

**Big Bald Lake
Stream and Wetland Investigations**

(July and September 2011)

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Introduction

Streams and wetlands are essential components of the water cycle. Streams and wetlands play an important corridor role in connecting fragmented habitats and thus in conserving biodiversity. On Big Bald Lake the streams connect the lake to its watershed.

Part A - Stream Investigation

The thermal status is one of the most important parameters of streams. This investigation was to assess the presence of the cartographically identified streams on Ontario Base Maps, search for other possible streams and determine the thermal status of any identified streams.

The thermal status was determined according to the method described in the Stream Assessment Protocol of the MNR. Investigation took place on July 14, 2011. Ambient air temperature was initially 27°C increasing to 29°C later in the afternoon. Maximum air temperatures for the days prior to the investigation were 30°C, 29°C and 25°C for July 11, 12, 13 respectively. Summer conditions had been drier than normal. These were excellent conditions for assessing stream permanence and thermal regime.

Across Ontario, streams are generally protected as fish habitat with buffers of a minimum of 15 m and more recently a more general rule of 30m buffer.

Field Methods:

The roads surrounding Big Bald Lake were slowly driven on July 14, 2011 and any evidence of water or of a water course or culvert was examined for evidence of running water. Cartographically identified streams shown on Ontario base maps were searched for and investigated.

When running water was found several parameters were measured:

- Size of culvert was measured or estimated
- Water temperature was taken in running water and in a shaded location
- Determine if watercourse characteristics occur
- Comment on the presence of aquatic vegetation
- Look for fish and classify to fish group or species
- Water flow was estimated by visualizing the stream flowing into a 1 gallon can and estimating the number of seconds required to fill the can. It is only an estimate to provide a rough guide to the relative size of the stream
- Photos were taken of most streams
- A way point was taken of the stream where it crossed the road

The streams mouths were investigated on Sept 16, 22 and 28, 2011 to determine how well protected the streams were. Streams 6 and 7 are located on crown property lots and these streams were walked from the road to the lake. Two new streams were located in September but the thermal regime test could not be done at this late date.

GPS waypoints were taken of the location of streams crossing roads and at the point of the streams entering the lake.

Analysis:

Nine streams are shown on the Ontario Base Map (OBM) (Map 1, page 10) as flowing into Big Bald Lake or the Big Bald Lake East Westland but these had not been ground proofed. Eight of these streams were investigated in the field. Five of these 8 mapped streams investigated were found not to exist and three were found to exist. This shows the difficulty of relying on air photo interpretation for identifying very small streams. Field investigation is essential. One OBM mapped stream was not investigated and this stream is shown on Map 1 (marked with a '?') flowing into the south east side of Big Bald Lake that was found to be inaccessible.

Twenty five culverts (Appendix 1, page 26) were investigated and 14 of these contained water or wet areas. However, only 9 of these had established watercourses in at least certain areas and can be considered as permanent watercourses or streams on the basis of flowing water. Another stream was found that did not cross a road (no culvert) making a total of 10 identified streams and these are shown on Map 2 (page 11) and Table 1 (p. 8).

In total, 10 streams (Table 1) were investigated for flow and they ranged from an estimated 1 (4.5 litres) gallon per minute flow to 20 gallons (90 litres) per minute flow (see Table 1 for more details).

Water temperature was taken in streams (#2 to 9) that were investigated in July and related to the ambient air temperature in the method described in the MNR's Stream Assessment Protocol to determine the thermal regime. The ambient air temperatures had been high the previous week and this allowed a good estimate of thermal regime.

There were 3 cold water streams with temperatures of 15°C and 16°C. Cold water streams would provide the required habitat of coldwater species such as mottled sculpin, slimy sculpin and brook trout. The presence of cold water streams indicates groundwater sources.

There were 4 cool water streams with temperatures ranging from 17°C to 22°C.

There was 1 marginal warm water stream with a water temperature of 21 °C (temperature taken earlier in the day with a lower ambient air temperature). This stream appears to flow from a pond located to the north and therefore is probably affected by surface drainage. Streams 1 and 10 were not investigated in July but only in September and as a result the thermal regime could not be tested.

The presence of fish were noted when seen. Fish were seen in streams 6 and 7 and the pond located on stream 8. Most were small cyprinids or baitfish species. Stream 8 had an in-stream small pond excavated and about approximately 20 cm long bass were seen in the pond – probably from stocking. The absence of observed fish in certain streams probably indicates insufficient searching and not the absence of fish.

The following provides a description of the 10 streams identified on Map 2 (page 11):

Stream 1 - This stream flows through property 1958 (911 number) and across FR 89 into Big Bald Lake. The access road (FR 89) appears to dam up a treed swamp wetland that empties out through a culvert into the lake. Thus stream 1 is an exceedingly short stream and is more an outlet than a linear feature.

Stream 2 - This is one of the larger identified streams with an estimated flow of 10 to 20 gal per minute. The stream flows through property 1709 and enters the lake through a treed swamp. This is a marginally warm water stream and this probably is a result of this stream originating in a pond about 60 m inland from where it crosses Philrick Dr. Stream 2 enters the lake in a wetland area but is within 2 m from cottage lawns on its west bank (see photo of stream 2).

Stream 3 and Stream 4 - These streams are separate as they cross Philrick Dr. but join a few meters downstream. These streams flow through property 1709. Stream 3 is a coldwater stream and stream 4 is a cool water stream. The combined stream flows through a swamp to reach the lake. The swamp protects the stream from shoreline development with about 6 m to the lawn on the east and 56 m to the lawn on the west.

Stream 5 - This is a very small cold water stream that flows through property 1767. It flows through a sugar maple dominated hardwood bush and enters the lake right at the corner of a waterfront dock (see photo of stream 5). The lack of wetland appears to have lead to less protection of the stream.

Stream 6 - Stream 6 is a small cool water stream and as it flows from Philrick Dr it disappears in the hummocks of the cedar swamp and then reappears in pools about 20 m from the road and then after 16 m the stream again forms a continuous stream just over 1 m wide with a mainly woody debris substrate. The dense cedar over story excluded the development of any aquatic vegetation in the stream or in the separated pools. The cedar swamp has a deep organic soils and a thick growth of dwarf scouring-rush (*Equisetum scirpoides*). Three cm long baitfish were seen during the July 14th visit but were not seen in the September visits.

At the stream mouth a stone wall is located about 2m to the east and a lawn is located 8 m to the west. The stream is located in a dense cedar swamp wetland from Philrick Dr. to the lake.

Stream 7 - Stream 7 is a cold water stream that flows about 110 m from-Philrick Dr to the lake. The culvert was perched about 10 cm which could impede fish movement upstream. Small minnows were seen just below the culvert.

Dragon fly larvae and water striders were seen. The stream for 100 m was about 1 m wide and 5 to 12 cm deep. In portions of this section the substrate on the west side of the stream was clay with silt on the other side of the stream. A short 12 m long section in a clearing had banks with good grass cover with water cress. More open areas had some aquatic vegetation of pond weed (*Potamogeton spp*). A few meters of gravel exist but is a very minor component.

The last section is a 40 m section where the stream slows down and widens out to 3 m width with a thick substrate of silt. This section was blocked by fallen trees. Stream vegetation was mainly crowfoot, pond weed and wild celery. Two painted turtles were seen basking in the vicinity of the mouth of the stream and a male wood duck was seen at the mouth. Shoreline development is located about 45 m to the north and 60 m to the south.

Stream 8 - Stream 8 is located in property 1465. The stream crosses Catalina Bay Road. This stream has an in stream pond just upstream from the Catalina Bay Road

and bass (some that were about 20 cm in length) were seen in this pond. It is assumed that these fish were stocked in this pond. The stream was classed as cool water. The stream flows about 237 m from the culvert through a treed swamp to exit into the lake. In front of the stream mouth is a band of grasses followed by a band of cattails.

Stream 9 - Stream 9 flows under Highway 36 and it is one of the larger streams. It is a cool water stream and it flows south into a bay that eventually connects to the Big Bald Lake East Wetland. It was determined that Big Bald Lake East Wetland is hydrologically connected to Big Bald Lake.

Stream 10 - Stream 10 flows out of the Mara Lake Wetland located on the south side of Big Bald Lake. Flowing out of a fairly large wetland the stream is presumably not a cold water stream. The stream was measured to be the largest of the 10 streams investigated with a water flow of about 22 gallons per minute. The stream descends a steep slope through a sugar maple upland forest. The stream is 0.6 m wide and the substrate is mainly rocky material. However the portion of the lake that it empties into is viewed as a lake or lacustrine marsh consisting of submergent vegetation and floating vegetation.

Discussion:

Big Bald Lake appears to be located in a basin of Precambrian igneous rock surrounded by an elevated area of younger Cambrian limestone rock.

The Philrick Dr and Fire Route 89, the road system to the north of Big Bald Lake, where the cold water streams and most of the cool water streams were found appears to be at the base of a limestone ridge. It could be that the water is percolating down through the limestone until it reaches the denser Precambrian rock and flowing parallel until it leaves the base of the limestone ridge.

In the areas of the stream crossing the roads are pockets of swampy wetland on the north side of the road with the south side flowing off more steeply. In the swampy areas the streams are generally diffuse and as the slope increases on the south side of the road the streams form well defined watercourses. Aquatic stream vegetation is present or not present depending on the amount of overhead forest cover. Photos were taken of most streams. As the streams approach the lake most of the streams are in wetland swamps. It would appear that these swamps impede development and therefore buffer the streams. It is interesting that stream 6 is one of only 2 streams that do not enter the lake within a wetland and this stream enters the lake inches from a dock. Protect these small wetlands from filling and other development and more protection of the small streams will be one of the benefits.

Overall the streams identified in this investigation are small their lengths short and therefore they do not provide a large amount of fish habitat. Big Bald Lake is a cool water lake on the large Trent Severn System and therefore the streams output would not be expected to affect the overall thermal regime of the lake. Similarly the small nature of the streams mean that it is unlikely that possible nutrients in the streams will have a large impact on the lake.

On the other hand ground water source streams are little gems. The Peterborough District of the MNR (Peterborough – Cold Water Stream Strategy 2005) has only one

identified cold water stream in Harvey Township and this adds 3 new cold water streams to the list. Cold water streams represent high quality groundwater sources with a unique diversity of species.

Globally, streams and rivers, like most habitats on earth, have been greatly modified. However loss and impairment of species in stream and river habitats is probably greater than in other habitat types. Streams and rivers are vulnerable to a host of impacts such as invasive species, pollution and damming to name a few. In this investigation two culverts (streams 7 and 8) were improperly placed causing a potential barrier to fish movement. Stream 8 had an in stream pond and this would result in thermal pollution that may of tipped the stream from cold water status to cool water. In stream ponds have generally not been allowed for over 3 decades. If the streams had been previously identified and recognized by the MNR and the municipality than the pond probably would not have been permitted and similarly more care would have been taken in the placement of the culverts.

Key Observations - STREAMS:

- There were 3 cold water streams with temperatures of 15°C and 16°C. Coldwater streams would provide the required habitat of coldwater species such as mottled sculpin, slimy sculpin and brook trout. The presence of cold water streams indicates groundwater sources. (Streams 3, 5, 7)
- There were 4 cool water streams with temperatures ranging from 17°C to 22°C. (Streams 4, 6, 8, 9)
- There was 1 marginal warm water stream with a water temperature of 21 °C (temperature taken earlier in the day with a lower ambient air temperature). This stream appears to flow from a pond located to the north and therefore probably represents surface drainage. (Stream 2)
- Two streams (1 and 10) were not investigated in July but only in September and as a result the thermal regime could not be tested.
- Fish were seen in streams 6 and 7 and the pond located on stream 8. Most were small cyprinids or baitfish species. Stream 8 had an in-stream small pond excavated and about approximately 20 cm long bass were seen in the pond – probably from stocking. The absence of observed fish in certain streams probably indicates insufficient searching and not the absence of fish.
- In this investigation two culverts (streams 7 and 8) were found to be improperly placed causing a potential barrier to fish movement. Stream 8 had an in-stream pond and this would result in thermal pollution that may have tipped the stream from cold water status to cool water.

Part 2 - Preliminary Wetland Investigation

Preliminary wetland work was undertaken on the wetlands in Big Bald Lake in September 16, 22 and 28, 2011. Our stream analysis found that many of the streams flow through portions of small wetlands in their upper portions probably originating in wet seepage areas, that are small wetlands, and through wetlands as they approach the lake. All of these wetlands would be patented land and not considered as part of Big Bald Lake. These wetlands are mainly treed and tall shrub swamp wetlands.

More significant wetlands are located in the eastern part of Big Bald Lake and are shown on Map 3 (page 12). The two larger wetlands that are immediately adjacent to the Big Bald Lake East Wetland, which is a provincially significant wetland, have fen characteristics (photos Wetland 1, 2 and 3) such as wire sedge (*Carex lasiocarpa*) and other fen plants. Fens usually develop in areas of restricted drainage with low oxygen levels and are usually dominated by sedges located on peat.

The entire wetland area in this location was found to be hydrologically connected to Big Bald Lake the areas identified would be lacustrian wetlands and some would be considered as part of Big Bald Lake but the more easterly portions is probably patented land. These wetland areas may be classified as provincially significant if a comprehensive wetland evaluation were conducted

Two other small and less significant lacustrian open water marsh wetlands are mapped in two bays on the south shore of Big Bald Lake.

Other Features

Osprey nests

Nests were seen at two locations in September but this was after osprey would be expected to have left and therefore it wasn't possible to confirm if the nests were active. In many areas osprey nest on man made nesting platforms however on Big Bald Lake the abundance of large shoreline white pine provides excellent natural nesting locations for the osprey.

Turtles

A number of the provinces turtles are now considered species at risk and several of these species probably occur in Big Bald Lake (e.g. Blandings turtle, map turtle and snapping turtle). September is not a good time to see basking turtles. However painted turtles were seen basking at the mouth of stream 7. Painted turtles are not a species at risk. A large snapping turtle was seen crossing Irwin Rd in September. The snapping turtle is a new Species of Special Concern.

Butternut

Butternut is an endangered species due to the widespread butternut canker disease that now infects almost all of our butternut. A dead infected tree was seen in the vicinity of stream 1 and a diseased butternut was seen on the shoreline in the vicinity of stream 10.

Waterfowl Staging Area

Ducks will group together or stage in the fall prior or during their migration. Staging areas are important areas for feeding or resting. The marshes to the east of Big Bald Lake

appear to have characteristics for waterfowl staging for example sago pond weed and wild celery two important duck foods are found in the marsh here.

On Sept 16, 2011 about 2 dozen wood ducks and several mallards were seen in the wetland area up the long bay straight south of the Catalina Bay marina.

Key Observations - WETLANDS:

- Big Bald Lake East Wetland (See Map 3) had been previously evaluated designated as a provincially significant wetland.
- Wetland areas adjacent (see Map 3) to the Big Bald Lake East Wetland are hydrologically connected and may be determined to be provincially significant if a comprehensive wetland evaluation were conducted.
- Two other small and less significant lacustrian open water marsh wetlands are mapped in two bays on the south shore of Big Bald Lake (see Map 3).

Big Bald Lake Stream and Wetland Investigations

Table 1. Data collected on 10 streams on Big Bald Lake

Stream#	Culvert Co-ordinates	Lake Co-ordinates	Culvert (dia inches)	Watercourse	Water	Flow	Quantity Estimate	Temp°C	Thermal Regime
1	N44 34.991 W78 23.558	N44 34.991 W78 23.558	18	Yes	Yes	Yes	6		Coolwater?
2	N44 35.155 W78 23.421	N44 35.096 W 78 23.445	13	Yes	Yes	Yes	10 to 20	21	Warmwater
3	N44 35.138 W78 23.381	N44 35.080 W78 23.407	18	Yes	Yes	Yes	1	17	Coldwater/coolwater
4	N44 35.138 W78 23.381	N44 35.080 W78 23.407	13	Yes	Yes	Yes	1	15	Coolwater
5	N44 35.080 W78 23.128	N44 35.059 W78 23.168	12	Yes	Yes	Yes	1	16	Coldwater
6	N44 34.953 W78 23.110	N44 34.915 W78 23.104	18	Yes	Yes	Yes	Missing	17	Coolwater
7	N44 35.010 W78 22.900	N44 34.938 W78 22.868	36	Yes	Yes	Yes	6 gal	15	Coldwater
8	N44 35.058 W78 22.172	N44 34.941 W78 22.201	13	Yes	Yes	Yes	4	19	Coolwater
9	N44 35.015 W78 21.924		48	Yes	Yes	Yes	15	22	Coolwater
10	NA	N44 34.233 W78 22.827	No	Yes	Yes	Yes	22		Coolwater?

Co-ordinates obtained by GPS

Culvert diameter estimated in inches

Watercourse- The stream has a formed structure with formed banks in the majority of the area investigated

Water – Water present in watercourse when investigated

Flow – Water was flowing when stream investigated

Quantity Estimate- Amount of water flowing was estimated in gallons per minute

Temp. – Temperature in centigrade taken in shade and in flow under conditions allowing thermal regime determinations

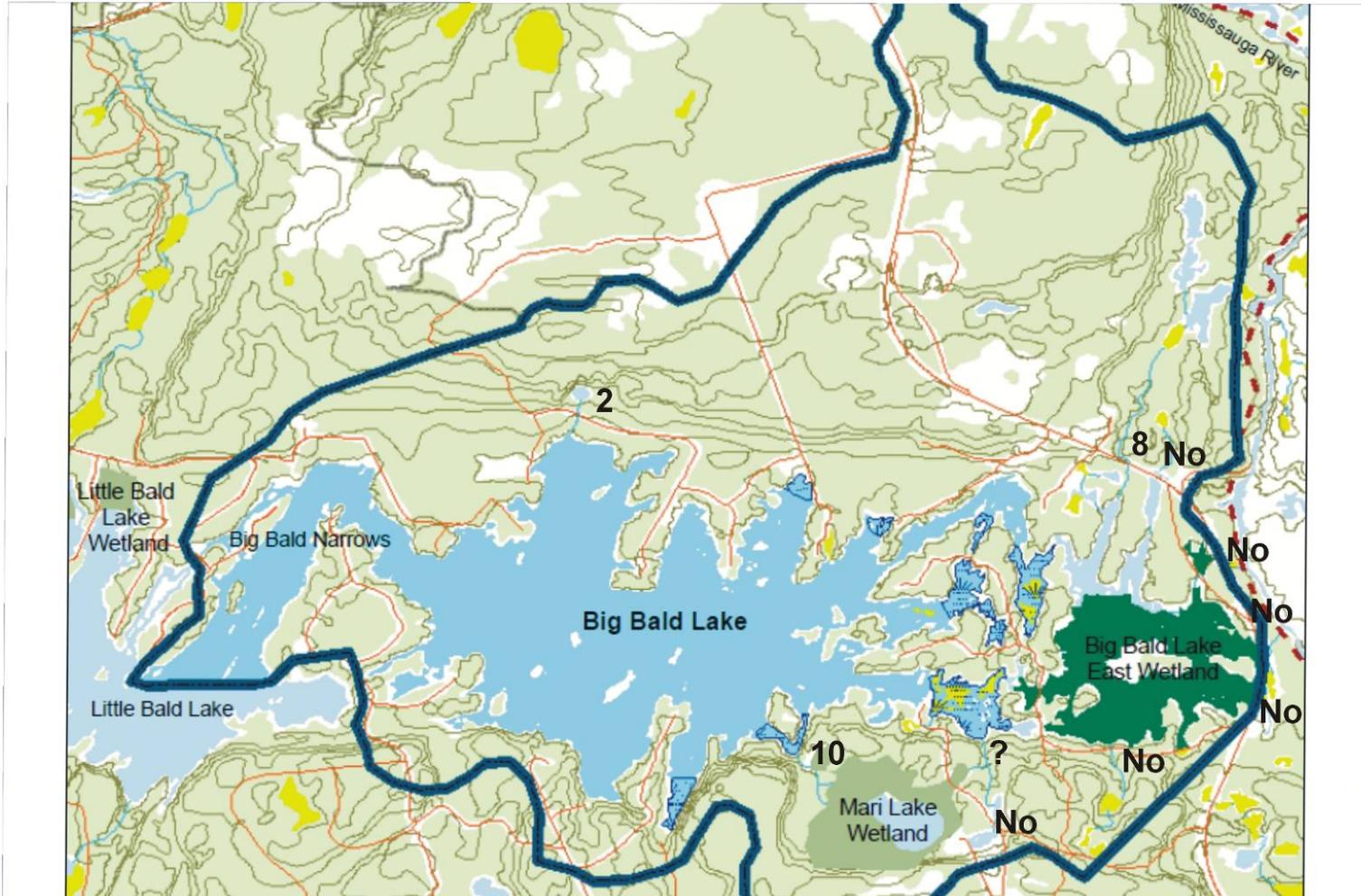
Thermal Regime – Thermal regime as defined by the Ontario Stream Protocol.

Big Bald Lake Stream and Wetland Investigations

Table 2. Information on owners of properties with streams

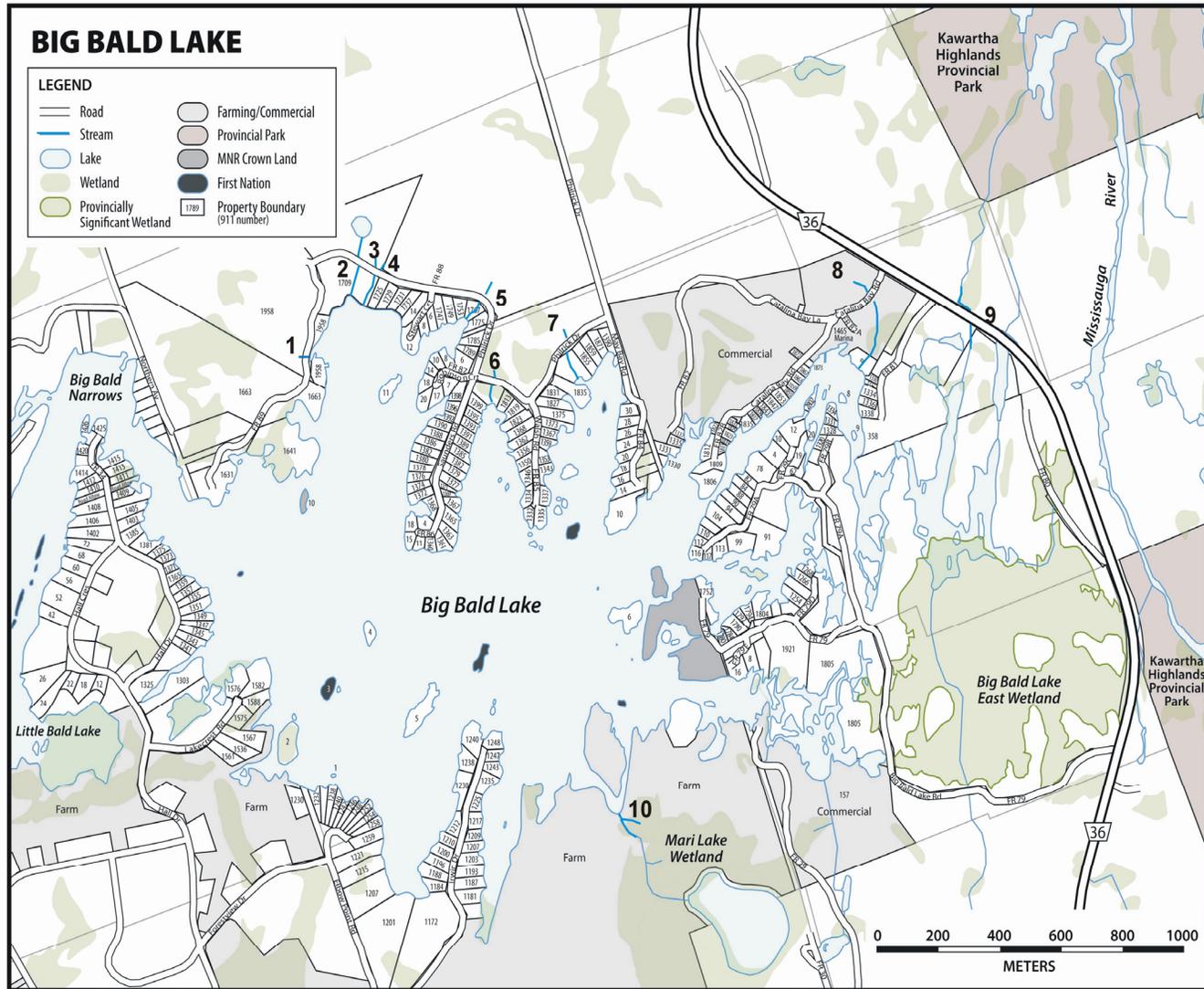
Stream #	911 No	Name of owners		Address of owners		
1	1958	unknown				
2	1709	Cooper	William & Marion	593 Lynden Rd	RR#8	Brantford
3	1709	Cooper	William & Marion	593 Lynden Rd	RR#8	Brantford
4	1709	Cooper	William & Marion	593 Lynden Rd	RR#8	Brantford
5	1767	Brown	Vivien & Mike	12 Fenwick Ave		Toronto
6	Crown					
7	Crown					
8	9 and 1465	Jones	Bill & Josephine	PO Box 142		Buckhorn
9	Unknown					
10	Unknown					

Map 1. Big Bald Lake Watercourses Previously Identified by Photo Interpretation

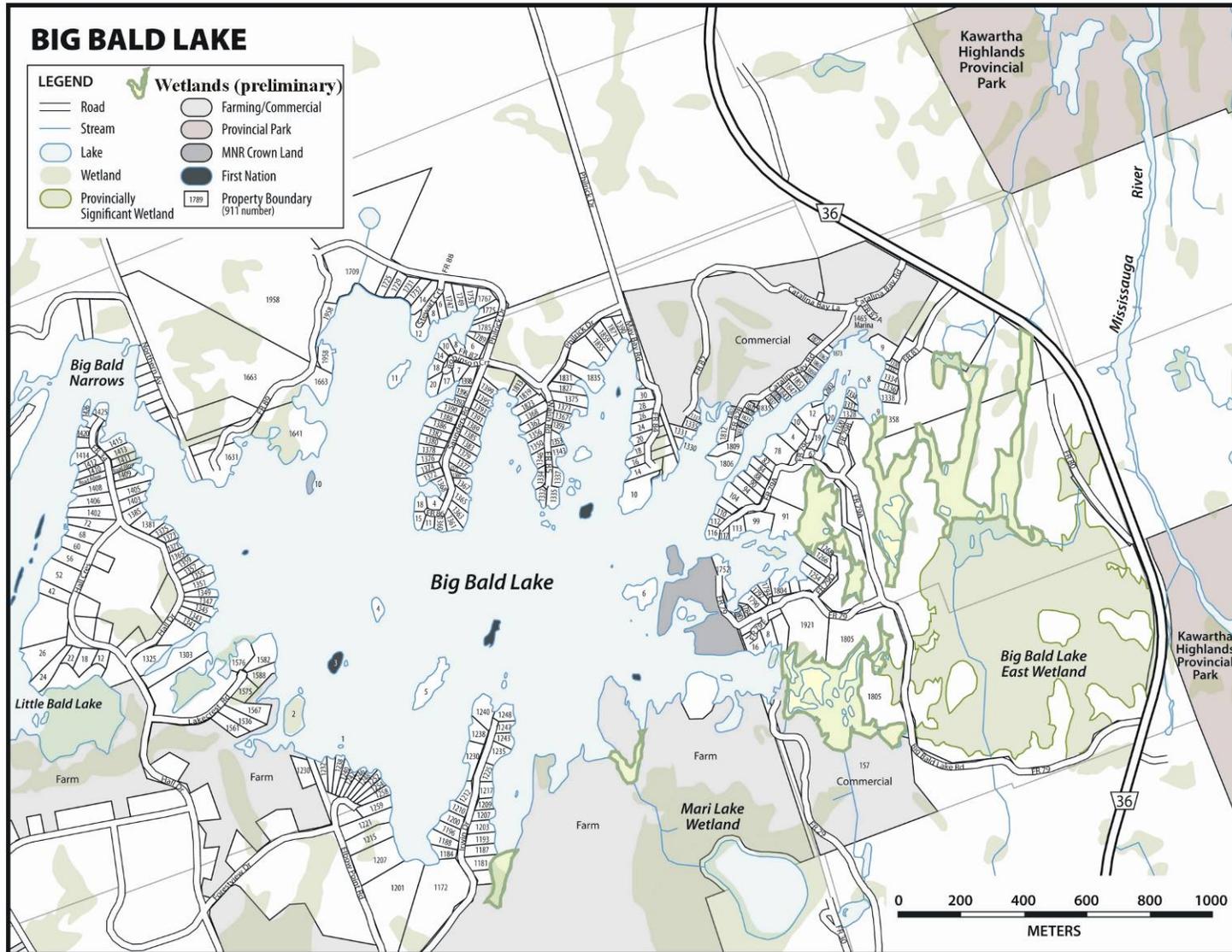


Numbered streams refers to streams identified on map and verified in field.
Streams marked with “No” were found not to exist.

Map 2. Locations of 10 streams investigated flowing into Big Bald Lake



Map 3. Preliminary Investigations of Wetlands in the East End of Big Bald Lake



STREAM PHOTOS



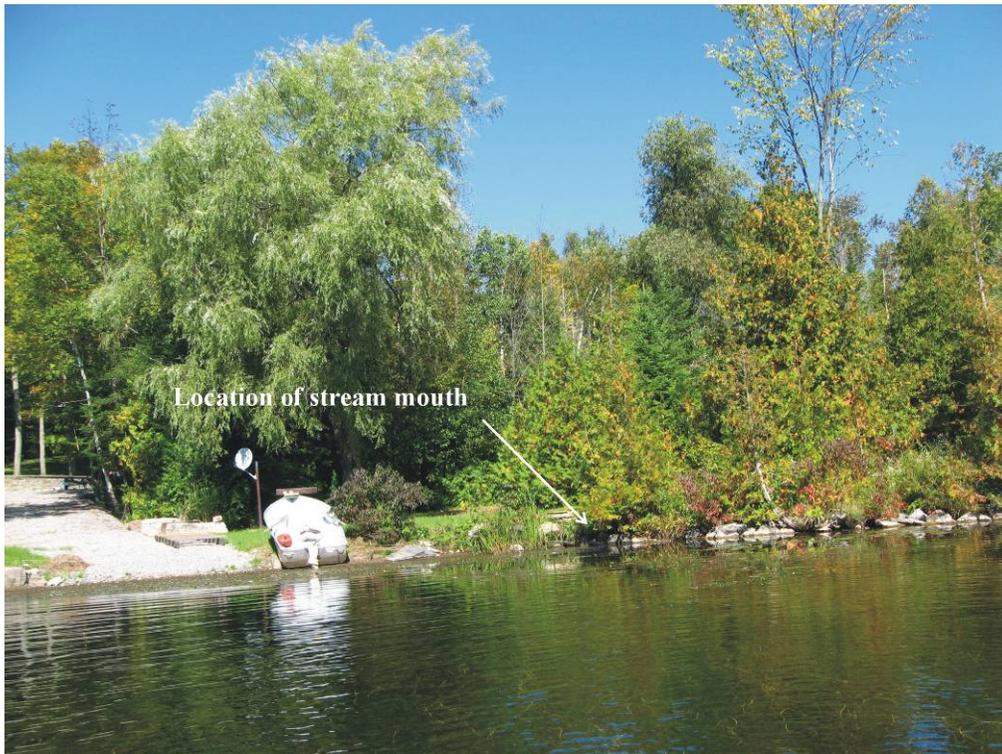
Stream 1. Stream opens into small marsh wetland.



Stream 1. Looking upstream from road and location of culvert into treed swamp



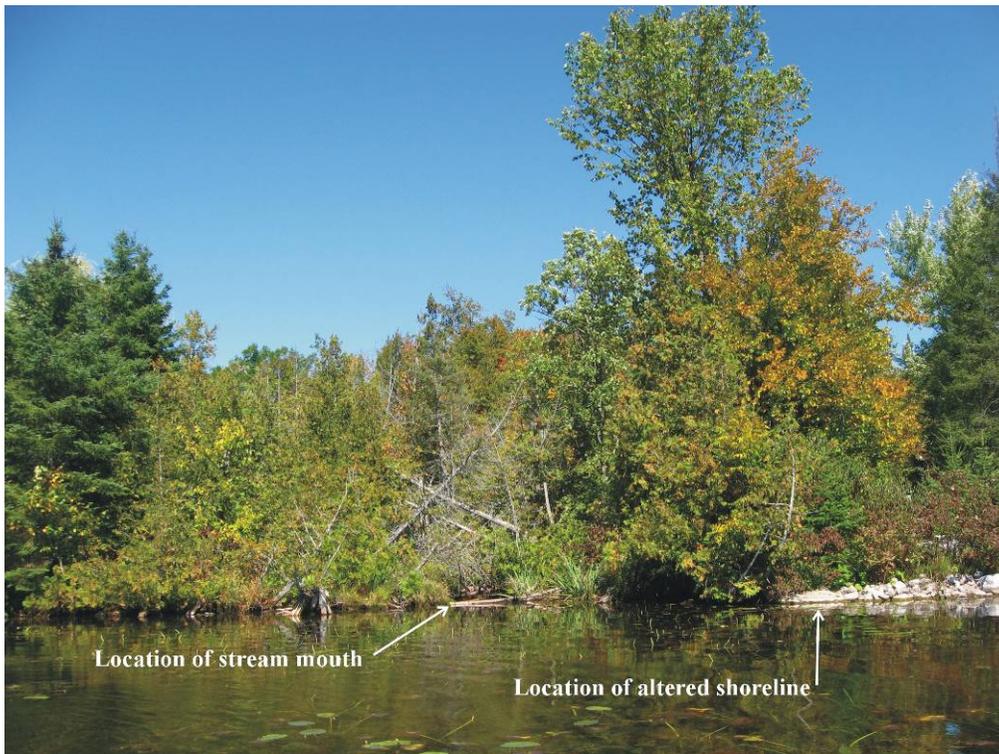
Stream 2. As it crosses Philrick Dr.



Stream 2. Stream enters lake near cottage.



Stream 3, 4. Stream mouth exiting through treed swamp.



Stream 3, 4. Stream mouth showing adjacent hardened shoreline.



Stream 5. A small cold water stream looking upstream to culvert.



Stream 5. Stream mouth located right at edge of dock



Stream 6. Stream through culvert on Philrick Dr



Stream 6. Location of stream mouth.



Stream 6. Stream mouth enters lake through a treed swamp



Stream 7. A cold water stream with a 36 inch diameter culvert.
Note perched culvert a potential barrier to fish movement.



Stream 7 Looking downstream showing watercourse characteristics.
Cyprinid fish were seen here



Stream 7. Stream characteristics in the lower section as it slows down and widens out before entering lake.



Stream 7. Stream enters lake through a treed swamp.



Stream #8. A cool water stream showing a perched culvert a serious barrier to fish movement.



Photo 8. Constructed in stream pond. Ponds such as this will increase stream temperatures.



Stream 8. Location of stream mouth in treed wetland with band of cattail and grasses in front.



Stream 9. One of the larger cool water streams showing watercourse characteristics.



Stream 10. Stream enters at the end of this small bay



Stream 10. Stream flows down steep hill through hardwood forest
(photo by Susan Lewin).

WETLAND PHOTOS



Wetland 1. Wetland on east side of Big Bald Lake showing sedges mixed with small open water areas.



Wetland 2. Wetland on east side of Big Bald Lake showing fen characteristics.



Wetland 3. Wetland on east side of Big Bald Lake showing shallow water marsh mixed with sedge habitat.

Appendix 1. Culverts investigated in Vicinity of Big Bald Lake –July 14, 2011

WP#	Co-ordinates	Culvert	Watercourse	Water	Flow
Stream 1	N44 34.991 W78 23.558	18	Yes	Yes	Yes
763	N44 34.989 W78 22.786	15	No	No	
765	N44 35.043 W78 22.829	12	No	No	
766	N44 35.010 W78 22.900	36	Yes	Yes	Yes
767	N44 34.975 W78 22.943	12	No	No	
770	N44 34.953 W78 23.110	18	Yes	Yes	Yes
771	N44 35.024 W78 23.109	12	No	No	
772	N44 35.080 W78 23.128	12	Yes	Yes	Yes
773	N44 35.096 W78 23.210	15	Yes	No	
774	N44 35.138 W78 23.381	18	Yes	Yes	Yes
774	N44 35.138 W78 23.381	13	Yes	Yes	Yes
775	N44 35.155 W78 23.421	13	Yes	Yes	Yes
779	N44 34.982 W78 22.306	13	Yes	Yes	Yes
782	N44 35.015 W78 21.924	48	Yes	Yes	Yes
783	N44 34.987 W78 21.835	24	No	Yes	No
785	N44 34.296 W78 21.660	15	No	No	No
786	N44 34.236 W78 21.760	13	No	Yes	No
787	N44 34.239 W78 21.955	12	No	No	
789	N44 34.407 W78 22.154	24	No		No
794	N44 34.684 W78 24.016	14	No	Yes	No
796	N44 35.028 W78 24.681	13	No	No	
797	N44 35.018 W78 24.211	12	No	No	
798	N44 35.009 W78 23.976	18	Yes	Yes	No
800	N44 34.762 W78 24.455	48	No	Yes	No
801	N44 34.777 W78 24.337	48	No	Yes	No

Stream 793 flows to Sandy Lake not Big Bald Lake