911975
**Dates Surveyed:** 17-Jun-08, 26-Jul-08

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** <1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 79.55 | 79.55 |
| **Wetted Width (m):** | 34.75 | 38.00 |
| **Riffle-Crest Depth (m):** | 0.06 | NA |
| **Pool Depth (m):** | 0.30 | 0.50 |
| **D (m):** | 0.01 | 0.01 |
| **$D_{95}$ (m):** | 0.01 | 0.01 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.18 | NA |
| **Pool:** | NM | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 70% pool, 15% riffle, 15% run (spring); 100% pool (summer)

**Substrate Composition:** 50% sand, 50% gravel

**Stream Cover:** None

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.00/0.40 | Flooded |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 16.00 | 6.20 |
| **TDS (g/l):** | 0.01 | 0.04 |
| **DO (mg/l)** | 14.11 | 11.49 |
| **%DO:** | 102.30 | NM |
| **Water Temp (˚C):** | 1.90 | 7.40 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - L | ARCH - N<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - L |

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**Mary River Project**

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Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – North Tributary #3 | **UTM:** | 17W 553047 7912054 |
| **Site:** | Reach 2 | **Dates Surveyed:** | 18-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 16.50 | 14.50 |
| **Wetted Width (m):** | 13.67 | 14.50 |
| **Riffle-Crest Depth (m):** | 0.21 | NA |
| **Run Depth (m):** | 0.74 | NA |
| **D (m):** | NM | NM |
| **$D_{95}$ (m):** | NM | <0.01 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.21 | NA |
| **Run:** | 0.56 | NA |
| **Pool:** | NA | 0.01 |

### Stream/Riparian Habitat

| | |
|---|---|
| **Channel Morphology:** | 50% riffle, 50% run |
| **Substrate Composition:** | 50% cobble,<br>30% gravel,<br>20% sand |
| **Stream Cover:** | 5% lg cobble |
| **Aquatic Vegetation:** | Periphyton |
| **Riparian Vegetation:** | Grasses, moss, willows |
| **Barriers Present (Y/N):** | N |
| **Location:** | NA |
| **Lakes Present (Y/N):** | Y |
| **Location:** | DS – Mary L. |

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.32/0.10 | Flooded |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 13.00 | 6.60 |
| **TDS (g/l):** | 0.01 | 0.04 |
| **DO (mg/l)** | 14.35 | 11.95 |
| **%DO:** | 102.10 | NM |
| **Water Temp (˚C):** | 1.30 | 6.10 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST – L | ARCH - M<br>NNST – L |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N |

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Figure 1.View upstream from habitat assessment in reach 2 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 2 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 2 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – North Tributary #3 | **UTM:** | 17W 552603 7912448 |
| **Site:** | Reach 3 | **Dates Surveyed:** | 18-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Confined

**Channel Gradient:** 1.5˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 17.40 | 17.40 |
| **Wetted Width (m):** | 15.30 | 14.80 |
| **Riffle-Crest Depth (m):** | 0.22 | 0.16 |
| **Pool Depth (m):** | 0.26 | 0.12 |
| **D (m):** | 0.05C | 0.05C |
| **$D_{95}$ (m):** | 2.60C | 2.60C |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.87 | 0.71 |
| **Pool:** | 0.40 | 0.04 |
| **Behind a rock:** | 0.09 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 50% riffle, 45% cascade, 5% pool

**Substrate Composition:** 60% cobble, 10% boulder, 10% gravel, 10% sand

**Stream Cover:** 10% boulder, 20% lg cobble

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, willows

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.10/0.10 | 0.25/0.25 |
| **Bank Stability:** | High | High |
| **Erosion Potential:** | Low | Low |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 12.00 | 6.00 |
| **TDS (g/l):** | 0.01 | 0.04 |
| **DO (mg/l)** | 14.47 | 11.97 |
| **%DO:** | 102.30 | NM |
| **Water Temp (˚C):** | 1.00 | 6.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - M<br>NNST - N |

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**Mary River Project**

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Figure 1.View upstream from habitat assessment in reach 3 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 3 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 3 of Mary Lake – North Tributary #3 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – North Tributary #4 | **UTM:** | 17W 553487 7910691 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 18-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** <1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 4.80 | 4.80 |
| **Wetted Width (m):** | 3.00 | 4.80 |
| **Run Depth (m):** | 0.91 | NA |
| **Pool Depth (m):** | NA | 1.30 |
| **D (m):** | 0.01-0.05 | <0.01 |
| **$D_{95}$ (m):** | NA | NA |
| **Point Velocities (m/s)** | | |
| **Run:** | 0.48 | NA |
| **Pool:** | NA | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% run (spring); 100% pool (summer)

**Substrate Composition:** 80% sand, 20% slumping banks

**Stream Cover:** FT banks

**Aquatic Vegetation:** Macrophytes

**Riparian Vegetation:** Grasses, moss, willows

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS - Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.40/0.40 | Flooded |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 17.00 | 5.70 |
| **TDS (g/l):** | 0.01 | 0.04 |
| **DO (mg/l)** | 13.30 | 11.60 |
| **%DO:** | 96.40 | NM |
| **Water Temp (˚C):** | 2.10 | 7.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - L | ARCH - L<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - L | ARCH - L<br>NNST - L |

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Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – North Tributary #4 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – North Tributary #4 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – North Tributary #4 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – South Tributary #1 | **UTM:** | 17W 554176 7909228 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 17-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined - Partial

**Channel Gradient:** >1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 15.20 | 15.20 |
| **Wetted Width (m):** | 7.50 | 15.20 |
| **Flat Depth (m):** | 0.10 | NA |
| **Pool Depth (m):** | 0.23 | 0.80 |
| **D (m):** | 0.01 | 0.01 |
| **$D_{95}$ (m):** | 0.01 | 0.01 |
| **Point Velocities (m/s)** | | |
| **Flat:** | 0.05 | NA |
| **Pool:** | 0.01 | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 50% flat, 50% pool (spring) 100% pool (summer)

**Substrate Composition:** 95% sand, 5% FT

**Stream Cover:** 20% UC banks

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.30/0.30 | None |
| **Bank Stability:** | Mod | Mod |
| **Erosion Potential:** | Mod | Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 19.00 | 4.00 |
| **TDS (g/l):** | 0.01 | 0.03 |
| **DO (mg/l)** | 12.61 | 11.47 |
| **%DO:** | 96.40 | NM |
| **Water Temp (˚C):** | 4.30 | 9.20 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - M |
| **Feeding:** | ARCH - N<br>NNST - H | ARCH - N<br>NNST - H |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – South Tributary #1 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – South Tributary #1 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – South Tributary #1 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – South Tributary #2 | **UTM:** | 17W 552058 7905109 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 18-Jun-08, 25-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 2.5˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 14.25 | 14.25 |
| **Wetted Width (m):** | 9.15 | 9.40 |
| **Riffle-Crest Depth (m):** | 0.10 | 0.28 |
| **Pool Depth (m):** | 0.36 | 0.25 |
| **D (m):** | 0.16C | 0.16C |
| **$D_{95}$ (m):** | 1.60C | 1.60C |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 1.80 | 0.81 |
| **Pool:** | 0.17 | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 70% cascade, 20% pool, 10% riffle (summer); 50% riffle, 50% pool (summer)

**Substrate Composition:** 60% cobble, 30% boulder, 10% gravel

**Stream Cover:** 30% boulder, 30% lg cobble, 30% UC banks

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.15/0.15 | 0.16/0.15 |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 23.00 | 4.10 |
| **TDS (g/l):** | 0.02 | 0.03 |
| **DO (mg/l)** | 13.96 | 11.17 |
| **%DO:** | 101.10 | NM |
| **Water Temp (˚C):** | 1.90 | 9.80 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - H |
| **Feeding:** | ARCH - M<br>NNST - H | ARCH - H<br>NNST - H |
| **Migration:** | ARCH - L<br>NNST - M | ARCH - L<br>NNST - L |

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Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – South Tributary #2 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – South Tributary #2 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – South Tributary #2 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – South Tributary #2 | **UTM:** | 17W 551620 7905310 |
| **Site:** | Reach 2 | **Dates Surveyed:** | 18-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** <1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 6.60 | 6.60 |
| **Wetted Width (m):** | 3.80 | 2.00 |
| **Riffle/Run Depth (m):** | 0.35 | 0.50 |
| **Pool Depth (m):** | >1.00 | >1.50 |
| **D (m):** | NM | NM |
| **$D_{95}$ (m):** | NM | NM |
| **Point Velocities (m/s)** | | |
| **Riffle/Run:** | 0.43 | 0.33 |
| **Pool:** | 0.32 | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 50% riffle, 50% pool (spring); 50% pool, 25% riffle, 25% run (summer)

**Substrate Composition:** 60% gravel, 30% cobble, 5% boulder, 5% sand

**Stream Cover:** 20% FT

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L., US deep ponds

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | None | None |
| **Bank Stability:** | Low | Low |
| **Erosion Potential:** | High | High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 22.00 | 4.50 |
| **TDS (g/l):** | 0.01 | 0.03 |
| **DO (mg/l)** | 13.25 | 11.17 |
| **%DO:** | 95.60 | NM |
| **Water Temp (˚C):** | 1.50 | 8.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - L | ARCH - L<br>NNST - N |
| **Migration:** | ARCH - L<br>NNST - L | ARCH - N<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 2 of Mary Lake – South Tributary #2 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 2 of Mary Lake – South Tributary #2 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 2 of Mary Lake – South Tributary #2 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary Lake – South Tributary #3 | **UTM:** | 17W 552404 7904215 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 18-Jun-08, 26-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 28.00 | 28.00 |
| **Wetted Width (m):** | 18.20 | 28.00 |
| **Riffle-Crest Depth (m):** | 0.30 | 0.14 |
| **Pool Depth (m):** | 0.26 | 0.30 |
| **D (m):** | 0.01-0.05 | 0.01-0.05 |
| **$D_{95}$ (m):** | 1.00 | 1.00 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 1.04 | 0.41 |
| **Pool:** | 0.02 | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

| | |
|---|---|
| **Channel Morphology:** | 80% riffle, 20% pool (spring); 80% pool, 20% riffle (summer) |
| **Substrate Composition:** | 90% cobble, 10% boulder, |
| **Stream Cover:** | 45% lg cobble, 10% boulders |
| **Aquatic Vegetation:** | Periphyton |
| **Riparian Vegetation:** | Grasses and moss |
| **Barriers Present (Y/N):** | N |
| **Location:** | NA |
| **Lakes Present (Y/N):** | Y |
| **Location:** | DS – Mary L. |

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | None | None |
| **Bank Stability:** | NA | NA |
| **Erosion Potential:** | NA | NA |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 18.00 | 3.90 |
| **TDS (g/l):** | 0.01 | 0.02 |
| **DO (mg/l)** | 14.43 | 12.06 |
| **%DO:** | 104.30 | NM |
| **Water Temp (˚C):** | 1.60 | 8.90 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - L |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - M<br>NNST - H |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - L<br>NNST - N |

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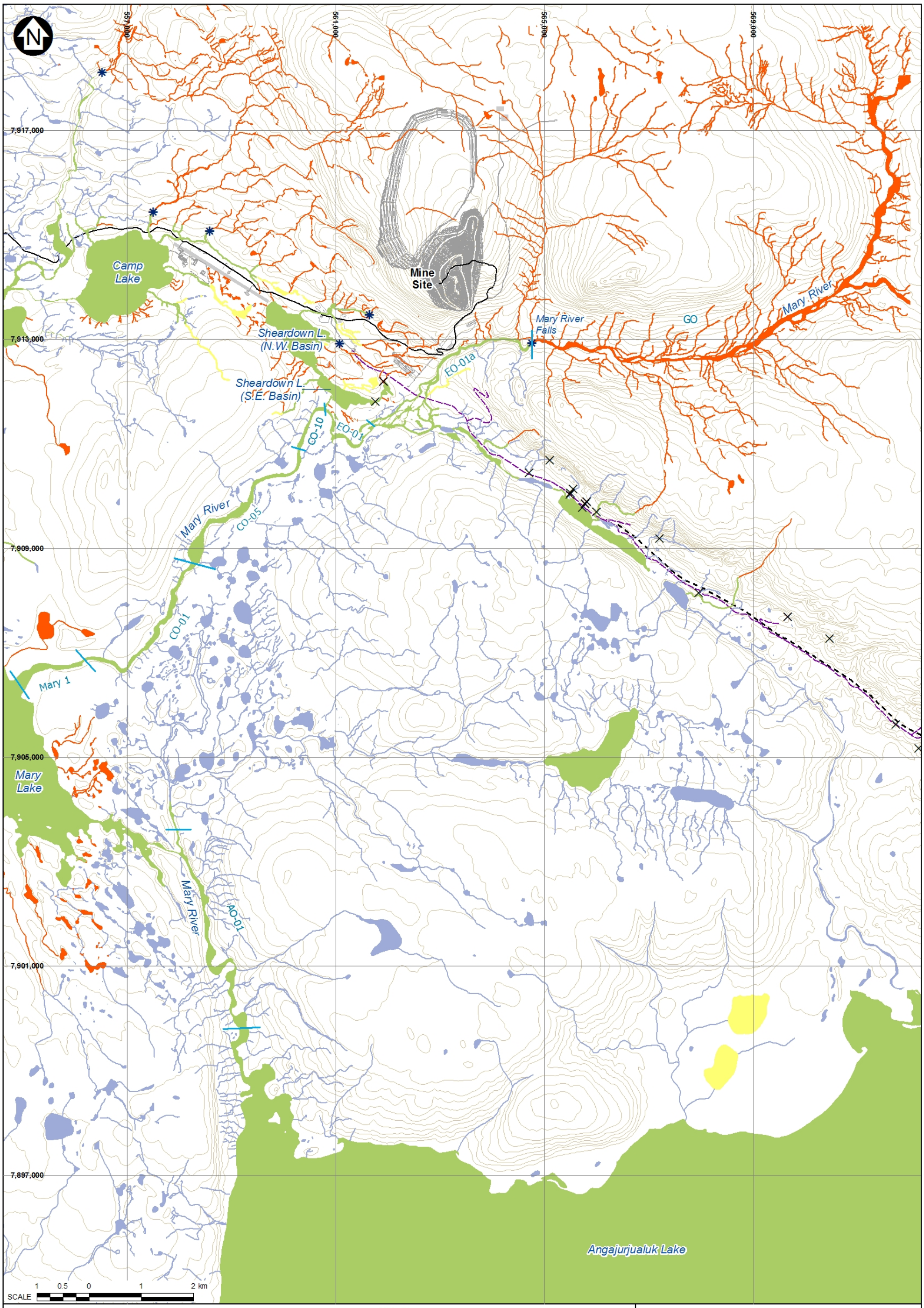
Figure 1.View upstream from habitat assessment in reach 1 of Mary Lake – South Tributary #3 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Mary Lake – South Tributary #3 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Mary Lake – South Tributary #3 during spring (a) and summer (b) 2008.




**LEGEND:**

**STATUS OF ARCTIC CHAR**

- PRESENT
- PROBABLE
- NOT PRESENT
- UNKNOWN

- FISH BARRIER
- FALLS
- REACH BOUNDARIES
- MILNE INLET TOTE ROAD (EXISTING)
- RAILWAY ALIGNMENT (PROPOSED)
- CONSTRUCTION ACCESS ROAD (PROPOSED)
- INFRASTRUCTURE (PROPOSED FOR CONSTRUCTION AND OPERATIONS PERIOD)

**NOTES:**

1. BASE MAP: (1:50,000) © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PROPOSED RAILWAY ALIGNMENT PROVIDED BY CANRAIL CONSULTANTS INC.
4. PROPOSED RAILWAY CONSTRUCTION ACCESS ROAD ALIGNMENT PROVIDED BY CANRAIL CONSULTANTS INC. DRAWING NO.: RAILWAY ALIGNMENT AND CONSTRUCTION ACCESS RD - MARY RIVER STEENSBY 2010 - 12AUG2010.dwg
5. MINE SITE INFRASTRUCTURE PROVIDED BY AMEC DRAWING NO.: MINE SITE - CONSTRUCTION PHASE - 01 - MAR 09 2009.dwg
6. CONTOUR INTERVAL IS 50 M AND IS IN METRES.

| REV | DDMMM'10 | ISSUED FOR | - | - | - | - |
|---|---|---|---|---|---|---|
| - | 01/09/2010 | DESCRIPTION | DESIGNED | DRAWN | CHK'D | APP'D |

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

# PRESENCE AND ABSENCE OF ARCTIC CHAR IN MARY RIVER AND ITS TRIBUTARIES

North/South Consultants Inc.
Aquatic Environment Specialists

| P/A NO. | REF NO. |
|---|---|
| - | - |

DATE: 27/09/2010 | REV 1

Path: \\terastation\GIS\MARY RIV _GDB\EIS_GDB\EIS_Figures_2010EIS_Figures\MXD\MR_Stream Habitat

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary River
**Site:** A0-01
**UTM:** 17W 559039 7900058
**Dates Surveyed:** 5-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | NA | NA | 63.10 |
| **Wetted Width (m):** | NA | NA | 40.23 |
| **Riffle-Crest Depth (m):** | NA | NA | 0.34 |
| **Pool Depth (m):** | NA | NA | 0.34 |
| **D (m):** | NA | NA | 0.08 |
| **$D_{95}$ (m):** | NA | NA | 1.05 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | NA | 0.51 |
| **Pool:** | NA | NA | 0.07 |
| **Run:** | NA | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 40% riffle, 40% rapids, 20% pool

**Substrate Composition:** 65% cobble, 15% silt/sand, 10% boulder, 10% gravel

**Stream Cover:** 10% boulders

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, willow

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** US – Mary L.
DS - Angajurjualuk L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NA | NA | UD |
| **Bank Stability:** | NA | NA | Mod |
| **Erosion Potential:** | NA | NA | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | NA | NA | 82.0 |
| **TDS (g/l):** | NA | NA | 0.05 |
| **DO (mg/l)** | NA | NA | 12.72 |
| **%DO:** | NA | NA | 100.4 |
| **Water Temp (˚C):** | NA | NA | 7.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |

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# Mine Site Aquatic Habitat Assessment

Figure 1.View upstream from habitat assessment at Site A0-01 in Mary River during fall.

Figure 2.View downstream from habitat assessment at Site A0-01 in Mary River during fall.

Figure 3.View across the habitat assessment site at Site A0-01 in Mary River during fall.

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary River
**Site:** Reach 1
**UTM:** 17W 555214 7906700
**Dates Surveyed:** 26-Jun-07, 2-Aug-07, 3-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 143.50 | 143.50 | 143.50 |
| **Wetted Width (m):** | 114.25 | 49.36 | 50.27 |
| **Riffle-Crest Depth (m):** | NA | NA | NA |
| **Run/Flat Depth (m):** | 0.32 | 0.30 | 0.30 |
| **D (m):** | < 0.01 | < 0.01 | < 0.01 |
| **$D_{95}$ (m):** | NA | NA | NA |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NA | NA | NA |
| **Pool:** | NA | NA | NA |
| **Run/Flat:** | 0.55 | 0.63 | 0.75 |

### Stream/Riparian Habitat

**Channel Morphology:** 100% run/flat

**Substrate Composition:** 100% sand

**Stream Cover:** None

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NM | 1.50/1.50 | 1.50/1.50 |
| **Bank Stability:** | Low | Low | Low |
| **Erosion Potential:** | High | High | High |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 97.8 | 116.2 | NM |
| **TDS (g/l):** | 0.06 | NM | NM |
| **DO (mg/l)** | 13.63 | 11.44 | NM |
| **%DO:** | 107.9 | 101.7 | NM |
| **Water Temp (˚C):** | 5.3 | 10.1 | 5.5 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Migration:** | ARCH - M<br>NNST - L | ARCH - H<br>NNST - M | ARCH - H<br>NNST - M |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment at Reach 1 in Mary River during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment at Reach 1 in Mary River during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site at Reach 1 in Mary River during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary River
**Site:** C0-01
**UTM:** 17W 556501 7906923
**Dates Surveyed:** 27-Jun-07, 2-Aug-07, 3-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 68.55 | 68.55 | 68.55 |
| **Wetted Width (m):** | 68.55 | 62.15 | 63.07 |
| **Riffle-Crest Depth (m):** | 0.24 | 0.08 | 0.08 |
| **Pool Depth (m):** | 0.16 | 0.20 | 0.17 |
| **D (m):** | 0.05 | 0.02 | 0.02 |
| **$D_{95}$ (m):** | 1.84 | 1.84 | 1.84 |
| **Point Velocities (m/s)** | | | |
| **Riffle/Rapids:** | 1.38 | 0.54 | 0.48 |
| **Pool:** | 0.27 | 0.14 | 0.33 |
| **Run:** | NM | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 60% rapids (spr), 35% run (spr), 5% pool (spr) 80% riffle (sum, fall), 20% pool (sum, fall)

**Substrate Composition:** 45% boulder, 45% cobble, 5% gravel, 5% sand

**Stream Cover:** 45% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, willow

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (m):** | 0.00/0.00 | 0.50/0.50 | NM |
| **Bank Stability:** | Mod | Mod | Mod |
| **Erosion Potential:** | Mod | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 65.5 | 110.7 | 196.0 |
| **TDS (g/l):** | 0.04 | NM | 0.13 |
| **DO (mg/l)** | 13.75 | 11.40 | 14.16 |
| **%DO:** | 103.8 | 99.5 | 103.1 |
| **Water Temp (˚C):** | 3.0 | 9.3 | 6.5 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - L | ARCH - M<br>NNST - L |
| **Migration:** | ARCH - M<br>NNST - N | ARCH - M<br>NNST - L | ARCH - M<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment at Site C0-01 in Mary River during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment at Site C0-01 in Mary River during spring (a), summer (b), and fall (c).


Figure 3.View across the habitat assessment site at Site C0-01 in Mary River during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary River
**Site:** C0-05
**UTM:** 17W 558378 7909254
**Dates Surveyed:** 27-Jun-07, 2-Aug-07, 3-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 91.40 | 91.40 | 91.40 |
| **Wetted Width (m):** | 91.40 | 84.09 | 85.00 |
| **Riffle-Crest Depth (m):** | NM | NM | 0.05 |
| **Run Depth (m):** | > 1.00 | ~ 1.00 | ~ 1.00 |
| **D (m):** | < 0.01 | < 0.01 | < 0.01 |
| **$D_{95}$ (m):** | 0.86 | 0.86 | 0.86 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | NM | NM | 0.15 |
| **Pool:** | NM | NM | NM |
| **Run:** | 0.22 | 0.06 | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 90% run/flat, 10% riffle

**Substrate Composition:** 40% boulder, 40% cobble, 10% sand, 10% silt

**Stream Cover:** 40% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses, moss, willow

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.
US – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.00/0.00 | 0.30/0.30 | 0.15/0.15 |
| **Bank Stability:** | Mod | Mod | Mod |
| **Erosion Potential:** | Mod | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 54.9 | 115.8 | 201.0 |
| **TDS (g/l):** | 0.04 | NM | 0.13 |
| **DO (mg/l)** | 14.66 | 11.62 | 13.92 |
| **%DO:** | 107.0 | 100.7 | 102.3 |
| **Water Temp (˚C):** | 2.2 | 9.0 | 7.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - L | ARCH - H<br>NNST - L | ARCH - M<br>NNST - L |
| **Migration:** | ARCH - M<br>NNST - N | ARCH - M<br>NNST - L | ARCH - M<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment at Site C0-05 in Mary River during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment at Site C0-05 in Mary River during spring (a), summer (b), and fall (c).

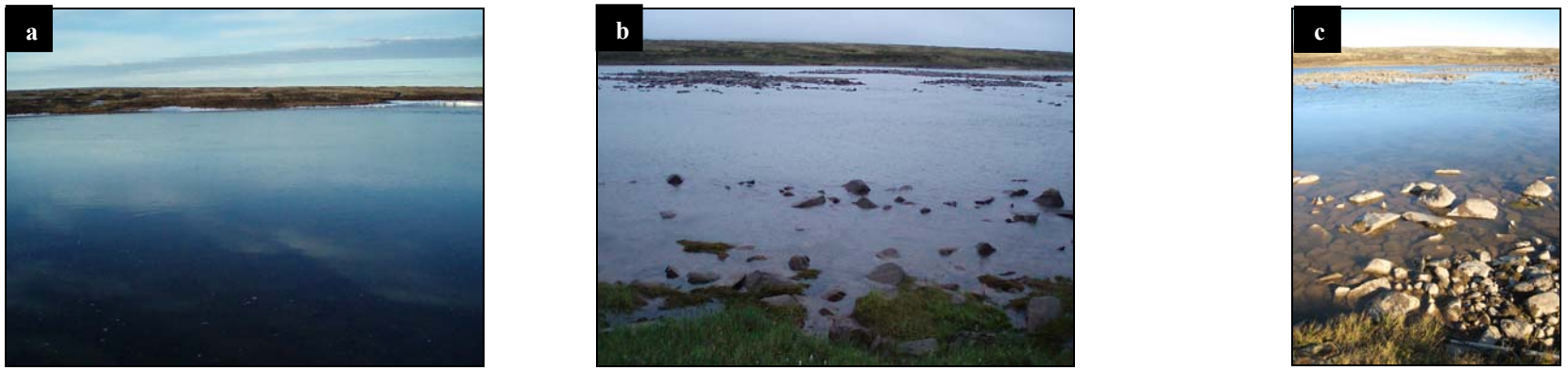


Figure 3.View across the habitat assessment site at Site C0-05 in Mary River during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary River
**Site:** C0-10
**UTM:** 17W 560690 7911705
**Dates Surveyed:** 27-Jun-07, 2-Aug-07, 3-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 74.95 | 74.95 | 74.95 |
| **Wetted Width (m):** | 74.95 | 66.72 | 62.15 |
| **Riffle-Crest Depth (m):** | 0.27 | 0.10 | 0.14 |
| **Pool Depth (m):** | NA | 0.52 | 0.32 |
| **D (m):** | 0.05 | 0.01 | 0.01 |
| **$D_{95}$ (m):** | 0.46 | 0.46 | 0.46 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 1.72 | 0.87 | 0.56 |
| **Pool:** | NA | 0.19 | NM |
| **Run:** | NA | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% riffle (spr)
90% riffle (sum, fall),
10% pool (sum, fall)

**Substrate Composition:** 80% cobble,
10% boulder,
5% gravel,
5% sand

**Stream Cover:** 10% boulder

**Aquatic Vegetation:** Periphyton,
submerged RV

**Riparian Vegetation:** Grasses, moss,
willow

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.
US – Sheardown L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.20/0.20 | 0.25/0.25 | 0.35/0.35 |
| **Bank Stability:** | Low | Low | Low |
| **Erosion Potential:** | High | High | High |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 49.0 | 125.1 | 196.0 |
| **TDS (g/l):** | 0.03 | NM | 0.13 |
| **DO (mg/l)** | 15.03 | 11.76 | 13.42 |
| **%DO:** | 108.8 | 100.9 | 104.9 |
| **Water Temp (˚C):** | 1.5 | 8.6 | 6.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N | ARCH - M<br>NNST - N |
| **Migration:** | ARCH - M<br>NNST - N | ARCH - M<br>NNST - L | ARCH - M<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment at Site C0-10 in Mary River during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment at Site C0-10 in Mary River during spring (a), summer (b), and fall (c).

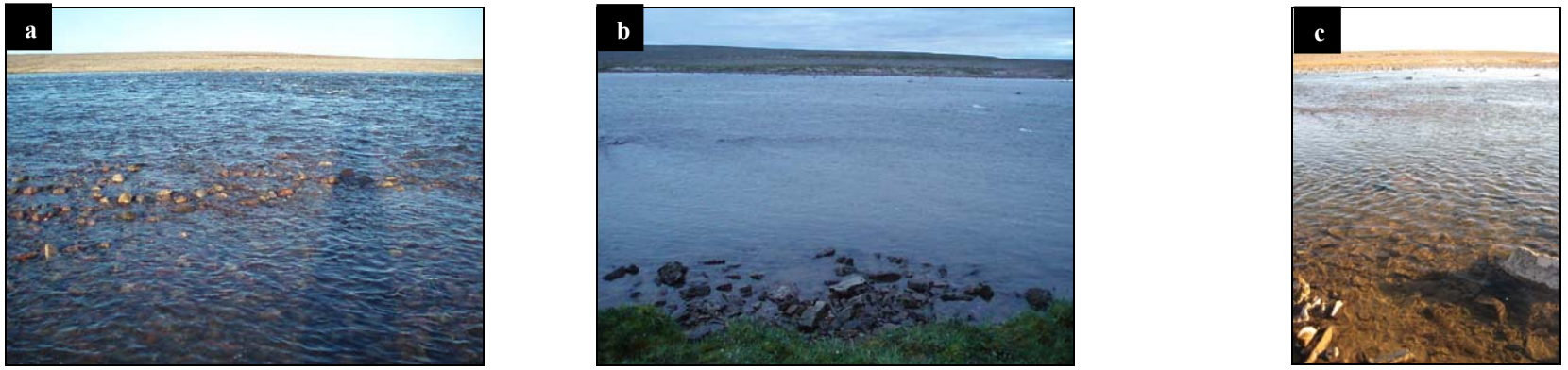


Figure 3.View across the habitat assessment site at Site C0-10 in Mary River during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary River | **UTM:** | 17W 562475 7911771 |
| **Site:** | E0-01 | **Dates Surveyed:** | 19-Jun-08, 27-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 1.5˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 78.64 | 78.64 |
| **Wetted Width (m):** | 18.29 | 14.00 |
| **Run/Rapid Depth (m):** | 0.90 | 0.65 |
| **Riffle/Pool Depth (m):** | 0.25 | 0.25 |
| **D (m):** | 0.10-0.50 | 0.02 |
| **$D_{95}$ (m):** | 1.90 | 0.74 |
| **Point Velocities (m/s)** | | |
| **Riffle/Rapid:** | 1.16 | 0.49 |
| **Run:** | 0.49 | NM |
| **Pool:** | NM | 0.03 |

### Stream/Riparian Habitat

**Channel Morphology:** 50% rapid, 50% run

**Substrate Composition:** 65% cobble, 20% boulder, 10% gravel, 5% sand

**Stream Cover:** 20% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** Y
**Location:** US falls

**Lakes Present (Y/N):** Y
**Location:** DS – Mary & Sheardown Lakes

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 1.40/Undef | 1.30/Unde |
| **Bank Stability:** | Mod | Mod |
| **Erosion Potential:** | Mod | Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 40.00 | 13.80 |
| **TDS (g/l):** | 0.03 | 0.09 |
| **DO (mg/l)** | 14.63 | 11.24 |
| **%DO:** | 103.30 | NM |
| **Water Temp (˚C):** | 1.00 | 10.20 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - M<br>NNST - N |

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**Mary River Project**

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Aquatic Environment Specialists

# Mine Site Aquatic Habitat Assessment



Figure 1.View upstream from habitat assessment in reach E0-01 of Mary River during spring (a) and summer (b) 2008.



Figure 2.View downstream from habitat assessment in reach E0-01 of Mary River during spring (a) and summer (b) 2008.

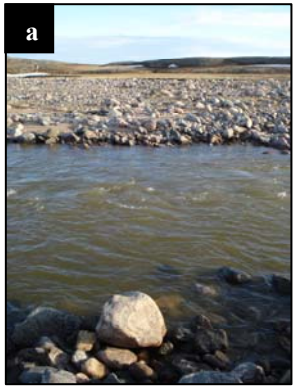



Figure 3.View across the habitat assessment site in reach E0-01 of Mary River during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Mary River | **UTM:** | 17W 564463 7912977 |
| **Site:** | Reach E0-01a | **Dates Surveyed:** | 19-Jun-08, 27-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Confined

**Channel Gradient:** 5˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 37.00 | 37.00 |
| **Wetted Width (m):** | 28.00 | 37.00 |
| **Riffle/Rapid Depth (m):** | 0.35 | 0.25 |
| **Pool Depth (m):** | 0.40 | 0.28 |
| **D (m):** | 0.10-0.50 | 0.10-0.50 |
| **$D_{95}$ (m):** | 2.60 | 2.60 |
| **Point Velocities (m/s)** | | |
| **Riffle/Rapid:** | 0.74 | 0.79 |
| **Pool:** | 0.04 | 0.04 |
| **Run:** | 1.47 | 1.55 |

### Stream/Riparian Habitat

**Channel Morphology:** 50% pool, 40% cascade/rapid, 10% run

**Substrate Composition:** 60% cobble, 40% boulder,

**Stream Cover:** 50% lg cobble 40% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** Y
**Location:** Falls US

**Lakes Present (Y/N):** Y
**Location:** DS – Mary & Sheardown Lakes

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | Undef | Undef |
| **Bank Stability:** | NA | NA |
| **Erosion Potential:** | NA | NA |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 30.00 | 11.60 |
| **TDS (g/l):** | 0.02 | 0.08 |
| **DO (mg/l)** | 15.11 | 11.30 |
| **%DO:** | 106.30 | NM |
| **Water Temp (˚C):** | 0.50 | 10.50 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - L<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach E0-01a of Mary River during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach E0-01a of Mary River during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach E0-01a of Mary River during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Mary River
**Site:** G0-09
**UTM:** 17W 571574 7916312
**Dates Surveyed:** 27-Jun-07, 3-Aug-07, 5-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 46.61 | 46.61 | 46.61 |
| **Wetted Width (m):** | 46.61 | 45.70 | 39.30 |
| **Riffle-Crest Depth (m):** | 0.46 | 0.52 | 0.14 |
| **Pool Depth (m):** | NA | 0.13 | 0.18 |
| **D (m):** | 0.02 | 0.02 | 0.01 |
| **$D_{95}$ (m):** | 0.66 | 0.66 | 0.66 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 1.03 | 0.89 | 0.75 |
| **Pool:** | NA | 0.06 | 0.05 |
| **Run:** | NM | NM | NM |

### Stream/Riparian Habitat

**Channel Morphology:** 95% riffle (spr), 5% run (spr) 50% riffle (sum, fall), 45% run (sum, fall), 5% pool (sum, fall)

**Substrate Composition:** 55% cobble, 25% boulder, 15% sand, 5% gravel

**Stream Cover:** 25% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** Y
**Location:** DS - Mary Falls

**Lakes Present (Y/N):** Y
**Location:** DS - Several km

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (m):** | 0.25/0.25 | 0.30/0.30 | NM |
| **Bank Stability:** | Mod | Mod | Mod |
| **Erosion Potential:** | Mod | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 24.4 | 84.9 | 160.0 |
| **TDS (g/l):** | 0.02 | NM | 0.10 |
| **DO (mg/l)** | 15.00 | 12.90 | 13.37 |
| **%DO:** | 105.5 | 103.9 | 97.4 |
| **Water Temp (˚C):** | 0.5 | 6.1 | 2.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment at Site G0-09 in Mary River during spring (a), summer (b), and fall (c).


Figure 2.View downstream from habitat assessment at Site G0-09 in Mary River during spring (a), summer (b), and fall (c).

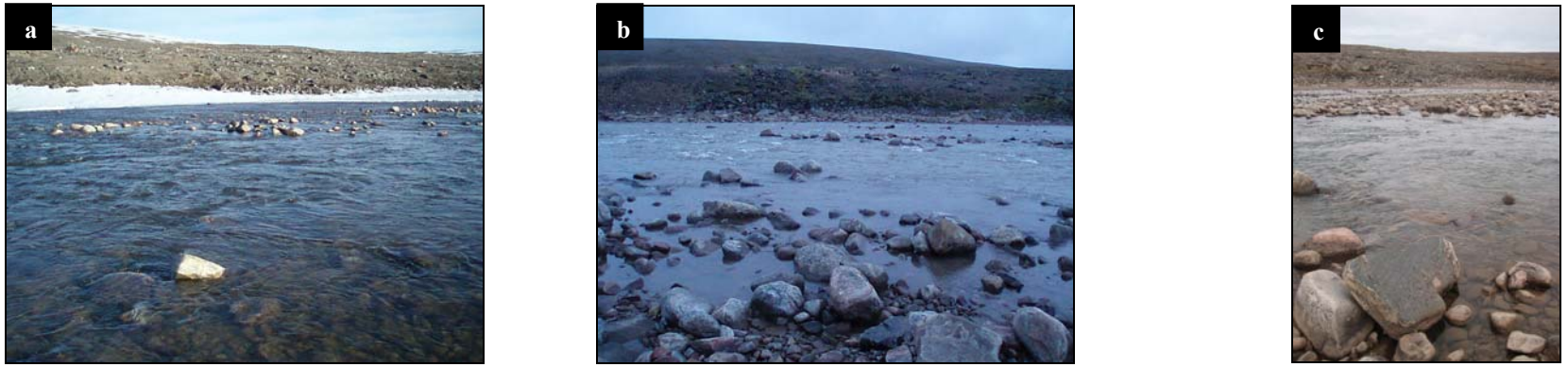


Figure 3.View across the habitat assessment site at Site G0-09 in Mary River during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

**Figure 1:** View upstream of E3-01.

**Figure 2:** View across E3-01 from right bank.

**Figure 3:** View downstream of E3-01.

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## Location

**Crossing ID:** E3-01
**UTM:** 17W 563829 / 7913062

**Date/Time Surveyed:** 24-Aug-07 / 11:50

## Site Description/Physical Characteristics

**Floodplain Width (m):** 6.40

**Channel Pattern:** sinuous

**Channel Confinement:** C

**Channel Gradient:** 7˚

### Hydrology

**Bankfull Width (m):** 6.40

**Wetted Width (m):** 4.57

**Depth Profile (25%, 50%, 75%; m):** N/M

**Max Depth (m):** 0.30

**Flow Regime:** per

### Bank Characteristics

**Bank Height (L/R; m):** UD / UD

**Bank Shape (L/R):** S / S

**Bank Stability:** low

### Stream/Riparian Habitat

**Channel Morphology:** 50% Ca, 50% Po

**Substrate Composition:** 30% Sa, 10% Gr, 58% Co, 2% Bo

**Stream Cover:** 2% Bo

**Barriers Present (Y/N):** Y
**Description/Location:** cascades ~ 50m DS

**Lakes Present (Y/N):** Y
**Description/Location:** several km DS (Mary L.)

## Biotic Characteristics

### Fisheries

**Electrofishing Conducted (Y/N):** Y
**Effort:** 600s
**Settings:** 200V 30Hz

**Fish Observed (Y/N):** N
**Species/Totals:** N/A
**Length Range:** N/A

### Potential Fish Utilization

**Arctic char (ARCH)**
**Spawning:** N **Rearing:** N
**Overwintering:** N **Migration:** N

**Ninespine stickleback (NNST)**
**Spawning:** N **Rearing:** N
**Overwintering:** N **Migration:** N

### Habitat Assessment Summary & Potential Habitat Compensation Notes

Two sets of cascades near the confluence of E0-03 with the Mary River prevent fish from accessing this site.

The conductivity in E3-01 was very high. Electrofishing at the confluence revealed that fish were not present in the Mary River within at least 20 m downstream of the outflow from E3-01.

E3-01 is not fish habitat. However, impacts to E3-01 affect important fish habitat in the Mary River downstream of the confluence and requires further study and possible compensation.

## Fish Habitat Quality

**No Fish Habitat**

# Mine Site Aquatic Habitat Assessment

**Figure 1:** View upstream of E4-01.

**Figure 2:** View across E4-01 from right bank.

**Figure 3:** View downstream of E4-01.

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## Location

**Crossing ID:** E4-01
**UTM:** 17W 563927 / 7913090

**Date/Time Surveyed:** 26-Aug-07 / 10:47

## Site Description/Physical Characteristics

**Floodplain Width (m):** N/M

**Channel Pattern:** sinuous

**Channel Confinement:** PC

**Channel Gradient:** 10˚

### Hydrology

**Bankfull Width (m):** 1.00

**Wetted Width (m):** 0.80

**Depth Profile (25%, 50%, 75%; m):** N/M

**Max Depth (m):** 0.20

**Flow Regime:** int - per

### Bank Characteristics

**Bank Height (L/R; m):** 0.15 / 0.15

**Bank Shape (L/R):** UC / UC

**Bank Stability:** moderate

### Stream/Riparian Habitat

**Channel Morphology:** 50% Ca, 50% Po

**Substrate Composition:** 10% Sa, 85% Co, 5% Bo

**Stream Cover:** 5% Bo

**Barriers Present (Y/N):** Y
**Description/Location:** cascade at assessed site

**Lakes Present (Y/N):** Y
**Description/Location:** several km DS (Mary L.)

## Biotic Characteristics

### Fisheries

**Electrofishing Conducted (Y/N):** Y
**Effort:** 300s
**Settings:** 400V 30Hz

**Fish Observed (Y/N):** N
**Species/Totals:** N/A
**Length Range:** N/A

### Potential Fish Utilization

**Arctic char (ARCH)**
**Spawning:** N **Rearing:** N
**Overwintering:** N **Migration:** N

**Ninespine stickleback (NNST)**
**Spawning:** N **Rearing:** N
**Overwintering:** N **Migration:** N

### Habitat Assessment Summary & Potential Habitat Compensation Notes

Cascades near E4-01's confluence with the Mary River prevent fish from accessing the stream.

Electrofishing was conducted in the Mary River near the confluence with E4-01, and 5-10 large, juvenile ARCH were captured.

Conductivity in E4-01 is marginally higher than other streams on the exploration property, and could provide moderate fish habitat if it were accessible. The reach of the Mary River that directly receives water from E4-01 is excellent fish habitat.

## Fish Habitat Quality

**No Fish Habitat**

555,000
557,000
559,000
7,921,000
7,919,000
7,917,000
7,915,000
IO-04
Tom River Falls
IO-01a
Tom River
CLT-2 Falls
CLT-1 Falls
IO-01
Camp Lake
Mary Lake
0.5 0.25 0 0.5 1 km
SCALE

**LEGEND:**

**STATUS OF ARCTIC CHAR**
- PRESENT
- PROBABLE
- NOT PRESENT
- UNKNOWN

- FISH BARRIER
- FALLS
- REACH BOUNDARIES
- MILNE INLET TOTE ROAD (EXISTING)
- INFRASTRUCTURE (PROPOSED FOR CONSTRUCTION AND OPERATIONS PERIOD)

**NOTES:**

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. MINE SITE INFRASTRUCTURE PROVIDED BY AMEC DRAWING NO.: MINE SITE - CONSTRUCTION PHASE - 01 -MAR 09 2009.dwg
4. CONTOUR INTERVAL IS 50 M AND IS IN METRES.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHK'D | APP'D |
|---|---|---|---|---|---|---|
| - | DDMMM'10 | ISSUED FOR | - | - | - | - |
| 1 | 01/09/2010 | | | | | |

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

# PRESENCE AND ABSENCE OF ARCTIC CHAR IN TOM RIVER AND ITS TRIBUTARIES

North/South Consultants Inc.
Aquatic Environment Specialists

P/A NO.: -
REF NO.: -
DATE: 27/09/2010
REV: 1

Path: \\terastation\GIS\Projects\Other\Mary River Freshwater\2010\Gemtd_DataReport_Maps\20100830_Overview_Steensby2Milne_cp.mxd

# Mine Site Aquatic Habitat Assessment

## Location

**Watercourse Name:** Tom River
**Site:** I0-01
**UTM:** 17W 555324 7914317
**Dates Surveyed:** 28-Jun-07, 1-Aug-07, 5-Sep-07

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 92.31 | 92.31 | 92.31 |
| **Wetted Width (m):** | 92.31 | 54.40 | 64.89 |
| **Riffle-Crest Depth (m):** | 0.27 | 0.05 | 0.10 |
| **Flat/Run Depth (m):** | > 1.00 | 0.53 | 0.60 |
| **D (m):** | 0.02 | 0.01 | < 0.01 |
| **$D_{95}$ (m):** | 0.11 | 0.11 | 0.11 |
| **Point Velocities (m/s)** | | | |
| **Riffle:** | 0.21 | 0.61 | 0.46 |
| **Pool:** | NA | NA | NA |
| **Flat/Run:** | 0.90 | 0.06 | 0.01 |

### Stream/Riparian Habitat

**Channel Morphology:** 90% run (spr), 10% riffle (spr), 85% riffle (sum, fall), 15% run (sum, fall)

**Substrate Composition:** 80% sand, 15% gravel, 5% cobble

**Stream Cover:** 50% undercut banks

**Aquatic Vegetation:** Periphyton, submerged RV

**Riparian Vegetation:** Grasses, willow, wildflowers

**Barriers Present (Y/N):** N
**Location:** NA

**Lakes Present (Y/N):** Y
**Location:** DS – Mary L.

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | NM | 1.15/1.15 | 1.10/1.10 |
| **Bank Stability:** | Low | Low | Low |
| **Erosion Potential:** | High | High | High |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 42.4 | 124.0 | 205.0 |
| **TDS (g/l):** | 0.03 | 0.08 | 0.13 |
| **DO (mg/l)** | 13.54 | 10.74 | 13.04 |
| **%DO:** | 109.7 | 98.4 | 105.3 |
| **Water Temp (˚C):** | 6.0 | 11.4 | 4.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - L | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - H<br>NNST - N | ARCH - H<br>NNST - N |

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Aquatic Environment Specialists

# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from the habitat assessment site in Reach I0-01 in Tom River during spring (a), summer (b), and fall (c).


Figure 2.View downstream from the habitat assessment site in Reach I0-01 in Tom River during spring (a), summer (b), and fall (c).

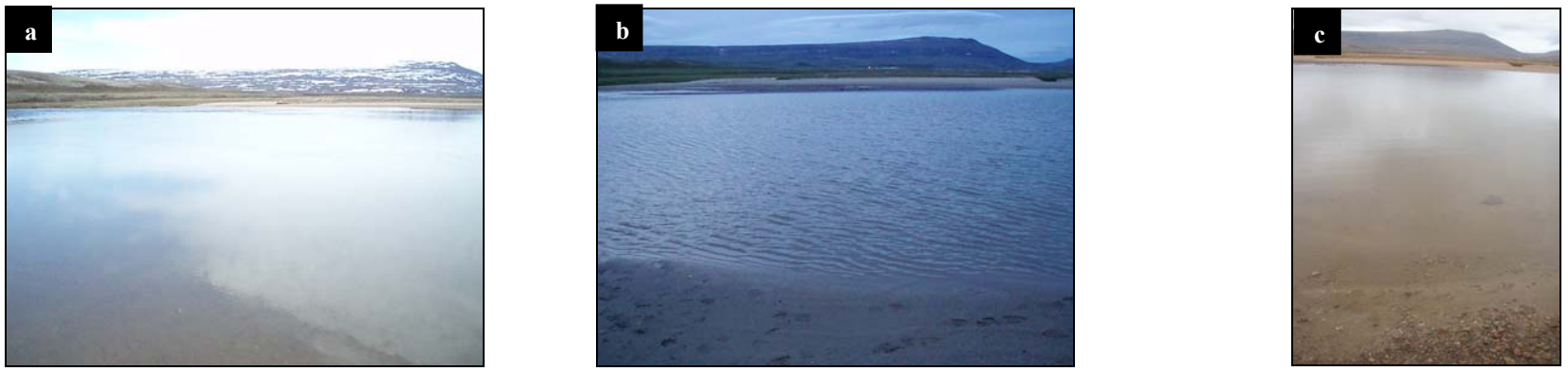


Figure 3.View across the habitat assessment site in Reach I0-01 in Tom River during spring (a), summer (b), and fall (c).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Tom River | **UTM:** | 17W 555721 7915025 |
| **Site:** | I0-01a | **Dates Surveyed:** | 18-Jun-08, 28-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial - Confined

**Channel Gradient:** 1˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 118.87 | 118.87 |
| **Wetted Width (m):** | 70.41 | 70.00 |
| **Riffle-Crest Depth (m):** | 0.22 | 0.07 |
| **Pool Depth (m):** | 0.17 | 0.05 |
| **D (m):** | 0.05-0.10 | 0.05-0.10 |
| **$D_{95}$ (m):** | 1.45C | 1.45C |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 0.45 | 0.52 |
| **Pool:** | 0.01 | 0.00 |
| **Behind a rock:** | NM | 0.02 |

### Stream/Riparian Habitat

| | |
|---|---|
| **Channel Morphology:** | 80% riffle, 20% pool |
| **Substrate Composition:** | 70% cobble, 15% gravel, 14% sand, 1% boulder |
| **Stream Cover:** | 15% lg cobble, 1% boulder |
| **Aquatic Vegetation:** | Periphyton |
| **Riparian Vegetation:** | Grass, moss, willow, wildflower |
| **Barriers Present (Y/N):** | Y |
| **Location:** | Falls US |
| **Lakes Present (Y/N):** | Y |
| **Location:** | DS – Mary L. |

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | Undef. | Undef. |
| **Bank Stability:** | Mod-High | Mod-High |
| **Erosion Potential:** | Low-Mod | Low-Mod |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 50.00 | 14.80 |
| **TDS (g/l):** | 0.04 | 0.10 |
| **DO (mg/l)** | 14.90 | 11.06 |
| **%DO:** | 103.90 | NM |
| **Water Temp (˚C):** | 0.70 | 10.00 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - N | ARCH - H<br>NNST - L |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - M<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from the habitat assessment in Reach I0-01a in Tom River during spring (a) and summer (b) 2008.


Figure 2.View downstream from the habitat assessment in Reach I0-01a in Tom River during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment in Reach I0-01a in Tom River during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Tom River | **UTM:** | 17W 557157 7919013 |
| **Site:** | I0-04 | **Dates Surveyed:** | 28-Jun-07, 31-Jul-07, 5-Sep-07 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bankfull Width (m):** | 72.21 | 72.21 | 72.21 |
| **Wetted Width (m):** | 72.21 | 28.21 | 28.33 |
| **Rapid/Riffle-Crest Depth (m):** | 0.28 | 0.25 | 0.54 |
| **Pool Depth (m):** | NA | 0.31 | 0.30 |
| **D (m):** | 0.03 | 0.02 | 0.02 |
| **$D_{95}$ (m):** | 0.76 | 0.76 | 0.76 |
| **Point Velocities (m/s)** | | | |
| **Rapid/Riffle:** | 0.99 | 0.98 | 0.97 |
| **Pool:** | NA | 0.19 | 0.04 |
| **Flat/Run:** | NA | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% rapids (spr)<br>90% riffle (sum, fall),<br>10% pool (sum, fall)

**Substrate Composition:** 45% cobble,<br>45% boulder,<br>5% sand,<br>5% gravel

**Stream Cover:** 45% boulder

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** Y<br>**Location:** DS – Tom Falls

**Lakes Present (Y/N):** Y<br>**Location:** DS – Mary

### L/R Bank Characteristics

| | Spr | Sum | Fall |
|---|---|---|---|
| **Bank Height (L/R; m):** | 0.15/0.15 | 0.65/0.65 | NM |
| **Bank Stability:** | Mod | Mod | Mod |
| **Erosion Potential:** | Mod | Mod | Mod |

### Water Quality

| | Spr | Sum | Fall |
|---|---|---|---|
| **Specific Conductance (µS/cm):** | 33.9 | 123.0 | 212.0 |
| **TDS (g/l):** | 0.02 | 0.08 | 0.14 |
| **DO (mg/l)** | 13.72 | 10.47 | 13.78 |
| **%DO:** | 104.6 | 96.3 | 99.4 |
| **Water Temp (˚C):** | 3.5 | 11.6 | 3.0 |

### Fish Habitat

| | Spr | Sum | Fall |
|---|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Migration:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |

# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from the habitat assessment in Reach I0-04 in Tom River during spring (a) and summer (b) and aerial view during fall (c).


Figure 2.View upstream from the habitat assessment in Reach I0-04 in Tom River during spring (a) and summer (b) and aerial view during fall (c).

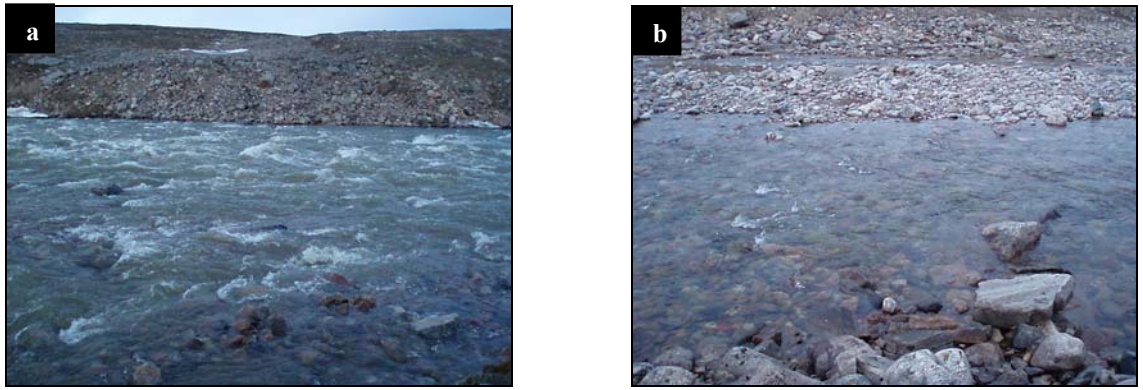


Figure 3.View across the habitat assessment in Reach I0-04 in Tom River during spring (a) and summer (b).

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Candidate Reference Stream #2 | **UTM:** | 17W 597385 7913174 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 19-Jun-08, 29-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Unconfined

**Channel Gradient:** 2˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 100.58 | 107.00 |
| **Wetted Width (m):** | 50.29 | 89.00 |
| **Riffle-Crest Depth (m):** | 0.22 | 0.20 |
| **Pool Depth (m):** | 0.24 | 0.15 |
| **D (m):** | 0.01-0.03 | 0.01-0.03 |
| **$D_{95}$ (m):** | 2.85 | 2.85 |
| **Point Velocities (m/s)** | | |
| **Riffle:** | 1.18 | 0.42 |
| **Pool:** | 0.35 | 0.00 |
| **Behind a rock:** | NM | 0.08 |

### Stream/Riparian Habitat

**Channel Morphology:** 40% rapids, 45% run, 15% pool (spring); 70% run, 30% pool (summer)

**Substrate Composition:** 60% cobble, 20% boulder, 20% sand

**Stream Cover:** 40% lg cobble, 30% boulder

**Aquatic Vegetation:** Periphyton

**Riparian Vegetation:** Grasses and moss

**Barriers Present (Y/N):** Unknown
**Location:** NA

**Lakes Present (Y/N):** DS
**Location:** ~ 38.2 km

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | Undef | Undef |
| **Bank Stability:** | NM | NM |
| **Erosion Potential:** | NM | NM |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 18.00 | 4.60 |
| **TDS (g/l):** | 0.01 | 0.03 |
| **DO (mg/l)** | 13.90 | 11.07 |
| **%DO:** | 98.70 | NM |
| **Water Temp (˚C):** | 1.40 | 9.10 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - M<br>NNST - N | ARCH - H<br>NNST - N |
| **Migration:** | ARCH - L<br>NNST - N | ARCH - L<br>NNST - N |

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Figure 1.View upstream from habitat assessment in reach 1 of Candidate Reference Stream #2 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Candidate Reference Stream #2 during spring (a) and summer (b) 2008.


Figure 3.View across the habitat assessment site in reach 1 of Candidate Reference Stream #2 during spring (a) and summer (b) 2008.

# Mine Site Aquatic Habitat Assessment

## Location

| | | | |
|---|---|---|---|
| **Watercourse Name:** | Candidate Reference Stream #3 | **UTM:** | 17W 528685 7915446 |
| **Site:** | Reach 1 | **Dates Surveyed:** | 20-Jun-08, 29-Jul-08 |

## Site Description/Physical Characteristics

**Confinement:** Partial

**Channel Gradient:** < 0.05˚

### Hydrology

| | Spr | Sum |
|---|---|---|
| **Bankfull Width (m):** | 164.59 | 149.00 |
| **Wetted Width (m):** | 160.93 | 140.00 |
| **Run Depth (m):** | 0.72 | 0.85 |
| **Pool Depth (m):** | NA | 0.05 |
| **D (m):** | < 0.01 | < 0.01 |
| **$D_{95}$ (m):** | < 0.01 | < 0.01 |
| **Point Velocities (m/s)** | | |
| **Run:** | 0.44 | 0.69 |
| **Pool:** | NA | 0.00 |
| **Behind a rock:** | NA | NA |

### Stream/Riparian Habitat

**Channel Morphology:** 100% run

**Substrate Composition:** 100% sand

**Stream Cover:** None

**Aquatic Vegetation:** None

**Riparian Vegetation:** Grass, moss, wildflower, willow

**Barriers Present (Y/N):** Unknown
**Location:** NA

**Lakes Present (Y/N):** DS
**Location:** ~13.3 km

### L/R Bank Characteristics

| | Spr | Sum |
|---|---|---|
| **Bank Height (L/R; m):** | 0.75/none | Undef |
| **Bank Stability:** | Mod-High | Mod-High |
| **Erosion Potential:** | Low-High | Low-High |

### Water Quality

| | Spr | Sum |
|---|---|---|
| **Specific Conductance (µS/cm):** | 115.00 | 19.80 |
| **TDS (g/l):** | 0.08 | 0.13 |
| **DO (mg/l)** | 13.50 | 11.54 |
| **%DO:** | 101.80 | NM |
| **Water Temp (˚C):** | 3.50 | 8.30 |

### Fish Habitat

| | Spr | Sum |
|---|---|---|
| **Spawning:** | ARCH - N<br>NNST - N | ARCH - N<br>NNST - N |
| **Feeding:** | ARCH - N<br>NNST - N | ARCH - L<br>NNST - N |
| **Migration:** | ARCH - M<br>NNST - N | ARCH - M<br>NNST - N |

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# Mine Site Aquatic Habitat Assessment


Figure 1.View upstream from habitat assessment in reach 1 of Candidate Reference Stream #3 during spring (a) and summer (b) 2008.


Figure 2.View downstream from habitat assessment in reach 1 of Candidate Reference Stream #3 during spring (a) and summer (b) 2008.

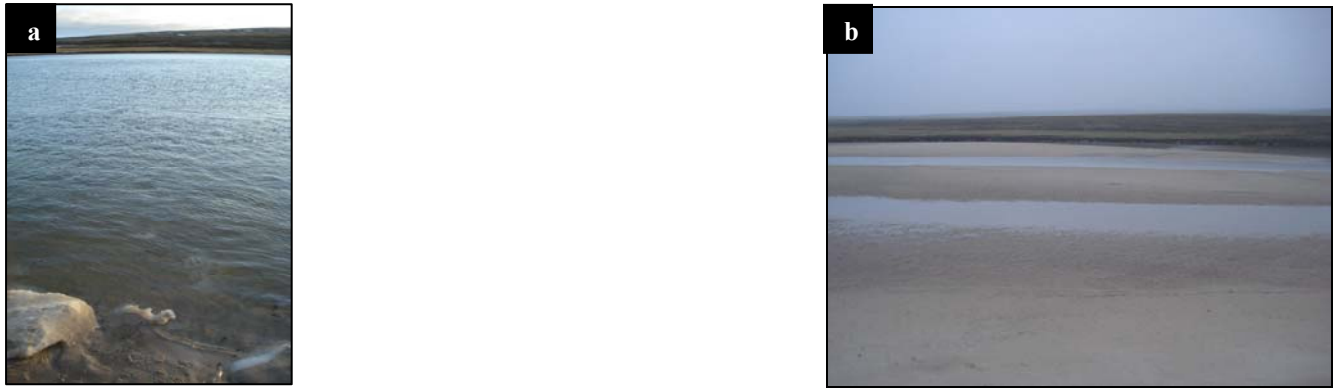


Figure 3.View across the habitat assessment site in reach 1 of Candidate Reference Stream #3 during spring (a) and summer (b) 2008.