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FINAL REPORT

2008 Fisheries Resource Study
Woodens River Watershed
Nova Scotia

NOVA SCOTIA TRANSPORTATION
AND INFRASTRUCTURE RENEWAL

PROJECT NO. 9299.10

Project No. 9299.10

DRAFT REPORT TO

Nova Scotia Transportation and Infrastructure Renewal
1672 Granville Street
Johnson Building, 3rd Floor
Halifax, NS B3J 3Z8

ON

2008 Fisheries Resource Study, Woodens River Watershed, Nova Scotia

October 22, 2008

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EXECUTIVE SUMMARY

At the request of Nova Scotia Transportation and Infrastructure Renewal (TIR), Jacques Whitford undertook a fisheries resource study of Ben Miller, Long, Gates, Millyard and Albert Bridge lakes in the Woodens River watershed, Nova Scotia. Five Island Lake, which was historically impacted by polychlorinated biphenyls (PCBs) from the former Associated Metals and Electronics Salvage Yard in the community of Five Island Lake, drains into these lakes in the following sequence: Long Lake, Gates Lake, Millyard Lake, Albert Bridge Lake. Ben Miller Lake is largely isolated from this drainage sequence, except during times of high run-off or water levels, when seasonal tributaries may connect it to Long Lake.

The objectives of this study were to:

- Assess potential impacts from upstream PCB sources to:
  - Game fish (i.e., brook trout, white perch, white sucker and yellow perch, greater than 0.12 kilograms and likely to be consumed by humans)
  - Small bodied fish (i.e., killifish, yellow perch, shiners, etc.) that may be preyed upon by natural predators
- Collect fisheries resource data (e.g., fish abundance, length, weight, sex, age, etc.) for use by Nova Scotia natural resource and fisheries departments.

Based on the data collected during the study, the following was concluded:

- Water quality in the five lakes sampled was generally consistent with freshwater Nova Scotia lakes, and supportive of freshwater fish habitat.
- The abundance and distribution of fish caught during the study was generally consistent with the lake size and water quality. Banded killifish, brook trout, gaspereau, golden shiner, white perch, white sucker and yellow perch were caught during the study.
  - Brook Trout were only caught in the three most upstream lakes (Ben Miller, Long and Gates lakes);
  - Golden Shiner were only caught in the two most upstream lakes (Ben Miller and Long lakes);
  - White Perch were only caught in Ben Miller Lake; and,
  - Gaspereau were only caught in the three most downstream lakes (Gates, Millyard and Albert Bridge lakes).
- Analytical results can be summarized as followed:
  - PCBs were reported in detectable concentrations in some game fish from all lakes in the study, but at concentrations below Ontario Ministry of the Environment's *Guide to Eating Ontario Sportfish* Consumption Restriction guideline (2007 – 2008 edition). Some game fish samples from Ben Miller and Albert Bridge lakes, did not contain detectable concentrations of PCBs.
  - PCBs were reported in detectable concentrations, but at concentrations below United States Environmental Protection Agency's *Dietary Exposure of Mink to Fish from the Housatonic River: Effects on Reproduction and Survival* guidelines (2003), for small whole-bodied composite fish samples from Long, Gates, Millyard and Albert Bridge lakes. The small whole-bodied composite fish sample from Ben Miller Lake did not contain detectable concentrations of PCBs.

Based on the data collected during the 2008 Woodens River Watershed Fisheries Resource Study, fish consumption advisories are not required on Ben Miller, Long, Gates, Millyard and Albert Bridge Lakes, to protect anglers from PCBs in fish tissue. Additionally, PCB consumption through fish from these lakes is not considered a risk to wildlife receptors. However, the pH of several lakes in the study area was sufficiently low to be an appreciable stressor for fish, particularly trout. We recommend DNR assemble and review any historic data respecting pH and general water chemistry for the watershed. If data is not available, a sampling program should be developed and implemented to evaluate pH trends along with other key indicator parameters (temperature, dissolved oxygen, and general water chemistry). This data should be compiled and forwarded to DNR to assist them in developing a fish stock management strategy for this lake system.

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1.0 INTRODUCTION

1.1 General

At the request of Nova Scotia Transportation and Infrastructure Renewal (TIR), Jacques Whitford undertook a fisheries resource study of Ben Miller, Long, Gates, Millyard and Albert Bridge lakes in the Woodens River watershed, Nova Scotia. The study was conducted from June 3 to 8, 2008.

Five Island Lake, which was historically impacted by polychlorinated biphenyls (PCBs) from the former Associated Metals and Electronics Salvage Yard in the community of Five Island Lake, drains into the lakes sampled in the following sequence: Long Lake, Gates Lake, Millyard Lake, Albert Bridge Lake. At the time of the study, no surface water inflow or outflow was observed in Ben Miller Lake. Local residents informed Jacques Whitford that this is generally the drainage condition of Ben Miller Lake, except during times of extremely high water when Ben Miller Lake drains into Long Lake via surface water run-off. It is anticipated that groundwater recharges Ben Miller Lake.

The objectives of this study were to:

1. Assess potential impacts from upstream PCB sources to:
   - Game fish (i.e., brook trout - *Salvelinus fontinalis*, white perch - *Morone americana*, white sucker - *Catostomus commersonii*, and yellow perch - *Perca flavenscens*, greater than 0.12 kilograms – kg – and likely to be consumed by humans); and
   - Small bodied fish (i.e., killifish, yellow perch, shiners, etc.) that may be preyed upon by natural predators.
2. Collect fisheries resource data (e.g., fish abundance, length, weight, sex, age, etc.) for use by Nova Scotia Fisheries and Aquaculture and Nova Scotia Department of Natural Resources (DNR).

1.2 Background

An electronics and salvage yard was formerly located close to North Bay of Five Island Lake, in the community of Five Island Lake. Part of the salvage operations at this site involved handling transformers and other PCB containing equipment. In 1988 Nova Scotia Environment (NSE) discovered an extensive distribution of PCBs. In 1994, an assessment of the site determined that PCB impacted soils had historically eroded from the electronics and salvage yard into North Bay of Five Island Lake.

By 2003, the source of PCBs at the former salvage yard was contained. Additionally, approximately 75% of the estimated PCB mass loading in Five Island and Hubley Big lakes was removed via an environmental dredging and remediation program of North Bay of Five Island Lake. Residual PCBs remained in sediment in Five Island Lake and Hubley Big Lake after the remediation program.

Five Island and Hubley Big lakes have been monitored for PCBs for several years, as a follow-up to remediation. Following remediation activities, PCB concentrations in fish tissue dropped significantly. However, PCBs have remained at elevated concentrations in fish tissue in these lakes (Jacques

Whitford, 2008). To assess PCBs in fish downstream lakes, Jacques Whitford was retained to undertake a fisheries resource study as described below.

2.0 SCOPE OF WORK

Fish sampling was proposed for six lakes in the Woodens River watershed: Ben Miller Lake, Long Lake, Croucher Lake, Gates Lake, Millyard Lake and Albert Bridge Lake. Lake locations are shown on Figure 1, Appendix A. However, the absence of roads and navigable waterways into Croucher Lake restricted access to this lake, and sampling could only be conducted on the remaining five lakes. Photographs of access to Croucher Lake are included in Appendix B.

A project-specific health and safety plan was prepared for the work. A copy of the plan was submitted to TIR before field work began.

Game fish and small-bodied fish were sampled from each lake, as follows:

- Gill net sampling was generally conducted following the methodology of Ontario Ministry of Natural Resource's (OMNR) "Spring Littoral Index Netting (SLIN) Manual of Instructions" (1999). Larger fish, suitable for consumption by humans, were collected using the gill nets. However, small bodied fish, not suitable for consumption by humans, were also occasionally caught in the gill nets, and were included in the small bodied whole fish composite samples when appropriate.
- Small fish sampling using minnow traps installed at appropriate inlets to each lake and generally following OMNR's SLIN methodology.
- Gill nets and minnow traps were only set in suitable locations for collecting fish. Locations with silty organic substrate, or with dense vegetation, were generally avoided.

The following lake water quality measurements were collected from each lake sampled: pH, specific conductivity, temperature, dissolved oxygen, salinity and total dissolved solids (TDS). These parameters were generally measured at the lake surface, 2 m below the lake surface and 4 m below lake surface.

Select game fish tissue samples (fillets including bone and skin), and small bodied fish whole composite samples (including all fish parts), were submitted to an analytical laboratory for analysis of PCBs.

Table 2-1 summarizes the number and type of sampling locations, as well as the number of fish submitted for PCB analysis, per lake. Gill net and minnow trap sampling locations are shown on Figures 2 – 4, Appendix A.

TABLE 2-1 Summary of 2008 Fisheries Resource Sampling

Lake	Gill Net	Minnow Trap	Samples Submitted for PCB Analysis	
			Game Fish Tissue	Small-bodied Whole Fish Composite
Long Lake	16	6	10	1
Ben Miller Lake	2	1	6	1
Gates Lake	4	2	2	1
Millyard Lake	3	3	0[1.]	1
Albert Bridge Lake	6	3	2	1

Note:
1. No game fish tissue samples were submitted for PCB analysis from Millyard Lake, as no fish of size likely to be consumed by humans were caught in this lake.

All fish species caught were identified, and were generally measured and weighed.

Brook trout, as well as large white perch, white sucker and yellow perch likely to be consumed by humans, were submitted as game fish tissue samples for PCB analysis. A variety of minnows and small fish were submitted as small-bodied whole fish composite tissue samples for PCB analysis.

The sex of fish that were mortalities at the time of capture, and game fish that were collected for sampling, were recorded.

Scale samples from caught trout were collected and submitted to Nova Scotia Fisheries and Aquaculture, along with other fisheries resource data.

3.0 REGULATORY FRAMEWORK

3.1 Human Consumption of Fish

Game fish sample PCB analytical results were compared to the Ontario Ministry of Environment's (OMOE) *Guide to Eating Ontario Sportfish* (2007 – 2008 Edition) (Guide). The Guide offers two guidelines for consumption of sport fish containing PCBs in a boneless, skinless, dorsal fillet, as follows:

- The *Consumption Restriction Guideline* (0.153 mg/kg fresh weight) is the highest allowable concentration of total PCBs before consumption restrictions for humans are advised.
- The *Total Restriction Guideline* (1.22 mg/kg fresh weight) is the concentration of total PCBs at which complete restriction from fish consumption by humans is advised.

For this study, the more conservative *Consumption Restriction Guideline* was applied to screen game fish samples for possible consumption restrictions.

3.2 Wildlife Consumption of Fish

Small-bodied whole fish and game fish sample PCB analytical results were compared to a value of 0.96 mg/kg fresh weight. This value was derived by the United States Environmental Protection Agency (USEPA) and is based on mink consuming a diet of PCB impacted Fish in the Housatonic River in western Massachuetts and Conneticuett. Fish make up an appreciable portion of mink diet and mink are one of the most sensitive aquatic species to PCB toxicity.

At concentrations of PCBs in fish less than 0.96 mg/kg, no detrimental effects on liver enzyme activity were detected in female and kit mink. A reduction in liver enzyme activity is considered a "minor" effect, but is conservative for estimating the potential effects of PCBs on mink. Higher PCB concentrations in diet are detrimental to reproductive success in mink. This work is published in USEPA's *Dietary Exposure of Mink to Fish from the Housatonic River: Effects on Reproduction and Survival* (June 10, 2003) (USEPA Mink Guideline).

Female mink are considered by the Canadian Council of Ministers of Environment (CCME) to have the highest food intake:body weight ratio of wildlife in Canadian aquatic ecosystems, which makes it one of the most sensitive receptors to bioaccumlated PCBs in the aquatic food chain.

Guidelines in CCME's *Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota* (1999, updated 2001) (CCME TRGs) are also available for comparison. These guidelines are intended to be protective of wildlife in aquatic ecosystems that could be impacted by highly persistent, bioaccumulative compounds, such as PCBs. The CCME TRG for PCBs in mammals is 0.79 ng toxic equivalency quotient (TEQ) per kg of diet, as developed by the World Health Organization.

CCME TRGs are based on data that is as inclusive as possible for all species and regions in Canada, and do not necessarily reflect local aquatic ecosystem wildlife conditions. As mink is considered to be the most sensitive aquatic ecosystem wildlife receptor in the Woodens River Watershed, the use of the USEPA Mink Guideline is more applicable to this study than CCME TRGs, which are considered to be overly conservative.

3.3 Lake Water Quality

CCME's *Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life* (FWAL) (1999, updated 2006) are intended to provide protection of freshwater life from anthropogenic stressors such as chemical inputs or changes to physical components (e.g., pH, temperature and debris). Guideline values are meant to protect all forms of aquatic life and all aspects of the aquatic life cycles, including the most sensitive life stage of the most sensitive species over the long term. Of the water quality parameters collected as part of this fisheries resource study, CCME FWAL guidelines exist for pH (range of 6.5 to 9) and dissolved oxygen (minimum concentration of 5.5 mg/L).

4.0 RESULTS

4.1 Sample Collection

Banded killifish (*Fundulus diaphanus*), brook trout, Gaspereau (*Alosa pseudoharengus*), golden shiner (*Notemigonus crysoleucas*), white perch, white sucker and yellow perch, were caught during the study. Fisheries resource data is provided in Table C-1, Appendix C, and is summarized in Table 4-1.

TABLE 4-1 Number and Type of Fish Species Caught per Lake

Lake	Fish Species	Number of Individuals Caught
Ben Miller Lake	Banded Killifish (*Fundulus diaphanus*)	2
	Brook Trout (*Salvelinus fontinalis*)	1
	Golden Shiner (*Notemigonus crysoleucas*)	4
	White Perch (*Morone americana*)	5
Long Lake	Banded Killifish (*Fundulus diaphanus*)	23
	Brook Trout (*Salvelinus fontinalis*)	8
	Golden Shiner (*Notemigonus crysoleucas*)	7
	White Sucker (*Catostomus commersonii*)	1
	Yellow Perch (*Perca flavescens*)	17
Gates Lake	Brook Trout (*Salvelinus fontinalis*)	2
	Gaspereau (*Alosa pseudoharengus*)	19
	White Sucker (*Catostomus commersonii*)	30
	Yellow Perch (*Perca flavescens*)	29
Millyard Lake	Banded Killifish (*Fundulus diaphanus*)	10
	Gaspereau (*Alosa pseudoharengus*)	4
	White Sucker (*Catostomus commersonii*)	2
	Yellow Perch (*Perca flavescens*)	12
Albert Bridge Lake	Gaspereau (*Alosa pseudoharengus*)	33
	White Sucker (*Catostomus commersonii*)	8
	Yellow Perch (*Perca flavescens*)	12

Of the five lakes sampled in this program:

- Brook trout were only caught in the three most up-stream lakes (Ben Miller Lake, Long Lake and Gates Lake);
- Golden shiner were only caught in the two most up-stream lakes (Ben Miller Lake and Long Lake);
- White perch were only caught in Ben Miller Lake; and,
- Gaspereau were only caught in the three most down-stream lakes (Gates Lake, Millyard Lake and Albert Bridge Lake).

4.2 Analytical Results

Game Fish

No game fish tissue samples contained concentrations of PCBs greater than OMOE's *Guide to Eating Ontario Sportfish*, Consumption Restriction guideline of 0.153 mg/kg fresh weight. PCBs in measurable concentrations (> 0.01 mg/kg) were reported in 17 of the 25 game fish tissue samples submitted for analysis; PCBs were not detected in 8 of the 25 game fish tissue samples submitted for analysis.

A summary of the game fish tissue sample analytical results are included in Table D-1, Appendix D. Laboratory certificates of analysis are also included in Appendix D.

Note: OMOE guidelines are based upon a boneless, skinless fish fillet, as the skin and bones of fish accumulate PCBs. To be conservative, fish skin and bones were included in the game fish (fillet) samples analyzed, as these parts of the fish are sometimes consumed by humans and wildlife receptors.

Small Whole-Body Fish

No small body whole fish composite tissue samples contained concentrations of PCBs greater than the USEPA Mink Guideline of 0.96 mg/kg fresh weight. PCBs in measurable concentrations (>0.01 mg/kg)

were reported in 4 of the 5 small body whole fish composite samples submitted for analysis; PCBs were not detected in 1 of the 5 small body whole fish composite samples submitted for analysis.

A summary of the small body whole fish composite sample analytical results are included in Table D-2, Appendix D.

4.3 Lake Water Quality

Lake water quality measurements were collected from each lake that fish were sampled from, using a YSI multi-meter. Lake water quality measurements were at taken in the locations shown on Figures 2 – 4, Appendix A, are provided in Table E-1, Appendix E, and summarized in Table 4-2, below.

TABLE 4-2 Summary of Lake Water Quality Measurements

Lake	pH	Specific Conductivity (µS/cm)	Temperature (˚C)	Dissolved Oxygen	
				(%)	(mg/L)
Ben Miller Lake	5.63	39	17.85	115.3	10.99
Long Lake	4.9	113	17.31	107.2	10.24
Gates Lake	4.72	93	15.90	111.7	11.05
Millyard Lake	4.76	92	16.58	106.8	10.43
Albert Bridge Lake	4.8	90	17.20	105.8	10.19

Notes:
1. µS/cm = microSiemens per centimetre
2. mg/L = milligrams per litre
3. ppt = parts per trillion
4. Values are the mean of water quality measurements taken at each of 0, 2 and 4 m below the surface of each lake

Generally, Long Lake, Gates Lake, Millyard Lake and Albert Bridge Lake had comparable water quality.

Dissolved oxygen concentrations in Ben Miller Lake were comparable with the other lakes. However, the pH and conductivity in Ben Miller Lake was different from the other lakes. The mean pH in Ben Miller Lake was 5.63 compared to a mean range of 4.72 to 4.9 in the other lakes. The mean conductivity in Ben Miller Lake was 39 µS/cm compared to a mean range of 90 to 113 µS/cm in the other lakes.

In comparison to CCME FWAL guidelines, lake water quality was as follows:

- The water quality results for pH in all lakes indicate that the water is more acidic than CCME FWAL guidelines recommend. pH results ranged from 4.59 to 5.81 (Table E-1), while the CCME FWAL guideline recommends a minimum pH of 6.5.
- The dissolved oxygen levels observed (10.49 – 11.75 mg/L, Table E-1) were above the recommended CCME FWAL guideline of a minimum dissolved oxygen level of 5.5 mg/L.

5.0 DISCUSSION

5.1 Sample Collection

Generally, the number and types of fish species caught during the program are common to Nova Scotia lakes with comparable characteristics to those of the lakes sampled in this fisheries resource study (confirmed by John MacMillan of Nova Scotia Fisheries and Aquaculture - personal communication, 28 July, 2008).

The absence of brook trout from downstream lakes may be a result of brook trout moving to deeper, cooler water than was sampled. Generally, brook trout move into deeper, cooler water later into the summer than the sampling was conducted, but this movement can be temporally variable.

Gaspereau migrate from the ocean to inland waters in the spring to spawn. The absence of Gaspereau from the upstream lakes sampled during this study may be a result of limited upstream fish passage or a factor of Gaspereau finding suitable spawning habitat in closer proximity to the ocean (further downstream) resulting in no need for fish to migrate further upstream. The absence of Gaspereau from fish caught in upstream lakes during the study is not a concern.

Golden Shiner prefer relatively clear water which may explain why they were only caught in Long Lake and Ben Miller Lake, which, based on field observations, had higher water clarity than the other lakes sampled during the study. Both Golden Shiner and White Perch are generally less abundant in Nova Scotia Lakes than the other fish caught during the study, and their apparent absence from in some of the lakes sampled during the study is not a concern.

5.2 Analytical Results

Game Fish

PCBs at concentrations below OMOE's *Guide to Eating Ontario Sportfish*, Consumption Restriction guideline, were detected in fish collected from all lakes sampled. Note that no game fish samples were collected from Millyard Lake.

One of seven game fish samples from Ben Miller Lake contained detectable concentrations (>0.01 mg/kg) of PCBs. Long Lake, adjacent to Ben Miller Lake, contained detectable concentrations of PCBs in all game fish samples submitted for analysis. The lower concentration of PCBs in game fish from Ben Miller Lake may be a result of Ben Miller Lake having minimal surface water contact, and passage ways for fish to travel through, with the Woodens River watershed (and upstream PCB sources from Five Island and Hubley Big lakes). This reduces the amount of fish able to migrate into and out of Ben Miller Lake to the Woodens River watershed, which in turn reduces the amount of PCBs taken up by Ben Miller Lake fish feeding on Woodens River watershed PCB impacted aquatic life. Additionally, given that Ben Miller Lake is upstream of PCB impacted lakes in the Woodens River watershed, PCB impacted sediment from upstream sources would not impact the lake.

Long Lake is directly downstream of Hubley Big Lake, which has had elevated concentrations of PCBs in fish in historical and recent monitoring events (Jacques Whitford, 2008). Fish sampled from Long Lake may be exposed to PCBs by migrating and feeding in Hubley Big Lake, and/or feeding on PCB

impacted fish and aquatic life that has migrated from Hubley Big Lake into Long Lake. Additionally, PCB impacted sediments from upstream sources may also have migrated into Long Lake.

Both of the game fish samples from Gates Lake contained detectable concentrations of PCBs. Gates Lake is 2 lakes downstream of Hubley Big Lake. Fish in Gates Lake are likely exposed to PCBs by the same pathways as fish in Long Lake (ingestion of PCB impacted fish from upstream sources and possibly PCB impacted sediments).

Two of five game fish samples analyzed for PCBs from Albert Bridge Lake did not contain detectable concentrations of PCBs. The absence of detectable PCB concentrations in game fish from Albert Bridge Lake may be a result of Albert Bridge Lake being a considerable distance downstream from concentrated upstream PCB impacts. This distance likely results in fewer PCB impacted fish migrating to Albert Bridge Lake from upstream PCB sources, and lower uptake of PCBs by fish in Albert Bridge Lake. Additionally, based on the distance from upstream sources, migration of PCB impacted sediment into Albert Bridge Lake is unlikely.

Based on sampling methodology and results, as well as the reported PCB concentrations in game fish, human and wildlife consumption of PCBs via fish from Long, Ben Miller, Gates and Albert Bridge lakes, is not a concern at this time.

Small Whole-Body Fish

Non-detectable concentrations of PCBs in small bodied whole fish samples were only reported in Ben Miller Lake. This may be a result of the minimal surface water interaction between Ben Miller Lake and other lakes in the Woodens River watershed, as described above.

Based on sampling methodology and results, as well as the reported PCB concentrations in small whole-bodied fish, wildlife consumption of PCBs via fish from Long, Ben Miller, Gates, Millyard and Albert Bridge lakes, is not a concern at this time.

5.3 Lake Water Quality

Generally, the water quality in all lakes sampled was comparable. However, the pH and conductivity in Ben Miller Lake was different than the pH in the other lakes: the pH of Ben Miller Lake was greater than the other lakes and the conductivity of Ben Miller Lake was lower than the other lakes.

At the time of the study, there was no surface water outflow from Ben Miller Lake, and no appreciable surface water inflow. Ben Miller Lake may be substantially recharged by groundwater does not receive surface water inputs from other lakes in the Woodens River watershed. This recharge condition – primarily local groundwater recharge with no surface water input/mixing of surface water from other sources – is likely the reason that Ben Miller Lake's water quality is different from the other lakes in the Woodens River watershed.

The pH levels observed in all lakes sampled is not unusual for Nova Scotia waters, which can be naturally acidic. The presence of fish in all lakes sampled provides evidence that the pH levels observed are not prohibitive for fish populations. However, such low pH in these lakes is an appreciable stressor for fish. Brook trout are especially sensitive to low pH (<5), and low pH is likely a contributing factor to low brook trout catches. A pH of 5.63 in Ben Miller Lake was marginally acceptable for brook trout habitat.

Dissolved oxygen concentrations in all lakes sampled was well above the CCME FWAL minimum recommended concentration of 5.5 mg/L and is supportive of fish habitat.

6.0 CONCLUSIONS

Based on the data collected during the 2008 Woodens River Watershed Fisheries Resource Study, the following is concluded:

Dissolved oxygen concentrations in the five lakes sampled was supportive of the freshwater fish species encountered during this study.

Long, Gates, Millyard and Albert Bridge lakes had low pH (4.72 – 4.9). This pH range is an appreciable stressor for fish, especially brook trout which are particularly sensitive to low pH (<5). The pH in Ben Miller Lake (pH 5.63) was marginally acceptable for brook trout.

The abundance and distribution of fish caught during the study was generally consistent with the lake size and water quality. Banded killifish, brook trout, gaspereau, golden shiner, white perch, white sucker and yellow perch were caught during the study.

- Brook trout were only caught in the three most upstream lakes (Long Lake, Ben Miller Lake and Gates Lake);
- Golden shiner were only caught in the two most upstream lakes (Long Lake and Ben Miller Lake);
- White Perch were only caught in Ben Miller Lake; and,
- Gaspereau were only caught in the three most downstream lakes (Gates Lake, Millyard Lake and Albert Bridge Lake).

PCB analytical chemistry results can be summarized as followed:

- PCBs were reported in detectable concentrations, but at concentrations below OMOE and USEPA guidelines, for game fish sampled from all lakes in the study. Some game fish samples from Ben Miller Lake and Albert Bridge Lake, did not contain detectable concentrations of PCBs.
- PCBs were reported in detectable concentrations, but at concentrations below USEPA guidelines, for small whole-bodied composite fish samples from Long, Gates, Millyard and Albert Bridge lakes. The small whole-bodied composite fish sample from Albert Bridge Lake did not contain detectable concentrations of PCBs.

PCB consumption through fish from Long Lake, Ben Miller Lake, Gates Lake, Millyard Lake and Albert Bridge Lake are not considered a risk to human or wildlife receptors at this time. Additionally, PCB consumption through fish of these lakes is not considered a risk to wildlife receptors.

7.0 RECOMMENDATIONS

Based on the data collected during the 2008 Woodens River Watershed Fisheries Resource Study, angling restrictions on Long Lake, Ben Miller Lake, Gates Lake, Millyard Lake and Albert Bridge Lake, to protect anglers from consumption of PCBs in fish tissue, are not required.

The pH of several lakes in the study area was sufficiently low to be an appreciable stressor for fish, particularly trout. We recommend DNR assemble and review any historic data respecting pH and

general water chemistry for the watershed. If data is not available, a sampling program should be developed and implemented to evaluate pH trends along with other key indicator parameters (temperature, dissolved oxygen, and general water chemistry). This data should be compiled and forwarded to DNR to assist them in developing a fish stock management strategy for this lake system.

8.0 CLOSURE

This report has been prepared for the sole benefit of Nova Scotia Transportation and Infrastructure Renewal. The report may not be used by any other person or entity without the express written consent of Jacques Whitford Limited and Nova Scotia Transportation and Infrastructure Renewal.

Any uses that a third party makes of this report, or any reliance on decisions made based on it, are the responsibility of such third parties. Jacques Whitford Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken, based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions and recommendations presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgement of Jacques Whitford Limited based on the data obtained from the work. The conclusions are based on the site conditions observed by Jacques Whitford Limited at the time the work was performed at the specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. In addition, analyses have been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Jacques Whitford Limited cannot warrant against undiscovered environmental liabilities.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

This report was prepared by David Leeder, M.I.T., and reviewed by Malcolm Stephenson, PhD.

Respectfully submitted,

JACQUES WHITFORD LIMITED

ORIGINAL SIGNED

David Leeder, M.I.T.
Project Scientist

ORIGINAL SIGNED

Malcolm Stephenson, PhD
Senior Technical Reviewer

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9.0 REFERENCES

Jacques Whitford. Fisheries Resource Study – Five Island Lake Watershed, 2007. January 28, 2008.

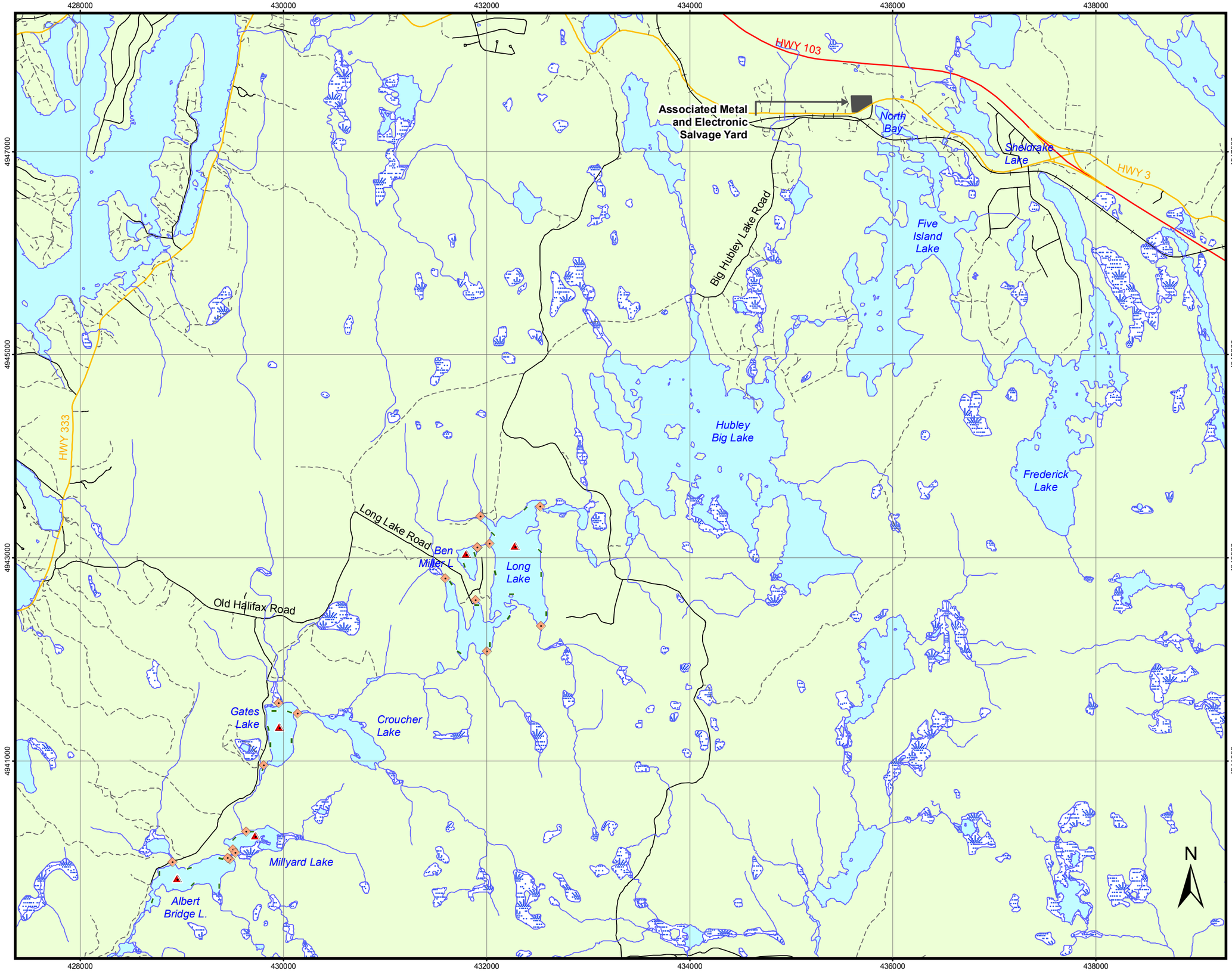
APPENDIX A

Figures

Figure 1

Nova Scotia Transportation & Infrastructure Renewal

2008 Woodens River Watershed Fisheries Resource Study



Map Features

- Minnow Trap Location
- Water Quality Measurement Location
- Gill Net Location (not to scale)
- Watercourse
- Major Highway
- Collector Highway
- Paved Road
- Unpaved Road
- Rail
- Waterbody
- Wetland

0 250 500 1,000 1,500 2,000

Metres

Map Parameters
Projection: UTM-NAD83-Z20
Scale 1:35,000
Date: July 24, 2008
Project No.: 09299.06

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Figure 2

Nova Scotia Transportation & Infrastructure Renewal

Long Lake and Ben Miller Lake 2008 Fisheries Resource Study

Map Features

- Minnow Trap Location
- Water Quality Measurement Location
- Gill Net Location
- Watercourse
- Access
- 5m Contours
- Waterbody
- Wetland

0 50 100 200 300 400

Metres

Map Parameters
Projection: UTM-NAD83-Z20
Scale 1:7,500
Date: July 24, 2008
Project No.: 09299.10

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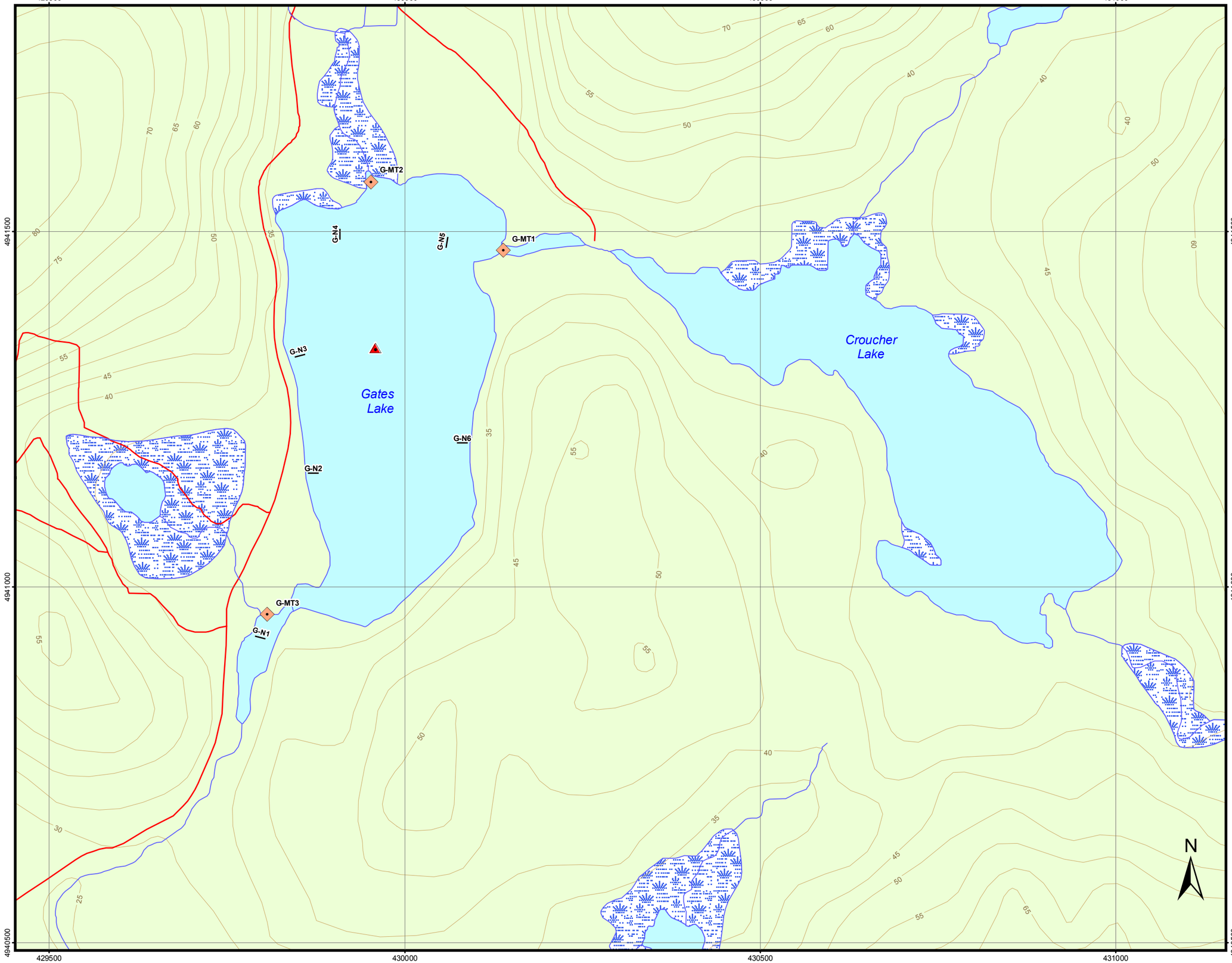

Figure 3

Nova Scotia Transportation & Infrastructure Renewal

Croucher Lake and Gates Lake 2008 Fisheries Resource Study

Map Features

- Minnow Trap Location
- Water Quality Measurement Location
- Gill Net Location
- Watercourse
- Access
- 5m Contours
- Waterbody
- Wetland

0 75 150 225 300

Metres

Map Parameters
Projection: UTM-NAD83-Z20
Scale 1:7,500
Date: July 24, 2008
Project No.: 09299.10

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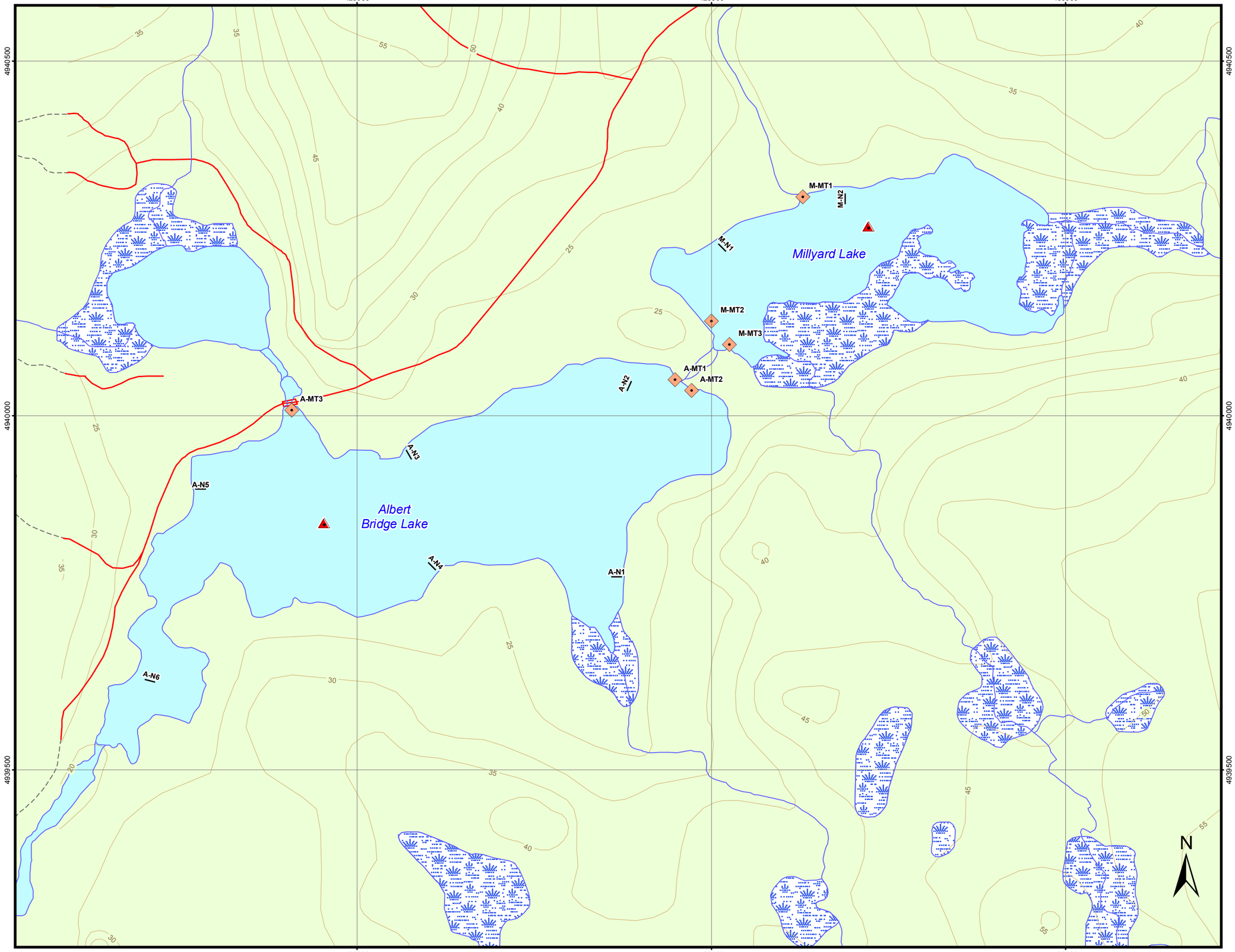
Figure 4

Nova Scotia Transportation & Infrastructure Renewal

Albert Bridge Lake and Millyard Lake 2008 Fisheries Resource Study



Map Features

- Minnow Trap Location
- Water Quality Measurement Location
- Gill Net Location
- Watercourse
- Access
- 5m Contours
- Waterbody
- Wetland

0 75 150 225 300

Metres

Map Parameters
Projection: UTM-NAD83-Z20
Scale 1:7,500
Date: July 24, 2008
Project No.: 09299.10

Jacques Whitford

APPENDIX B

Photographs

Jacques Whitford

Photo 1: Gill Net (Ends Marked by White Buoys) in Long Lake

Photo 2: Road Access to Croucher Lake. Note Locked Gate (Private Property) and Unsafe, Narrow Bridge Preventing Vehicle Access

Photo 3: Stream Access to Croucher Lake from Gates Lake. Note Shallow Rapids, Low Bridge and Trees across Stream

Photo 4: Stream Access to Croucher Lake from Gates Lake

Photo 5: Access Road to Albert Bridge and Millyard Lakes

Photo 6: Looking Upstream (Northeast) at Millyard Lake from Albert Bridge Lake. This Shallow Rapid (Approx. 100m Long) is the Only Public Access to Millyard Lake

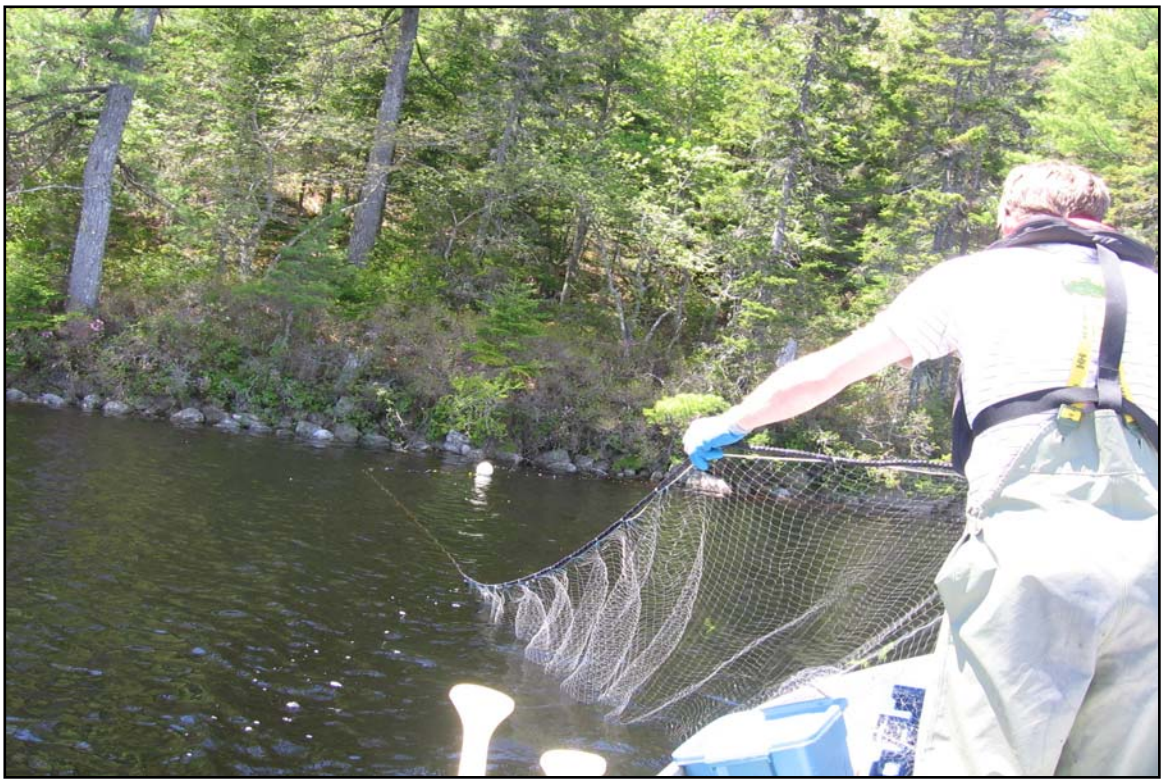


Photo 7: Hauling in Gill Net

Photo 8: Collecting Fisheries Resource Data and Game Fish Tissue Sampling

Photo 9: Brook Trout Caught in Long Lake

Photo 10: Banded Killifish (Typical) Caught in Long Lake

Photo 11: Golden Shiner Caught in Ben Miller Lake

Photo 12: Gaspereau (Typical) Caught in Gates Lake

APPENDIX C

Fisheries Resource Data

Jacques Whitford

TABLE C-1 FISHERIES RESOURCE DATA
Nova Scotia Transportation and Infrastructure Renewal
2008 Fisheries Resource Study, Woodens River Watershed
Jacques Whitford Project No. 9299.10

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Ben Miller Lake							
B-N1	9-Jun-08	White Perch	B-N1-1	0.20	24.1	Female	Yes
B-N1	9-Jun-08	White Perch	B-N1-2	0.19	23.4	Female	Yes
B-N1	9-Jun-08	White Perch	B-N1-3	0.19	23.8	Female	Yes
B-N1	9-Jun-08	White Perch	B-N1-4	0.18	22.9	Female	Yes
B-N1	9-Jun-08	White Perch	B-N1-5	0.19	23.2	Female	Yes
B-N2	9-Jun-08	Brook Trout	B-N2-1	0.51	36.0	Female	Yes
B-MT1	9-Jun-08	Banded Killifish	B-MT1-Dip[7.]	0.06[8.]	8.7	Unknown	Yes
B-MT1	9-Jun-08	Banded Killifish	B-MT1-Dip[7.]		7.1	Unknown	Yes
B-MT1	9-Jun-08	Golden Shiner	B-MT1-Dip[7.]		9.3	Unknown	Yes
B-MT1	9-Jun-08	Golden Shiner	B-MT1-Dip[7.]		8.2	Unknown	Yes
B-MT1	9-Jun-08	Golden Shiner	B-MT1-Dip[7.]		7.6	Unknown	Yes
B-MT1	9-Jun-08	Golden Shiner	B-MT1-Dip[7.]		8.4	Unknown	Yes
B-MT2	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
B-MT3	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
Long Lake							
L-N1	6-Jun-08	Yellow Perch	L-N1-1	0.06	14.5	Unknown	Yes
L-N1	6-Jun-08	Brook Trout	L-N1-2	0.16	22.4	Unknown	Yes
L-N2	6-Jun-08	Yellow Perch	L-N2-1	0.13	23.4	Male	Yes
L-N3	6-Jun-08	Yellow Perch	L-N3-1	0.06	13.4	Male	Yes
L-N3	6-Jun-08	Yellow Perch	L-N3-2	0.13	20.4	Unknown	Yes
L-N3	6-Jun-08	White Sucker	n/a	0.91	-	Unknown	No
L-N4	6-Jun-08	Golden Shiner	L-N4-1	0.04	12.9	Unknown	Yes
L-N4	6-Jun-08	Brook Trout	L-N4-2	0.24	24.4	Female	Yes
L-N4	6-Jun-08	Yellow Perch	L-N4-3	0.06	15.7	Unknown	Yes
L-N4	6-Jun-08	Yellow Perch	L-N4-4	0.06	13.7	Unknown	Yes
L-N4	6-Jun-08	Yellow Perch	n/a	-	-	Unknown	No
L-N5	6-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-N6	6-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-N7	6-Jun-08	Brook Trout	L-N7-1	0.26	28.7	Unknown	Yes
L-N7	6-Jun-08	Brook Trout	L-N7-2	0.32	29.9	Female	Yes
L-N8	6-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-N9	9-Jun-08	Brook Trout	L-N9-1	0.14	22.5	Female	Yes
L-N9	9-Jun-08	Brook Trout	L-N9-2	0.23	25.2	Female	Yes
L-N9	9-Jun-08	Golden Shiner	L-N9-3	0.04	12.9	Female	Yes
L-N9	9-Jun-08	Yellow Perch	L-N9-4	0.06	12.9	Unknown	Yes
L-N9	9-Jun-08	Yellow Perch	n/a	0.06	12.9	Unknown	No
L-N10	9-Jun-08	Yellow Perch	L-N10-1	0.07	14.4	Unknown	Yes
L-N10	9-Jun-08	Yellow Perch	L-N10-2	0.08	15.4	Unknown	Yes
L-N10	9-Jun-08	Yellow Perch	L-N10-3	0.06	12.9	Female	Yes
L-N10	9-Jun-08	Yellow Perch	n/a	0.07	14.0	Unknown	No

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Long Lake							
L-N10	9-Jun-08	Yellow Perch	n/a	0.07	14.0	Unknown	No
L-N10	9-Jun-08	Yellow Perch	n/a	0.07	14.0	Unknown	No
L-N11	9-Jun-08	Yellow Perch	L-N11-1	0.18	24.6	Unknown	Yes
L-N11	9-Jun-08	Golden Shiner	L-N11-2	0.06	14.0	Female	Yes
L-N11	9-Jun-08	Brook Trout	L-N11-3	0.14	19.8	Unknown	Yes
L-N11	9-Jun-08	Brook Trout	L-N11-4	0.24	25.6	Unknown	Yes
L-N11	9-Jun-08	Yellow Perch	n/a	0.06	-	Unknown	No
L-N12	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-MT1	9-Jun-08	Banded Killifish	L-MT1-Dip[4.]	0.06[5.]	8.7	Unknown	Yes
L-MT1	9-Jun-08	Banded Killifish	L-MT1-Dip[4.]		7.1	Unknown	Yes
L-MT1	9-Jun-08	Golden Shiner	L-MT1-Dip[4.]		9.3	Unknown	Yes
L-MT1	9-Jun-08	Golden Shiner	L-MT1-Dip[4.]		8.2	Unknown	Yes
L-MT1	9-Jun-08	Golden Shiner	L-MT1-Dip[4.]		7.6	Unknown	Yes
L-MT1	9-Jun-08	Golden Shiner	L-MT1-Dip[4.]		8.4	Unknown	Yes
L-MT2	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-MT3	5-Jun-08	Banded Killifish	L-MT3-Dip[4.]	0.1[6.]	4.5	Unknown	Yes
L-MT3	5-Jun-08	Banded Killifish	L-MT3-Dip[4.]		4.9	Unknown	Yes
L-MT3	5-Jun-08	Banded Killifish	L-MT3-Dip[4.]		5.3	Unknown	Yes
L-MT3	5-Jun-08	Banded Killifish	L-MT3-Dip[4.]		4.1	Unknown	Yes
L-MT3	5-Jun-08	Banded Killifish	L-MT3-Dip[4.]		5.1	Unknown	Yes
L-MT3	5-Jun-08	Banded Killifish	L-MT3-Dip[4.]		5.1	Unknown	Yes
L-MT3	5-Jun-08	Banded Killifish	n/a	-	3.2	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	3.2	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	3.4	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	3.6	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	3.8	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	3.8	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	4.0	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	4.0	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	4.2	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	4.4	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	4.6	Unknown	No
L-MT3	5-Jun-08	Banded Killifish	n/a	-	4.6	Unknown	No
L-MT4	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-MT5	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-MT6	9-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
L-MT7	9-Jun-08	Banded Killifish	L-MT7-Dip[4.]	-	-	Unknown	Yes
L-MT7	9-Jun-08	Banded Killifish	L-MT7-Dip[4.]	-	-	Unknown	Yes
L-MT7	9-Jun-08	Banded Killifish	L-MT7-Dip[4.]	-	-	Unknown	Yes

TABLE C-1 FISHERIES RESOURCE DATA
Nova Scotia Transportation and Infrastructure Renewal
2008 Fisheries Resource Study, Woodens River Watershed
Jacques Whitford Project No. 9299.10

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Gates Lake							
G-N1	3-Jun-08	White Sucker	n/a	0.65	-	Unknown	No
G-N2	3-Jun-08	White Sucker	n/a	0.65	-	Unknown	No
G-N2	3-Jun-08	Yellow Perch	G-N2-1[9.]	0.06	15.0	Unknown	Yes
G-N2	3-Jun-08	Yellow Perch	G-N2-2[9.]	0.06	15.0	Unknown	Yes
G-N2	3-Jun-08	Yellow Perch	G-N2-3[9.]	0.06	15.0	Unknown	Yes
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N2	3-Jun-08	Yellow Perch	n/a	0.06	15.0	Unknown	No
G-N3	3-Jun-08	White Sucker	n/a	0.80	-	Unknown	No
G-N3	3-Jun-08	White Sucker	n/a	0.80	-	Unknown	No
G-N3	3-Jun-08	Yellow Perch	G-N3-1[9.]	0.07	16.0	Female	Yes
G-N3	3-Jun-08	Yellow Perch	n/a	0.18	23.5	Unknown	No
G-N3	3-Jun-08	Yellow Perch	n/a	0.18	23.5	Unknown	No
G-N3	3-Jun-08	Gaspereau	n/a	0.18	23.5	Male	No
G-N4	3-Jun-08	Gaspereau	n/a	0.18	23.5	Unknown	No
G-N4	3-Jun-08	White Sucker	n/a	0.55	-	Unknown	No
G-N4	3-Jun-08	Yellow Perch	G-N4-1[9.]	0.12	19.0	Male	Yes
G-N4	3-Jun-08	Yellow Perch	G-N4-2[9.]	0.13	19.5	Unknown	Yes
G-N4	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N4	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Gaspereau	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Gates Lake							
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.60	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	White Sucker	n/a	0.30	-	Unknown	No
G-N5	3-Jun-08	Brook Trout	G-N5-1	0.12	21.0	Female	Yes
G-N5	3-Jun-08	Brook Trout	G-N5-2	0.23	25.5	Female	Yes
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.11	-	Unknown	No
G-N5	3-Jun-08	Yellow Perch	n/a	0.23	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	White Sucker	n/a	0.50	-	Unknown	No
G-N6	3-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
G-N6	3-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
G-N6	3-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
G-N6	3-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
G-MT1	4-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
G-MT2	4-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
G-MT3	4-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a

TABLE C-1 **FISHERIES RESOURCE DATA**
Nova Scotia Transportation and Infrastructure Renewal
2008 Fisheries Resource Study, Woodens River Watershed
Jacques Whitford Project No. 9299.10

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Millyard Lake							
M-N1	4-Jun-08	Gaspereau	n/a	0.35	-	Unknown	No
M-N1	4-Jun-08	Gaspereau	n/a	0.35	-	Unknown	No
M-N1	4-Jun-08	Gaspereau	n/a	0.35	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	M-N1-1	0.05	13.8	Male	Yes
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N1	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-N2	4-Jun-08	White Sucker	n/a	0.23	-	Unknown	No
M-N2	4-Jun-08	White Sucker	n/a	0.23	-	Unknown	No
M-N2	4-Jun-08	Gaspereau	n/a	0.35	-	Unknown	No
M-N2	4-Jun-08	Yellow Perch	M-N2-1	0.06	14.5	Unknown	Yes
M-N2	4-Jun-08	Yellow Perch	M-N2-2	0.04	13.5	Male	Yes
M-N2	4-Jun-08	Yellow Perch	n/a	0.05	-	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	8.4	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	8.8	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	9.0	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	8.0	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	7.4	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	7.1	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	n/a	-	7.6	Unknown	No
M-MT3	5-Jun-08	Banded Killifish	M-MT3-8[10.]		6.6	Unknown	Yes
M-MT3	5-Jun-08	Banded Killifish	M-MT3-9[10.]	0.04[11.]	7.6	Unknown	Yes
M-MT3	5-Jun-08	Banded Killifish	M-MT3-10[10.]		6.7	Unknown	Yes

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Albert Bridge Lake							
A-N1	5-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
A-N2	5-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
A-N2	5-Jun-08	Yellow Perch	A-N2-1	0.07	20.9	Unknown	Yes
A-N2	5-Jun-08	White Sucker	A-N2-2	0.13	22.6	Unknown	Yes
A-N2	5-Jun-08	Yellow Perch	A-N2-3[12.]	0.04	12.0	Male	Yes
A-N2	5-Jun-08	Yellow Perch	A-N2-4[12.]	0.05	13.5	Male	Yes
A-N2	5-Jun-08	Yellow Perch	A-N2-5[12.]	0.05	13.5	Unknown	Yes
A-N2	5-Jun-08	Yellow Perch	A-N2-6[12.]	0.03	14.0	Male	Yes
A-N2	5-Jun-08	White Sucker	n/a	0.10	-	Unknown	No
A-N2	5-Jun-08	White Sucker	n/a	0.10	-	Unknown	No
A-N2	5-Jun-08	White Sucker	n/a	0.10	-	Unknown	No
A-N2	5-Jun-08	White Sucker	n/a	0.10	-	Unknown	No
A-N2	5-Jun-08	Gaspereau	n/a	0.34	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.17	-	Unknown	No
A-N3	5-Jun-08	Gaspereau	n/a	0.23	-	Unknown	No
A-N3	5-Jun-08	Yellow Perch	A-N3-1	0.26	28.9	Unknown	Yes
A-N3	5-Jun-08	Yellow Perch	A-N3-2	0.08	15.2	Unknown	Yes
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No

TABLE C-1 FISHERIES RESOURCE DATA
Nova Scotia Transportation and Infrastructure Renewal
2008 Fisheries Resource Study, Woodens River Watershed
Jacques Whitford Project No. 9299.10

Sample	Date	Species	ID	Weight	Fork	Sex	Collected
Albert Bridge Lake							
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Gaspereau	n/a	0.20	-	Unknown	No
A-N4	5-Jun-08	Yellow Perch	A-N4-1	0.04	13.5	Unknown	Yes
A-N4	5-Jun-08	Yellow Perch	A-N4-2	0.05	13.1	Male	Yes
A-N5	5-Jun-08	Gaspereau	n/a	-	-	Unknown	No
A-N5	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N5	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N5	5-Jun-08	Gaspereau	n/a	0.15	-	Unknown	No
A-N5	5-Jun-08	Yellow Perch	A-N5-1	0.12	21.9	Unknown	No
A-N5	5-Jun-08	White Sucker	A-N5-2	0.45	33.7	Unknown	No
A-N5	5-Jun-08	White Sucker	A-N5-3	0.39	32.4	Unknown	No
A-N5	5-Jun-08	Yellow Perch	n/a	-	-	Unknown	No
A-N6	5-Jun-08	White Sucker	n/a	0.40	-	Unknown	No
A-N6	5-Jun-08	Yellow Perch	A-N6-1	0.06	14.9	Male	Yes
A-MT1	5-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
A-MT2	5-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a
A-MT3	5-Jun-08	No fish	n/a	n/a	n/a	n/a	n/a

Notes:

1. n/a = not applicable
2. ' - ' = no data
3. Collected = Game fish tissue, or whole fish composite, sample collected for analysis of polychlorinated biphenyl concentration.
4. Samples combined into whole body composite sample L-COMP.
5. Batch weight for all fish collected in L-MT1-Dip combined.
6. Batch weight for all fish collected in L-MT3-Dip combined.
7. Samples combined into whole body composite sample B-COMP.
8. Batch wieght for all fish collected in B-MT1-Dip combined.
9. Samples combined into whole body composite sample G-COMP.
10. Samples combined into whole body composite sample M-COMP.
11. Batch weight for M-MT3-8, M-MT3-9 and M-MT3-10 combined.
12. Samples combined into whole body composite sample A-COMP.

APPENDIX D

Analytical Chemistry Summary Tables &
Copies of Laboratory Certificates of Analysis

Jacques Whitford

TABLE D-1 **TISSUE POLYCHLORINATED BIPHENYL CHEMISTRY - GAME FISH**
Nova Scotia Transportation and Infrastructure Renewal
2008 Fisheries Resource Study, Woodens River Watershed
Jacques Whitford Project No. 9299.10

Parameters	RDL (mg/kg)	OMOE Sport Fish Guidelines (mg/kg)	USEPA Mink Guideline (mg/kg)	Sample ID						
				Ben Miller Lake						
				B-N1-1	B-N1-2	B-N1-2 Lab-Dup	B-N1-3	B-N1-4	B-N1-5	B-N2-1
Total Polychlorinated Biphenyls	0.01	0.153	0.96	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Fish Species:				White Perch	White Perch	n/a	White Perch	White Perch	White Perch	Brook trout
Weight (kg):				0.20	0.19	n/a	0.19	0.18	0.19	0.51
Fork Length (cm):				24.1	23.4	n/a	23.8	22.9	23.2	36.0
Date collected:				9-Jun-08	9-Jun-08	9-Jun-08	9-Jun-08	9-Jun-08	9-Jun-08	9-Jun-08

Parameters	RDL (mg/kg)	OMOE Sport Fish Guidelines (mg/kg)	USEPA Mink Guideline (mg/kg)	Sample ID										
				Long Lake										
				L-N1-2	L-N2-1	L-N4-2	L-N7-1	L-N7-2	L-N7-2 Lab-Dup	L-N9-1	L-N9-2	L-N11-1	L-N11-3	L-N11-4
Total Polychlorinated Biphenyls	0.01	0.153	0.96	0.07	0.1	0.06	0.03	0.11	0.07	0.11	0.06	0.11	0.06	0.06
Fish Species:				Brook trout	Yellow perch	Brook trout	Brook trout	Brook trout	n/a	Brook trout	Brook trout	Yellow perch	Brook trout	Brook trout
Weight (kg):				0.16	0.13	0.24	0.26	0.32	n/a	0.14	0.23	0.18	0.14	0.24
Fork Length (cm):				22.4	23.4	22.4	28.7	29.9	n/a	22.5	24.2	24.6	19.8	25.6
Date collected:				6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08	6-Jun-08

Parameters	RDL (mg/kg)	OMOE Sport Fish Guidelines (mg/kg)	USEPA Mink Guideline (mg/kg)	Sample ID						
				Gates Lake		Albert Bridge Lake				
				G-N5-1	G-N5-2	A-N2-1	A-N2-2	A-N3-1	A-N5-1	A-N5-3
Total Polychlorinated Biphenyls	0.01	0.153	0.96	0.07	0.05	0.07	<0.01	0.08	0.05	<0.01
Fish Species:				Brook trout	Brook trout	Yellow perch	White sucker	Yellow perch	Yellow perch	White sucker
Weight (kg):				0.12	0.23	0.07	0.13	0.26	0.12	0.39
Fork Length (cm):				21.0	25.5	20.9	22.6	28.9	21.9	32.4
Date collected:				3-Jun-08	3-Jun-08	5-Jun-08	5-Jun-08	5-Jun-08	5-Jun-08	5-Jun-08

Notes:

1. RDL = laboratory's reportable detection limit
2. mg/kg = milligrams per kilogram
3. Lab-Dup = laboratory QA/QC duplicate
4. OMOE Sport Fish Guidelines = Ontario Ministry of Environment's *Guide to Eating Ontario Sport Fish* (2007 - 2008 Edition), Consumption Restriction Guideline for total polychlorinated biphenyls.
5. USEPA Mink Guideline = Value at which detrimental effects to liver enzyme activity in female and kit mink is detected, as published in the United States Environmental Protection Agency's *Dietary Exposure of Mink to Fish from the Housatonic River: Effects on Reproduction and Survival* (June 10, 2003).
6. **Bold & Underlined =** parameter concentration exceeds applicable guideline
7. Fork Length = Length of fish from snout to fork on tail
8. cm = centimetres
9. kg = kilograms
10. n/a = not applicable

TABLE D-2 **TISSUE POLYCHLORINATED BIPHENYL CHEMISTRY - SMALL, WHOLE FISH**
Nova Scotia Transportation and Infrastructure Renewal
2008 Fisheries Resource Study, Woodens River Watershed
Jacques Whitford Project No. 9299.10

Parameters	RDL (mg/kg)	USEPA Mink Guideline (mg/kg)	Sample ID				
			Ben Miller Lake	Long Lake	Gates Lake	Millyard Lake	Albert Bridge Lake
			B-COMP	L-COMP	G-COMP	M- COMP	A-COMP
		Date collected:	9-Jun-08	6-Jun-08	3-Jun-08	4-Jun-08	5-Jun-08
Total Polychlorinated Biphenyls	0.01	0.96	<0.01	0.03	0.05	0.03	0.02

Notes:

1. RDL = laboratory's reportable detection limit
2. mg/kg = milligrams per kilogram
3. Lab-Dup = laboratory QA/QC duplicate
4. USEPA Mink Guideline = Value at which detrimental effects to liver enzyme activity in female and kit mink is detected, as published in the United States Environmental Protection Agency's *Dietary Exposure of Mink to Fish from the Housatonic River: Effects on Reproduction and Survival* (June 10, 2003).
5. **Bold & Underlined =** parameter concentration exceeds applicable guideline

APPENDIX E

Lake Water Quality Measurements

Jacques Whitford

TABLE E-1 LAKE WATER QUALITY MEASUREMENTS
Nova Scotia Transportation and Infrastructure Renewal
2008 Woodens River Watershed Fisheries Resource Study
Jacques Whitford Project No. 9299.10

Lake	Date	Sample Depth (m below water surface)	pH	Specific Conductivity (µS/cm)	Temp (°C)	DO Concentration (%)	DO Concentration (mg/L)	TDS (mg/L)
Ben Miller Lake	8-Jun-08	0	5.81	37	22.17	123.1	10.73	0.05
		2	5.65	39	17.38	122.7	11.75	0.24
		4	5.41	42	14.00	100.0	10.49	0.27
Long Lake	6-Jun-08	0	4.88	111	17.57	108.2	10.2	0.072
		2	4.90	111	17.67	108.4	10.31	0.073
		4	4.93	117	16.70	105.0	10.2	0.075
Gates Lake	3-Jun-08	0	4.79	96	17.91	114.0	10.8	0.062
		2	4.78	96	15.93	111.2	11.03	0.062
		4	4.59	86	13.85	110.0	11.31	0.053
Millyard Lake	4-Jun-08	0	4.74	93	16.62	106.8	10.43	0.060
		2	4.77	92	16.56	107.0	10.44	0.060
		4	4.78	92	16.55	106.6	10.42	0.061
Albert Bridge Lake	5-Jun-08	0	4.81	90	17.75	107.4	10.21	0.058
		2	4.80	90	16.94	105.5	10.18	0.058
		4	4.80	90	16.90	104.6	10.17	0.059
CCME FWAL Guideline			≥ 6.5	-	-	-	>5.5	-

Notes:

1. µS/cm = microSeimens per centimetre
2. ˚C = degrees Celsius
3. mg/L = milligrams/litre
4. DO = dissolved oxygen
5. ppt = parts per trillion
6. TDS = total dissolved solids
7. CCME FWAL Guidelines = Canadian Council of Minister's of Environment's *Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life* (1999, updated 2006)
8. ' - ' = no guideline available

Your P.O. #: NSD016400
Your Project #: SD09299.10/ Z9100
Site: 5 ISLAND LAKE
Your C.O.C. #: B 57721

Attention: David Leeder
Jacques Whitford Limited
3 Spectacle Lake Dr
Dartmouth, NS
B3B 1W8

Report Date: 2008/07/04

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A862153
Received: 2008/06/11, 16:30

Sample Matrix: TISSUE
Samples Received: 28

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
PCBs in tissue by GC/ECD	28	2008/06/25	2008/07/04	ATL SOP 00110 R2	Based on EPA8082

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

MARIE (MCNAIR) MUISE, Project Manager
Email: marie.muise.reports@maxxamanalytics.com
Phone# (902) 420-0203 Ext:236

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

For Service Group specific validation please refer to the Validation Signature Page

Total cover pages: 1

Maxxam Job #: A862153
Report Date: 2008/07/04

Jacques Whitford Limited
Client Project #: SD09299.10/ Z9100
Project name: 5 ISLAND LAKE
Your P.O. #: NSD016400

POLYCHLORINATED BIPHENYLS BY GC-ECD (TISSUE)

Maxxam ID		Z25489	Z25489	Z25491	Z25492		
Sampling Date		2008/06/09	2008/06/09	2008/06/09	2008/06/09		
COC Number		B 57721	B 57721	B 57721	B 57721		
Registration #							
	Units	**B-N1--2**	**B-N1--2 Lab-Dup**	**B-N1-3**	**B-N1-4**	**RDL**	**QC Batch**
PCBs							
Total PCB	ug/g	ND	ND	0.02	ND	0.01	1546088
Surrogate Recovery (%)							
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	N/A	1546088
Decachlorobiphenyl	%	96	92	92 (1)	98	N/A	1546088

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

Maxxam ID		Z25493	Z25494	Z25495	Z25496		
Sampling Date		2008/06/09	2008/06/03	2008/06/04	2008/06/06		
COC Number		B 57721	B 57721	B 57721	B 57721		
Registration #							
	Units	**B-N1-5**	**G-COMP**	**M- COMP**	**L-COMP**	**RDL**	**QC Batch**
PCBs							
Total PCB	ug/g	ND	0.05	0.03	0.03	0.01	1546088
Surrogate Recovery (%)							
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	N/A	1546088
Decachlorobiphenyl	%	100	85 (1)	84 (1)	81 (1)	N/A	1546088

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

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Report Date: 2008/07/04

Jacques Whitford Limited
Client Project #: SD09299.10/ Z9100
Project name: 5 ISLAND LAKE
Your P.O. #: NSD016400

POLYCHLORINATED BIPHENYLS BY GC-ECD (TISSUE)

Maxxam ID		Z25497	Z25498	Z25499	Z25500		
Sampling Date		2008/06/05	2008/06/09	2008/06/06	2008/06/06		
COC Number		B 57721	B 57721	B 57721	B 57721		
Registration #							
	Units	**A-COMP**	**B-COMP**	**L-N9-1**	**L-N9-2**	**RDL**	**QC Batch**
PCBs							
Total PCB	ug/g	0.02	ND	0.11	0.06	0.01	1546088
Surrogate Recovery (%)							
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	N/A	1546088
Decachlorobiphenyl	%	75 (1)	97	93 (1)	92 (1)	N/A	1546088

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

Maxxam ID		Z25501	Z25502	Z25503		
Sampling Date		2008/06/06	2008/06/06	2008/06/06		
COC Number		B 57721	B 57721	B 57721		
Registration #						
	Units	**L-N1-2**	**L-N4-2**	**L-N7-1**	**RDL**	**QC Batch**
PCBs						
Total PCB	ug/g	0.07	0.06	0.03	0.01	1546088
Surrogate Recovery (%)						
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	N/A	1546088
Decachlorobiphenyl	%	85 (1)	80 (1)	79 (1)	N/A	1546088

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

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Report Date: 2008/07/04

Jacques Whitford Limited
Client Project #: SD09299.10/ Z9100
Project name: 5 ISLAND LAKE
Your P.O. #: NSD016400

POLYCHLORINATED BIPHENYLS BY GC-ECD (TISSUE)

Maxxam ID		Z25504	Z25504	Z25505	Z25506		
Sampling Date		2008/06/06	2008/06/06	2008/06/06	2008/06/06		
COC Number		B 57721	B 57721	B 57721	B 57721		
Registration #							
	Units	**L-N7-2**	**L-N7-2 Lab-Dup**	**L-N11-3**	**L-N11-4**	**RDL**	**QC Batch**
PCBs							
Total PCB	ug/g	0.11	0.07	0.06	0.06	0.01	1546092
Surrogate Recovery (%)							
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	N/A	1546092
Decachlorobiphenyl	%	111 (1)	78	100 (1)	95 (1)	N/A	1546092

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

Maxxam ID		Z25507	Z25508	Z25509	Z25510		
Sampling Date		2008/06/09	2008/06/09	2008/06/03	2008/06/03		
COC Number		B 57721	B 57721	B 57721	B 57721		
Registration #							
	Units	**B-N2-1**	**B-N1-1**	**G-N5-1**	**G-N5-2**	**RDL**	**QC Batch**
PCBs							
Total PCB	ug/g	ND	ND	0.07	0.05	0.01	1546092
Surrogate Recovery (%)							
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	N/A	1546092
Decachlorobiphenyl	%	104	82	93 (1)	102 (1)	N/A	1546092

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

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Client Project #: SD09299.10/ Z9100
Project name: 5 ISLAND LAKE
Your P.O. #: NSD016400

POLYCHLORINATED BIPHENYLS BY GC-ECD (TISSUE)

Maxxam ID		Z25511	Z25512	Z25513	Z25514		
Sampling Date		2008/06/05	2008/06/05	2008/06/05	2008/06/05		
COC Number		B 57721	B 57721	B 57721	B 57721		
Registration #							
	Units	**A-N2-2**	**A-N2-1**	**A-N5-1**	**A-N5-3**	**RDL**	**QC Batch**
PCBs							
Total PCB	ug/g	ND	0.07	0.05	ND	0.01	1546092
Surrogate Recovery (%)							
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	N/A	1546092
Decachlorobiphenyl	%	96	104 (1)	107 (1)	91	N/A	1546092

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

Maxxam ID		Z25515	Z25516	Z25517		
Sampling Date		2008/06/05	2008/06/06	2008/06/06		
COC Number		B 57721	B 57721	B 57721		
Registration #						
	Units	**A-N3-1**	**L-N2-1**	**L-N11-1**	**RDL**	**QC Batch**
PCBs						
Total PCB	ug/g	0.08	0.10	0.11	0.01	1546092
Surrogate Recovery (%)						
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	N/A	1546092
Decachlorobiphenyl	%	107 (1)	92 (1)	99 (1)	N/A	1546092

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Aroclor 1260.

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Maxxam Job #: A862153
Report Date: 2008/07/04

Jacques Whitford Limited
Client Project #: SD09299.10/ Z9100
Project name: 5 ISLAND LAKE
Your P.O. #: NSD016400

GENERAL COMMENTS

Results relate only to the items tested.

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Jacques Whitford Limited
Attention: David Leeder
Client Project #: SD09299.10/ Z9100
P.O. #: NSD016400
Project name: 5 ISLAND LAKE

Quality Assurance Report

Maxxam Job Number: DA862153

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1546088	CMI	REAGENT BLANK	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		79	%	30 - 130
			Total PCB	2008/07/04	ND, RDL=0.05		ug/g	
		MATRIX SPIKE						
		[Z25491-01]	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		103	%	30 - 130
			Total PCB	2008/07/04		77	%	30 - 130
		Spiked Blank	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		76	%	30 - 130
			Total PCB	2008/07/04		74	%	30 - 130
		Method Blank	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		79	%	30 - 130
			Total PCB	2008/07/04	ND, RDL=0.05		ug/g	
		RPD [Z25489-01]	Total PCB	2008/07/04	NC		%	50
1546092	CMI	REAGENT BLANK	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		92	%	30 - 130
			Total PCB	2008/07/04	ND, RDL=0.05		ug/g	
		MATRIX SPIKE						
		[Z25505-01]	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		111	%	30 - 130
			Total PCB	2008/07/04		97	%	30 - 130
		Spiked Blank	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		98	%	30 - 130
			Total PCB	2008/07/04		84	%	30 - 130
		Method Blank	2,4,5,6-Tetrachloro-m-xylene	2008/07/04		NA	%	30 - 130
			Decachlorobiphenyl	2008/07/04		76	%	30 - 130
			Total PCB	2008/07/04	ND, RDL=0.05		ug/g	
		RPD [Z25504-01]	Total PCB	2008/07/04	38.6		%	50

ND = Not detected
NC = Non-calculable
RPD = Relative Percent Difference
SPIKE = Fortified sample

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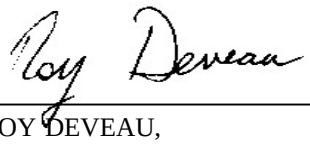
Validation Signature Page

Maxxam Job #: A862153

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

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