

**Appendix E: Marathon PGM Terrestrial Baseline Assessment 2009 (Northern Bioscience)**

# Marathon PGM

## Terrestrial Baseline Assessment 2009

# DRAFT

November 2009

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## Abstract

This report described a 2009 baseline environmental assessment for the Marathon PGM study area, 10 km north of Armstrong Ontario. It supplements the initial baseline assessment conducted in 2007 to 2008. Emphasis of the present study was on terrestrial habitat mapping, species at risk surveys, and caribou habitat assessment.

Terrestrial habitat is mostly (over 80%) birch forest on silty soils. Open rock barrens are common on hilltops. Jack pine and trembling aspen dominated forest are absent. Most of the forest is over 100 years old. Peatlands, cliffs, and other communities make up a small proportion of the study area.

Species at Risk (species listed under provincial or federal endangered species legislation) in the study area include three bird species. Canada warbler is a common nesting species in birch mixedwood forest. A single olive-sided flycatcher was observed and is a possible nesting species. A family group of rusty blackbirds at a wetland near the middle of the study area indicates that this species breeds here. Three other bird species at risk; peregrine falcon, common nighthawk and bald eagle; inhabit the surrounding area but were not observed in the study area. Peregrine falcon habitat in the study area is marginal (cliff faces less than 15 m high and less than 100 m long).

Five provincially rare plant species were observed in or adjacent to the study area: Appalachian firmoss, alpine woodsia, Braun's holly fern, alga pondweed, and shore plantain. These species are not listed under endangered species legislation but are considered to be rare in Ontario. Eleven regionally rare (i.e. rare in Thunder Bay District) were also discovered.

The study area itself lacks significant caribou winter or calving habitat, and there are no known records of caribou within about 20 km. However its position in the Lake Superior Coast Range means that the study area is considered to be caribou habitat. The area could function as a travel corridor connecting the Lake Superior coast with the Lake Superior Uplands and caribou ranges farther north.

Cover photo: Marathon PGM study area landscape.

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## Introduction

The Marathon PGM proposed mining project is located about 10 km north of Marathon Ontario. This report supplements the initial baseline assessment conducted in 2007 to 2008 (Golder Associates Ltd. 2009).

Emphasis of the present study is on terrestrial habitat mapping, species at risk surveys, and caribou habitat assessment.

## Methods

### Terrestrial Habitat Mapping

Terrestrial habitat was mapped based on Forest Resource Inventory (FRI) data supplemented with fieldwork, air photograph interpretation, and Northern Ontario Engineering Geology Terrain Study Maps (NOEGTS). Fieldwork focused on visiting representative vegetation types and communities and compiling notes on soils and vegetation.

### Species Surveys

Surveys for species at risk were conducted on 19 dates between March 20 and August 25 2009 (Table 1). Species identified as potentially occurring in the study area by Golder Associates Ltd. (2009) were targeted, particularly 10 species of vascular plants and two species of butterfly. Emphasis was placed on cliff and shoreline habitats and forest openings.

Additional searches were devoted to surveying for rare odonates (dragonflies and damselflies) and butterflies.

**Table 1. Field survey dates, Marathon PGM study area 2009. Personnel are Robert Foster (RFF), Allan Harris (AGH) and Brian Ratcliff (BR).**

Date	Personnel	Location
March 20	AGH, BR	Aerial survey
June 19 - 24	RFF, BR	Aerial survey, bird monitoring, species at risk surveys
July 14 - 18	RFF, AGH	Species at risk surveys, vegetation surveys
August 4 - 7	AGH, BR	Species at risk surveys, vegetation surveys
August 24 - 25	RFF, AGH	Species at risk surveys, vegetation surveys

Animal, plant, and plant community observations were recorded throughout the study area. Georeferenced (GPS) points were recorded throughout the study area (Figure 1).

Lists of vascular plants, birds, mammals, amphibians, butterflies, and odonates encountered during fieldwork are provided in Appendix 1 to Appendix 6. Scientific names of species mentioned in the text are provided in the appendices.

## **Bird Monitoring**

Bird monitoring was conducted on June 19 and 20 2009 at 33 stations (Figure 1) following the Forest Bird Monitoring Program (FBMP) protocol. This consists of a transect of three 10-minute listening stations, 200 m apart. Breeding status was assigned consistent with the approach used by the Ontario Breeding Bird Atlas (Cadman et al. 2008).

Additional records were compiled from the Ontario Breeding Bird Atlas database (2 atlas squares overlapping the study area; 16EV50 and 16EV40;) (Ontario Breeding Bird Atlas 2009) and a Breeding Bird Survey route (U.S. Department of the Interior 2009) at the south edge of the study area along Highway 17 (data available for 23 years between 1976 and 2004).

## **Aerial Surveys**

A helicopter survey of the study area was conducted on March 20 2009 (11:00 - 12:15 EDT). Target species were woodland caribou and other ungulates, but all observed tracks were recorded. We also surveyed cliffs for potential peregrine falcon nesting habitat to be revisited during the nesting season. Observers were Al Harris and Brian Ratcliff. The survey was conducted with a Bell Long Ranger at a height of 150 to 200 m and ground speed of about 70 to 90 km / hour. Transect spacing was approximately 1 km (Figure 9). The survey route was recorded as a GPS track and waypoints were recorded for all track sightings. Weather conditions were calm and mostly clear. Temperature was -7 °C at 11:00. There was continuous snow cover in the forest of 50 to 70 cm. There had been no fresh snow for approximately one week prior to the survey.

An aerial survey for peregrine falcons was conducted on June 23 2009 using the same aircraft. Conditions were clear and calm. Observer was Rob Foster.

## **Caribou Habitat Assessment**

Caribou habitat was assessed using Ontario's Landscape Tool (Elkie et al. 2009a, Elkie et al. 2009b). This model uses Forest Resource Inventory data to map caribou refuge habitat, winter habitat and habitat capability.

Anthropogenic disturbance was assessed and mapped on a 2 km X 2 km grid. Human disturbances in each grid square were identified using MNR GIS data, aerial photographs (2005

and 2008), topographic maps, and Google Earth. The following criteria were used to assign each grid square to a disturbance category:

Disturbance Category	Disturbance
<b>High</b>	<ul style="list-style-type: none"> <li>• Highway 17</li> <li>• Human habitation</li> </ul>
<b>Medium</b>	<ul style="list-style-type: none"> <li>• Utility corridor</li> <li>• Within 100 m of Highway 17</li> <li>• Drivable unpaved road</li> </ul>
<b>Low</b>	<ul style="list-style-type: none"> <li>• No active roads</li> <li>• May include older cutovers and inactive roads</li> </ul>

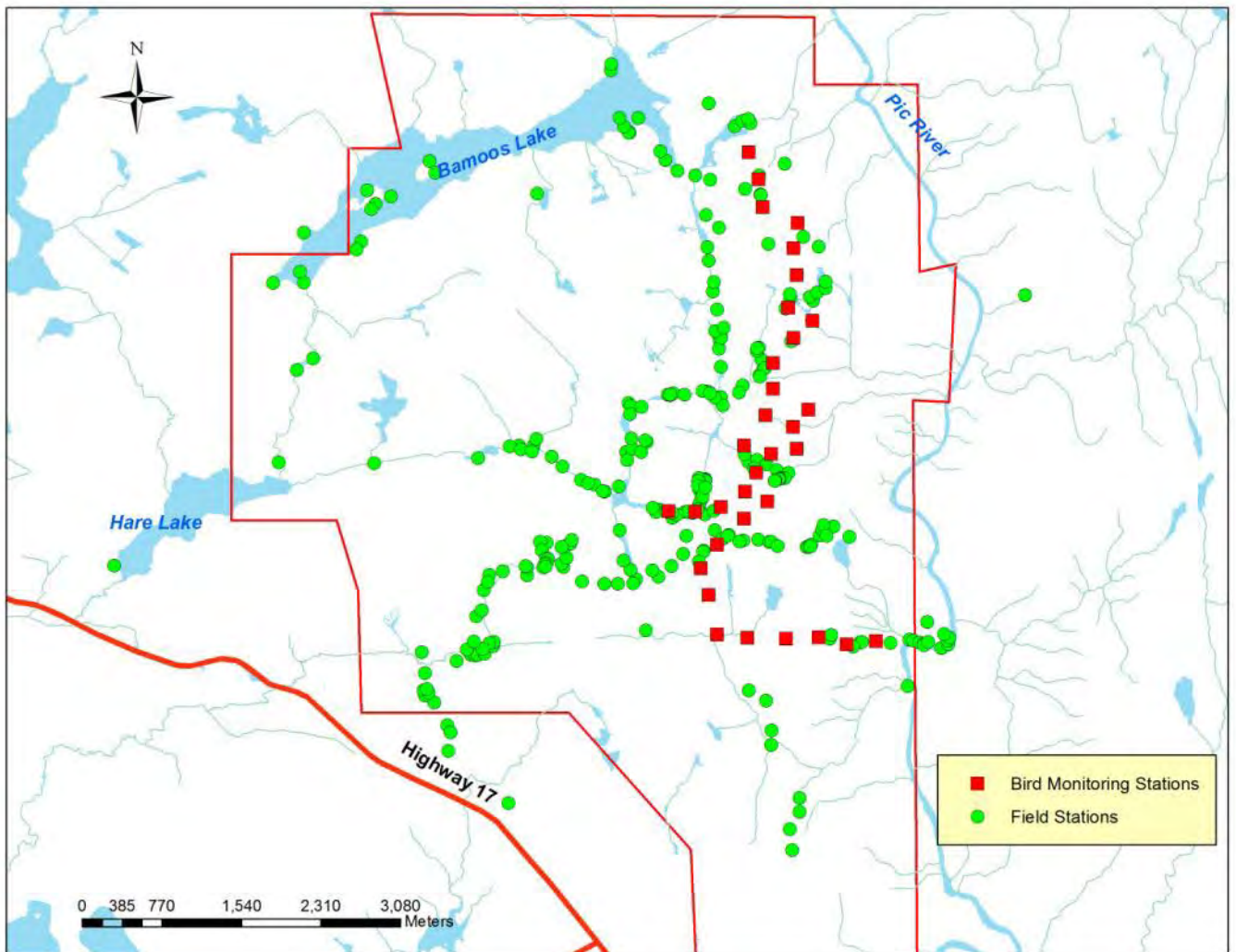


Figure 1. Field survey locations. Marathon PGM study area 2009.

## Results and Discussion

### Terrestrial Habitat

Table 1 is a summarizes habitats within the Marathon PGM study area. Two ecological land classifications (ELC) were used because the study area straddles the boundary between two OMNR ELC systems. Although the study area falls mainly within the range of the Northeastern Ontario classification system (Taylor et al. 2000), the Northwestern Ontario system (Racey et al. 1996) was applied to non-forested communities since an equivalent wetland ELC does not exist for northeastern Ontario. ELC site types and ecosites were not mapped in Forest Resource Inventory and areas presented in Table 1 were estimated based on fieldwork and aerial photos.

The study area consists of steep bedrock knob topography with prominent east-west oriented valleys (Figure 2, Figure 5). Silty glaciolacustrine deposits cover most of the study area (Figure 2). Deep, moist silty soils are found along the Pic River. Shallower silty soils are found on slopes and hilltops. Some smaller areas of sandy, ice-contact delta occur in the south end of the study area.

Birch-dominated mixedwood forest (NE 3a and NE 6a; Taylor et al. 2000) makes up about 70% of the study area (Figure 3, Figure 6). Balsam fir, black spruce and white spruce are the most common secondary tree species, usually with a rich understorey of mountain maple, beaked hazel, and other tall shrubs. White birch - black spruce stands on shallow (less than 30 cm) silty soils (NE 1) are common on slopes and tops of low hills. Some of the white spruce are large diameter, supercanopy trees, extending above the main birch canopy.

Upland black spruce dominated stands on silty soils (NE 5a, NE 9) occur in small patches. These stands almost always include balsam fir and white birch and a tall shrub understorey. Black spruce forest on peat (NE 11, NE 13, NE 14) are uncommon (total area about 17 ha) and is confined to a few small bedrock depressions filled with organic soils.

Stands dominated by jack pine and trembling aspen are absent although these species are generally common in northwestern Ontario.

Most of the forest is greater than 100 years old (Figure 4, Figure 7). A few pure white birch stands in the southern part of the study area along the Pic River are approximately 20 years of age and apparently originated from logging. There have been no recent forest fires in the study area. Much white birch forest is classified as "old growth" according to provincial standards (Uhlig et al. 2001). Onset of old growth in white birch stands is 90 to 110 years depending on site type.

Non-forested communities (other than rock barrens) cover less than 5 % of the study area and are discussed in Table 1.

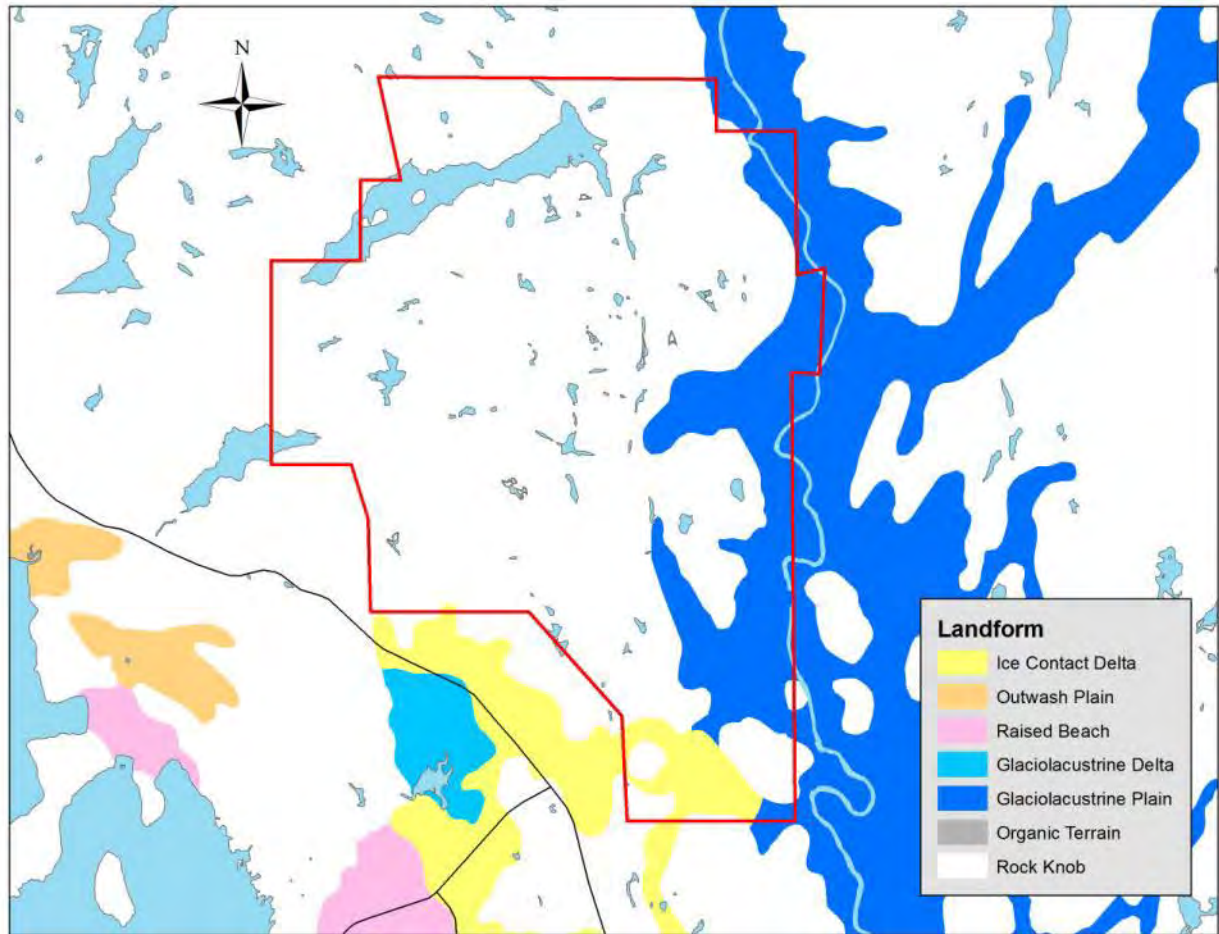


Figure 2. Landforms of the Marathon PGM study area (Northern Ontario Engineering Geology Terrain Study data).

**Table 2. Ecological land classification for the Marathon PGM study area. Northeastern Ontario Forest Ecosystem classification sites types (NE) (Taylor et al. 2000) are provided for forested conditions. Northwestern Ontario Ecosites (NW) (Racey et al. 1996) are provided for non-forested conditions.**

Site Type / Ecosite	Description	Notes
NE 1	Very Shallow Soil	Black spruce and white birch stands with less than 30 cm of soil. Common on valley slopes.
NE 3a	Mixedwood-Medium Soil	Birch dominated mixedwoods make up about 70% of the study area. Balsam fir, black spruce and white spruce are the common secondary tree species. Usually with a rich understory of mountain maple, beaked hazel and other tall shrubs.
NE 6a	Mixedwood-Fine Soil	
NE 5a	Black Spruce-Fine Soil	Upland black spruce stands on silty soils. Almost always with balsam fir and white birch and a tall shrub understory.
NE 9	Conifer-Moist Soil	
NE 7a	Hardwood-Fine Soil	Pure white birch stands mainly in the southern part of the study area along the Pic River. Total area 173 ha. Mostly young stands (approximately 20 years) apparently originated from logging.
NE 11	Black Spruce-Labrador Tea	Lowland black spruce stands on organic soils make up about 20 ha. In valley bottoms and bedrock depressions.
NE 13	Conifer-Speckled Alder	
NE 14	Black Spruce- Leatherleaf	
NW ES1	Beach / Bar	Very small sand beach present at the west end of Bamoo's Lake
NW ES4	Cliff	Several small cliffs up to about 12 m high. Larger cliffs have a band of talus at the base.
NW ES5	Talus or Steep Slope	
NW ES7	Rock Barren	Several extensive areas of rock barren present totaling almost 53 ha. Vegetation is predominantly <i>Cladonia</i> lichens, blueberries, and other low shrubs.
NW ES40	Treed Fen: Tamarack- Black Spruce / Sphagnum: Organic Soil	Peatland communities confined to small areas in bedrock basins, isolated from lakes and streams. Area is less than 2 ha
NW ES41	Open Poor Fen: Ericaceous Shrub / Sedge / Sphagnum: Organic Soil	
NW ES44	Thicket Swamp: Organic-Mineral Soil	Alder thickets on stream floodplains. Total area 32 ha.
NW ES45	Shore Fen: Organic Soil	Located on shores of lakes and streams. Vegetation consists of sedges, grasses and low shrubs. Total area is 42 ha
NW ES46	Meadow Marsh: Organic-Mineral Soil	
NW ES47	Sheltered Marsh: Emergent: Sedimentary Peat Substrate	Small areas in sheltered bays on lakes.
NW ES49	Open Water Marsh: Submergent / Floating-leaved: Sedimentary Peat Substrate	

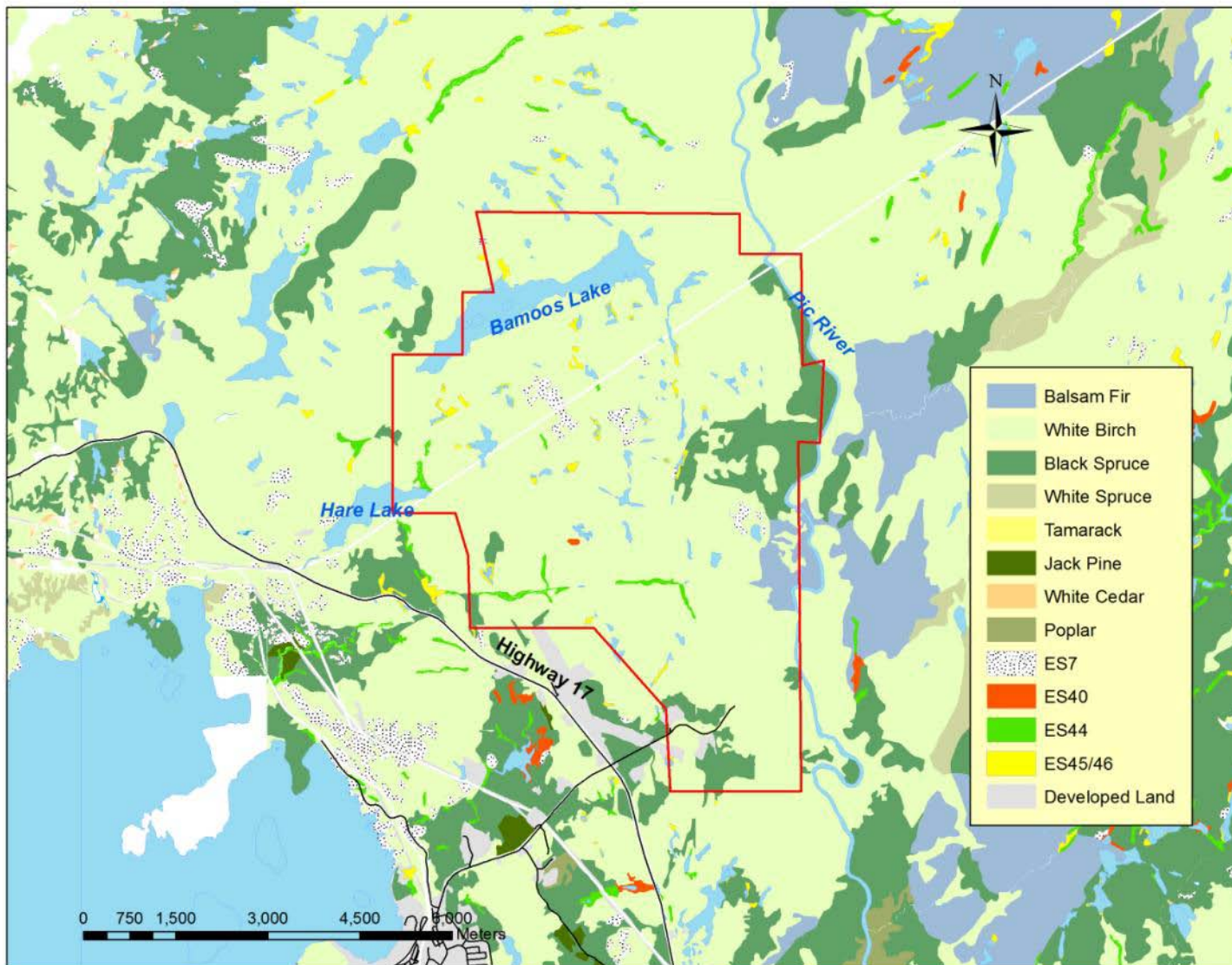


Figure 3. Vegetation map of the Marathon PGM study area showing dominant tree species (OMNR data) for forest communities and Northwestern Ontario ecosites for non-forested communities (refer to Table 1 for details).

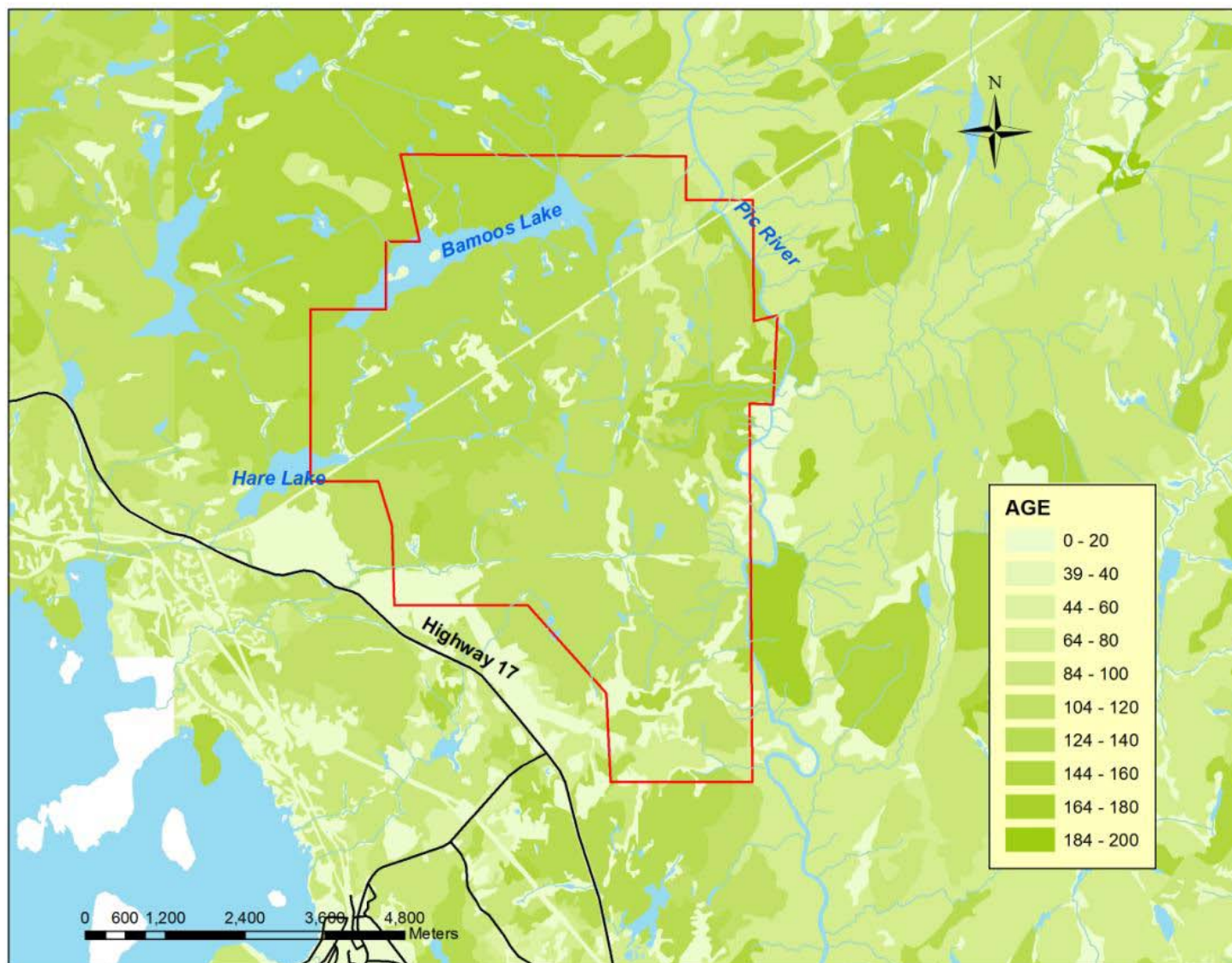


Figure 4. Forest age class (years) composition (OMNR data) in Marathon PGM study area.



**Figure 5. Typical landscapes with white birch and balsam fir forest.**

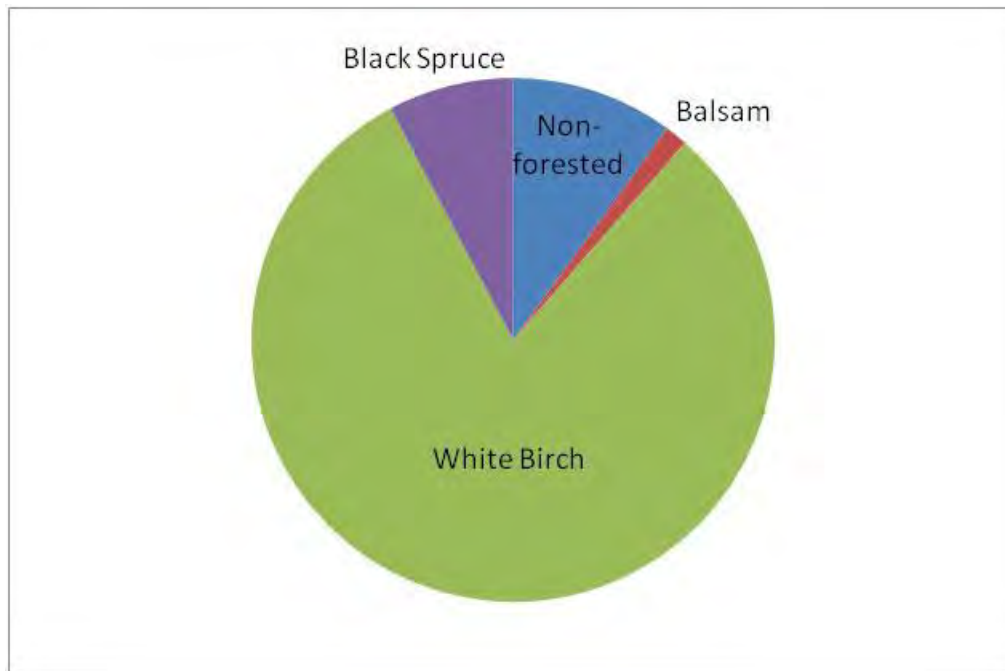


Figure 6. Forest composition (working groups) in the Marathon PGM study area (OMNR data).

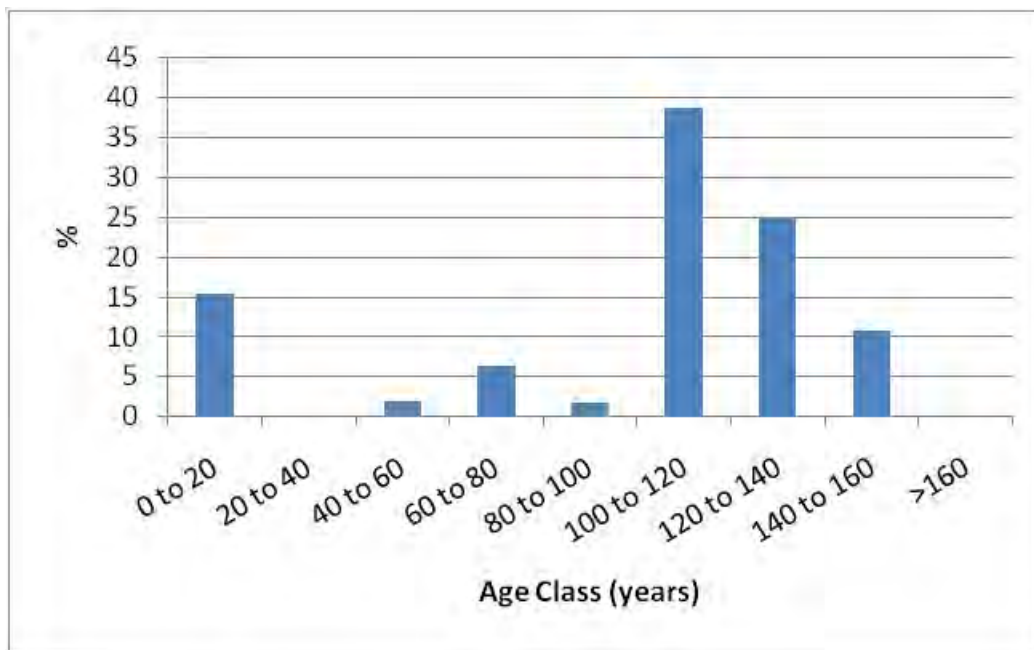


Figure 7. Forest age class (years) distribution in the Marathon PGM study area (OMNR data).

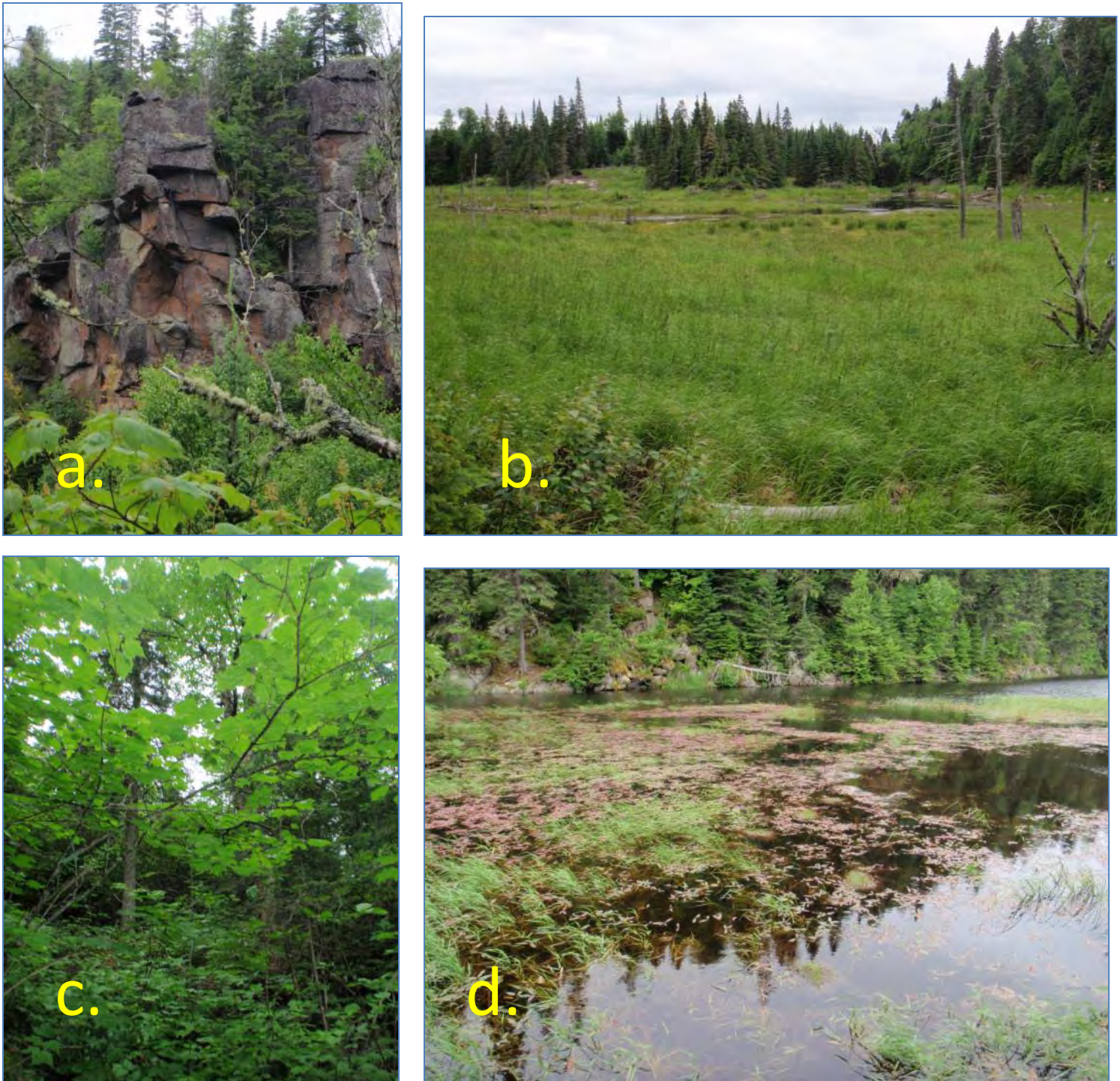


Figure 8. (a) Cliff (Ecosite 4), (b) meadow marsh (Ecosite 45), (c) white birch mixedwood forest (Site Type 3a), (d) sheltered marsh (Ecosite 47).

## Vascular Plants

A total of 291 vascular plant species was observed in the study area (Appendix 1). Most species are typical boreal forest plants that are common throughout northwestern Ontario.

Several species of arctic-alpine disjunct plant species, including fragrant cliff fern, glaucous blue grass, alpine bistort, rock cranberry, northern woodsia, and smooth woodsia were discovered on cool, north-facing cliffs. These species are significant because they are geographically separated from their main ranges in arctic and alpine regions in northern and western Canada.

Thirty non-native plant species were discovered, mainly along roads and trails. Typical non-native species along the old logging road included clovers (*Trifolium* spp.), common dandelion, ox-eye daisy, and common plantain.

Rare plant species are discussed under *Species at Risk*.

## Birds

A total of 64 bird species was observed in the study area in 2009, with an additional 58 species reported from the surrounding area during the Ontario Breeding Bird Atlas (2000 – 2005) or on the Breeding Bird Survey south of the study area (U.S. Department of the Interior 2009). Most of these species probably nest in the study area (Appendix 2). The species composition and density is typical of a mature mixedwood forest bird community, with a diversity of warblers, thrushes, sparrows, and vireos. White-throated sparrow, Black-throated green warbler, and winter wren are the most common species (Table 2). Forest Bird Monitoring data are in Appendix 9 and Appendix 10. Rare bird species are discussed under *Species at Risk*.

**Table 3. The most common bird species recorded in Forest Bird Monitoring stations (totalling 90% of birds tallied) in the Marathon PGM study area, June-July, 2009.**

Species	n
White-throated Sparrow	68
Black-throated Green Warbler	49
Winter Wren	42
Swainson's Thrush	34
American Redstart	28
Red-eyed Vireo	26
American Robin	22
Least Flycatcher	19
Mourning Warbler	16
Nashville Warbler	16
Magnolia Warbler	14
Ovenbird	12
Cedar Waxwing	8
Yellow-rumped Warbler	8

## **Mammals**

A total of 11 mammal species (Appendix 3) was observed in the study area. No small mammal trapping was conducted, so this list should be considered incomplete. Typical boreal fauna such as black bear, moose, timber wolf, beaver, and red fox are present. Woodland caribou were not observed, but are discussed under *Species at Risk* below. No white-tailed deer sign was observed.

The March 2009 aerial survey results are summarized in Figure 9. Moose tracks were seen at five locations and unknown ungulate tracks were at six locations. The unknown ungulate tracks were probably those of moose, given the absence of definitive caribou sign such as cratering, slush pits, or groups of tracks from multiple animals. No animals were sighted. Moose sign was relatively scarce during the winter survey, perhaps due to the generally poor winter habitat (sparse mixedwood forest cover) (Figure 5). Additional species observed include red fox, river otter, timber wolf, and snowshoe hare.

Beaver lodges are present on many lakes and streams in the study area. Distribution of active lodges is shown in Figure 10. This distribution could serve as a baseline for future monitoring.

No moose were observed directly in 2009 during summer fieldwork, but tracks and droppings were commonly seen, particularly along trails, roads, and cut lines. Moose browse, particularly mountain maple, was relatively abundant in overmature mixedwoods where the overstorey was breaking apart and there was a dense shrub understorey. A Class 4 (very high potential; Ranta 1993) moose aquatic feeding area is present on a small stream about 600 m south of the west end of Bamooos Lake (OMNR data).

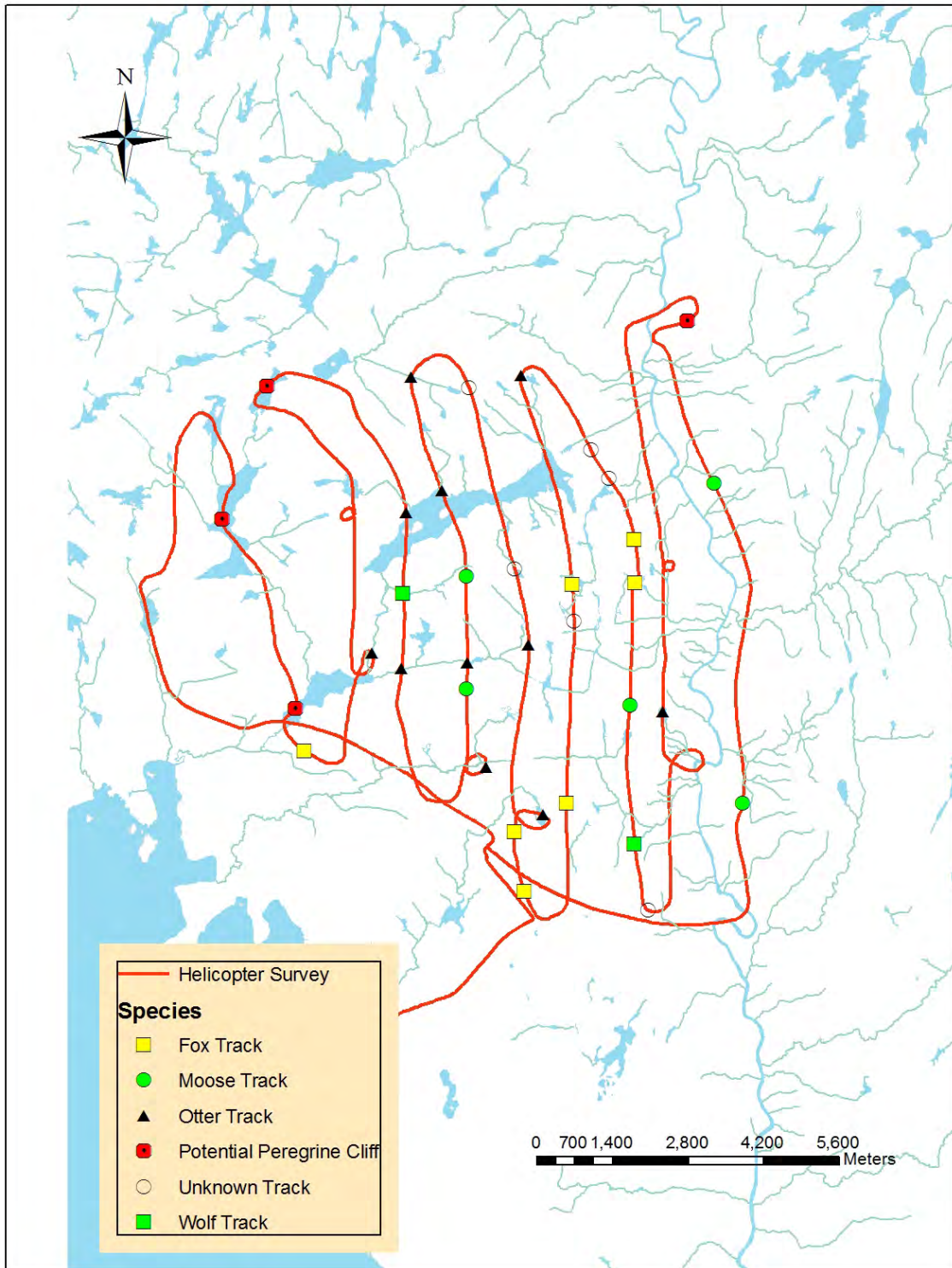


Figure 9. Helicopter survey route March 20 2009. Marathon PGM study area.

## **Amphibians**

Seven species of amphibians were observed in the study area, none of them provincially rare (Appendix 4). No reptiles were observed. The early season breeders (spring peeper, wood frog, American toad) had dispersed from their breeding pools by the time fieldwork was initiated, but were commonly observed in forest habitat. Mink frogs were heard calling in small lakes and ponds on several occasions in mid summer and apparently breed there. A single green frog was heard in similar habitat on August 5, 2009. Two salamander species, red-backed and blue spotted, were seen on one occasion each. These species are uncommonly seen north of Lake Superior (Foster et al. 2004).

## **Invertebrates**

Twelve species of butterflies (Appendix 5) and 19 species of dragonflies and damselflies (odonates) were observed in the study area in 2009 (Appendix 6). Most of the odonate species were associated with lakes, ponds, or small streams. Relatively few clubtail (Gomphidae) species, usually associated with larger, fast-flowing streams, were observed.

No rare species of butterflies or odonates were observed despite targeted surveys. The cold, wet conditions that predominated during 2009 fieldwork meant that few butterflies or odonates were flying and reduced the likelihood of finding rarer species. Two rare butterflies identified by Golder Associates Ltd. (2009) as potentially occurring in the study area (large marble (*Euchloe ausonides*) and taiga alpine (*Erebia mancinus*) were not confirmed in the present study.

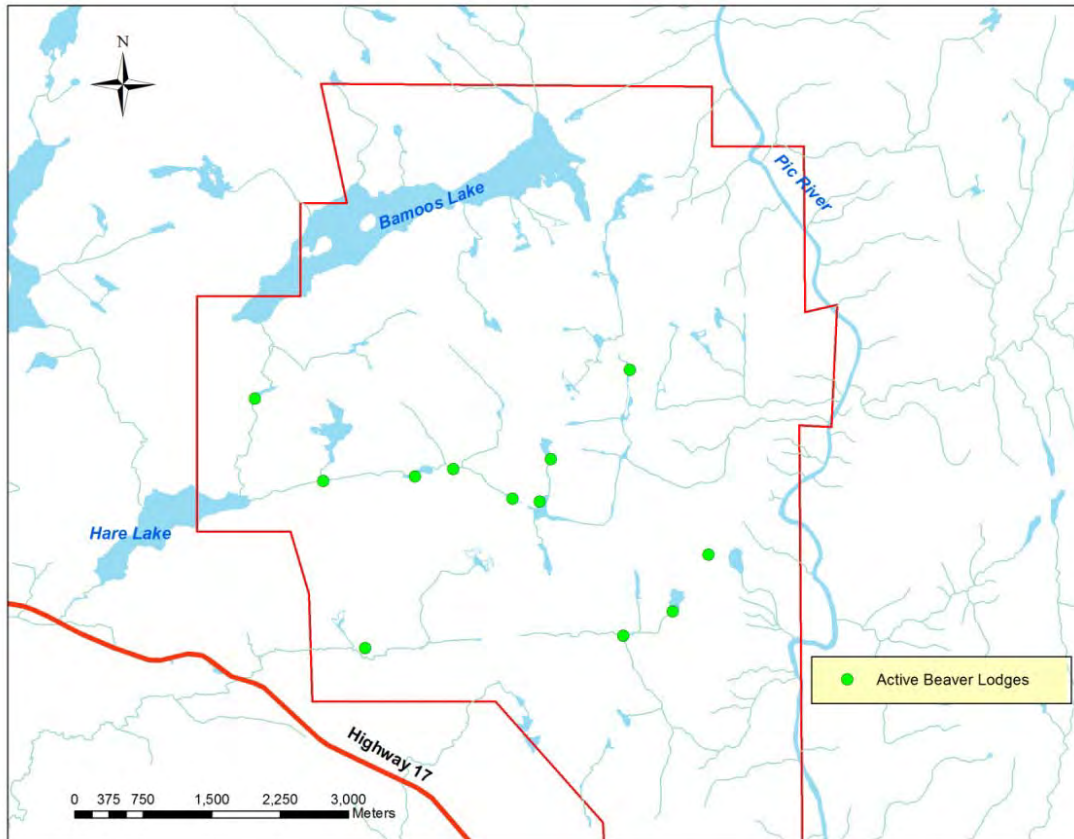


Figure 10. Active beaver lodges 2009. Marathon PGM study area.

## Species at Risk

The following species are designated as Species At Risk (SAR) and are therefore protected under provincial or federal legislation. Locations are shown in Figure 12 and details provided in Appendix 8.

### **Canada Warbler (Threatened Nationally; Special Concern in Ontario)**

Canada warbler is a common nesting species in birch-dominated mixedwood forest in the study area. Seventeen were observed during species at risk encounter surveys and the species was detected at 4 out of 31 FBMP stations (total of 5 birds). Canada warblers were also recorded every year of 23 years of Breeding Bird Survey south of the study area (1976 to 2004) with a maximum count of 15 in 1985.

### **Rusty Blackbird (Special Concern Nationally; Not at Risk in Ontario)**

The discovery of a family group of rusty blackbirds on a beaver meadow indicates that this species nests in the study area. Searches of similar habitat elsewhere in the study area failed to find any more individuals. Typical habitat includes shorelines and open wetlands.

**Olive-sided Flycatcher (Threatened Nationally; Special Concern in Ontario)**

A single olive-sided flycatcher was seen on the shore of a small lake southeast of Bamooos Lake. The presence of this species in June suggests that it nests in the study area, but no singing males or other nesting evidence was observed. This species was reported on 2 years (1979 and 1980) of 23 years of Breeding Bird Surveys south of the study area. Typical habitat is shorelines and peatlands with scattered trees.

The following three bird species were not recorded in the study area, but are known to nest in the surrounding landscape.

**Common Nighthawk (Threatened Nationally; Special Concern in Ontario)**

Although no common nighthawks were observed in 2008 or 2009, this species was tallied once (1998) in the Breeding Bird Survey south of the study area. It may be an uncommon nesting species in the study area, preferring open bedrock ridges, burns and cutovers.

**Peregrine Falcon (Special Concern Nationally; Threatened in Ontario)**

No peregrine falcons were observed in the study area in 2009. OMNR data shows the nearest nest location about 8 km west of the study area. An aerial survey in March 2009 found four potential nesting cliffs just outside the study area (Figure 11). However a follow-up aerial survey in June 2009 found no evidence of nesting on these cliffs. Cliff habitat within the study area were classified as "marginal" habitat value (cliff faces less than 15 m high and less than 100 m long; Brian Ratcliff pers. comm.).

**Bald Eagle (Not at Risk Nationally; Special Concern in Ontario)**

Bald eagles are not known to nest in the study area. This species is apparently an uncommon nesting birds in the Marathon area. No nests or birds were observed in 2009 fieldwork, although a single adult was observed near the Marathon Airport in 2008 (Golder Associates Ltd 2009). None were reported in 23 years of Breeding Bird Surveys along Highway 17 at the south edge of the study area. OMNR data show the nearest nest bald eagle nest at about 11 km north of the study area (there is an unknown raptor species stick nest about 3 km southeast of the study area).



**Figure 11. Potential peregrine falcon nesting cliff at Seeley Lake (in background), west of the Marathon PGM study area.**

### **Rare Plants**

The following plants are designated as provincially area (S1 to S3; NHIC 2009) but are not listed under endangered species legislation. Locations are shown in Figure 14 and Figure 15 and details are provided in Appendix 8.

#### *Appalachian Firmoss (S3)*

A few individuals of this species were discovered growing in a bedrock crevice on the south shore of Bamooos Lake (Figure 16).

#### *Alpine Woodsia (S2)*

A small population of this fern was discovered in on a north-facing cliff. Alpine woodsia is an arctic-alpine disjunct species, found in colder than average microclimates outside its typical range.

#### *Braun's Holly Fern (S3)*

A single patch of Braun's holly fern grows in a wooded valley between two cliffs near the centre of the study area.

#### *Alga Pondweed (S2)*

This aquatic species was discovered in two lakes in the study area (Figure 13). It was quite abundant where it did occur, forming dense mats on the lake beds. Alga pondweed is easily overlooked and may be more common in the study area.

*Shore Plantain (S3)*

Shore plantain grows on a sand beach at the west end of Hare Lake (Figure 17). This location is just outside the study area.

**Regionally Rare Plants**

Eleven plant species that are rare in Thunder Bay District (TBFN 2003) are found in the study area (Figure 15, Appendix 8). Although rare in Thunder Bay District (found at <6 locations) these plants are common elsewhere in Ontario. Notable among these is Oake's pondweed, which was not previously known to occur in Thunder Bay District (TBFN 2003). This aquatic plant was discovered at six locations in small lakes.

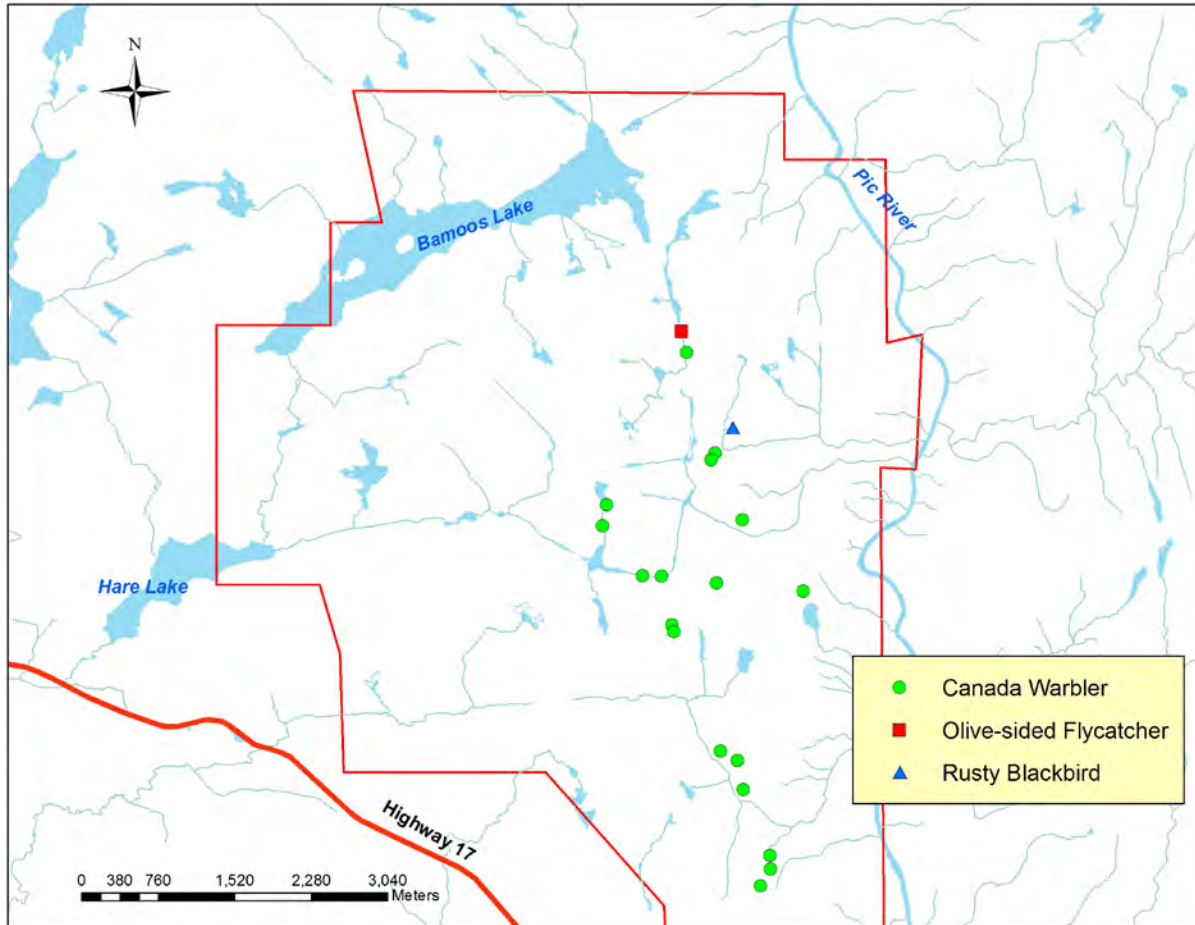


Figure 12. Map of Marathon PGM study area showing rare bird locations.



Figure 13. Alga pondweed (*Potamogeton confervoides*), a provincially rare plant, occurs in several small lakes.

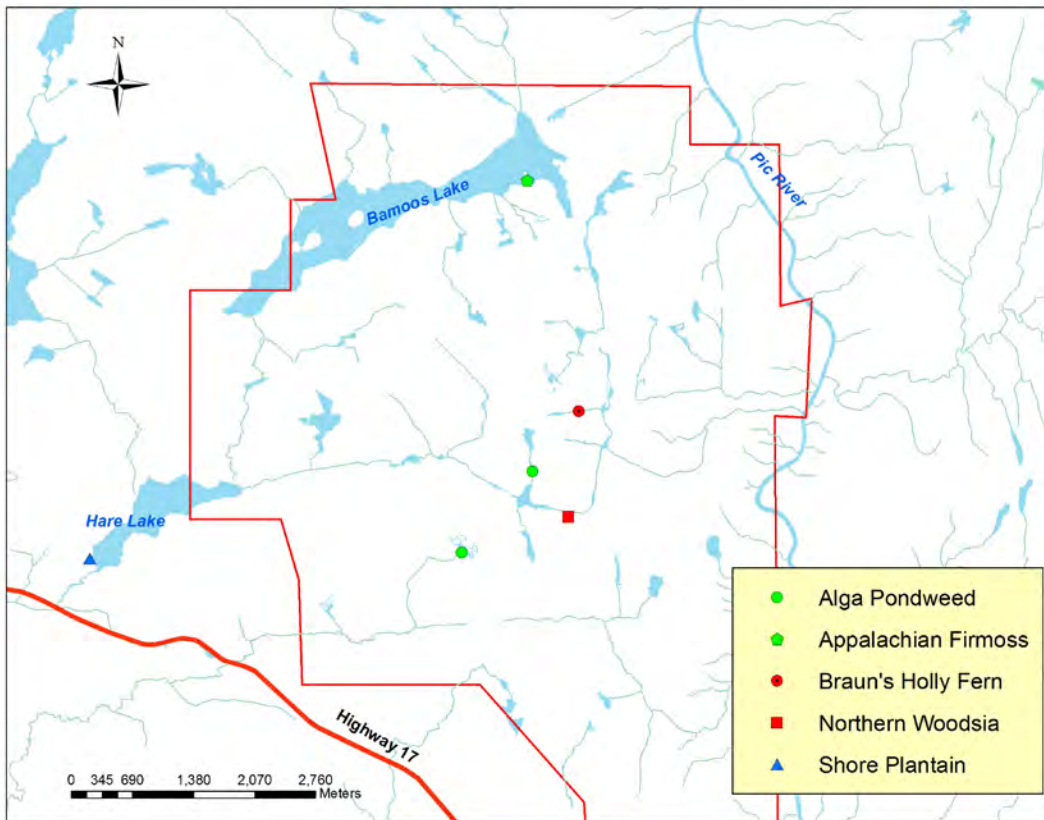


Figure 14. Map of Marathon PGM study area showing provincially rare plants locations.

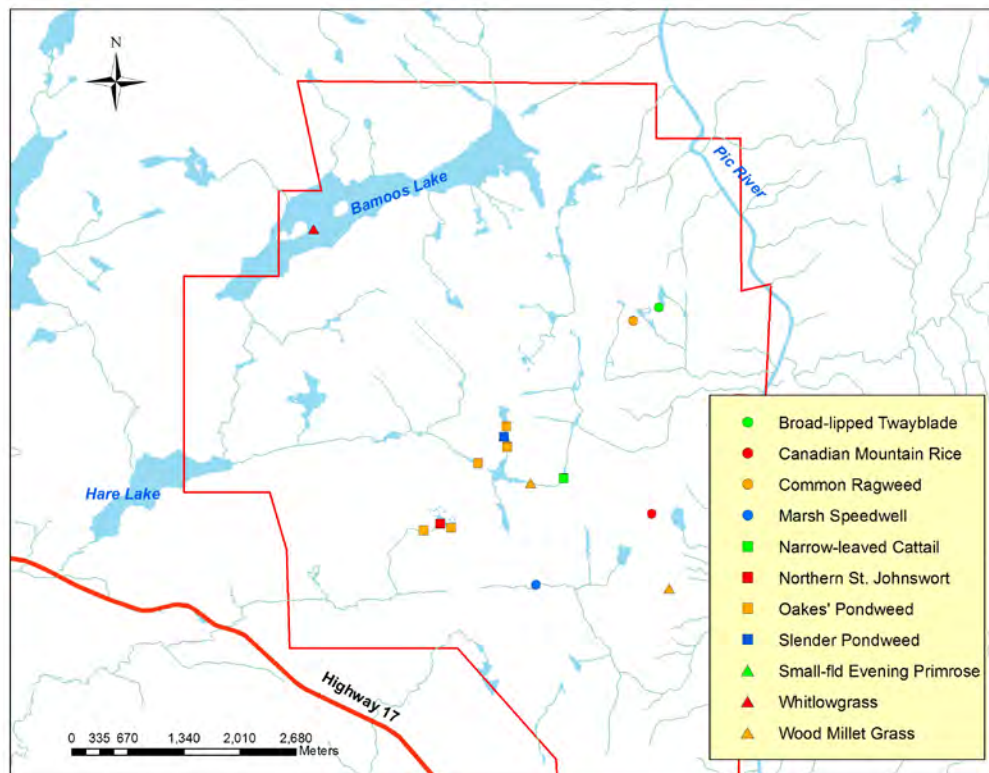


Figure 15. Map of Marathon PGM study area showing regionally rare plants locations.



Figure 16. Appalachian fir moss (*Huperzia appalachiana*) growing in a bedrock crevice on Bamooos Lake shoreline.



Figure 17. Shore plantain (*Littorella americana*) grows on a beach on Hare Lake.

## **Woodland Caribou (Threatened Nationally; Threatened in Ontario)**

Woodland caribou are classified as Threatened in Ontario under the *Endangered Species Act 2007*. Historically, caribou probably occupied the study area, but their range has receded northward in Ontario leaving several small residual populations along the Lake Superior coast. The range recession is associated with habitat changes due to human settlement and forest fragmentation (Schaefer 2003). These habitat changes have caused changes in the predator-prey balance, increased hunting mortality, and displacement due to increased human activity.

No evidence of woodland caribou was observed in the present study. Survey effort included an aerial survey in March; searching shorelines, trails and roads for tracks; and searching bedrock barrens for pellets or evidence of winter feeding (cratering). OMNR records included no caribou records in or adjacent to the study area. The nearest known extant caribou populations are in Neys Provincial Park at Pic Island (about 20 km to the west), in Slate Islands Provincial Park (about 50 km to the west), and Pukaskwa National Park (about 30 km to the south). In addition, there are a number of scattered records of individual animals or small groups from the north shore, possibly representing individual animals, rather than established populations (OMNR data).

Despite the lack of recent caribou records, the study area is considered to be caribou habitat since this species uses habitat at various spatial scales. We examine habitat at three scales:

1. Local Scale (study area)
2. Landscape Scale (approximately Terrace Bay to Pukaskwa National Park), and
3. Range Scale

### **Local Scale**

The study area lacks large tracts of mature coniferous forest (Figure 3) where caribou can isolate themselves from moose and deer and their associated predators (Ontario Woodland Caribou Recovery Team 2008). Typical calving habitat, including large lakes (Ontario Woodland Caribou Recovery Team 2008) with islands and extensive peatlands (where cows and isolate themselves from predators) is also lacking. Some rocky hilltops with lichen cover (Figure 18) are potential winter habitat and could support caribou moving through area, particularly in winter. The predominantly hardwood forest of the study area (Figure 3) may support high moose and predator populations and therefore be unsustainable for caribou.

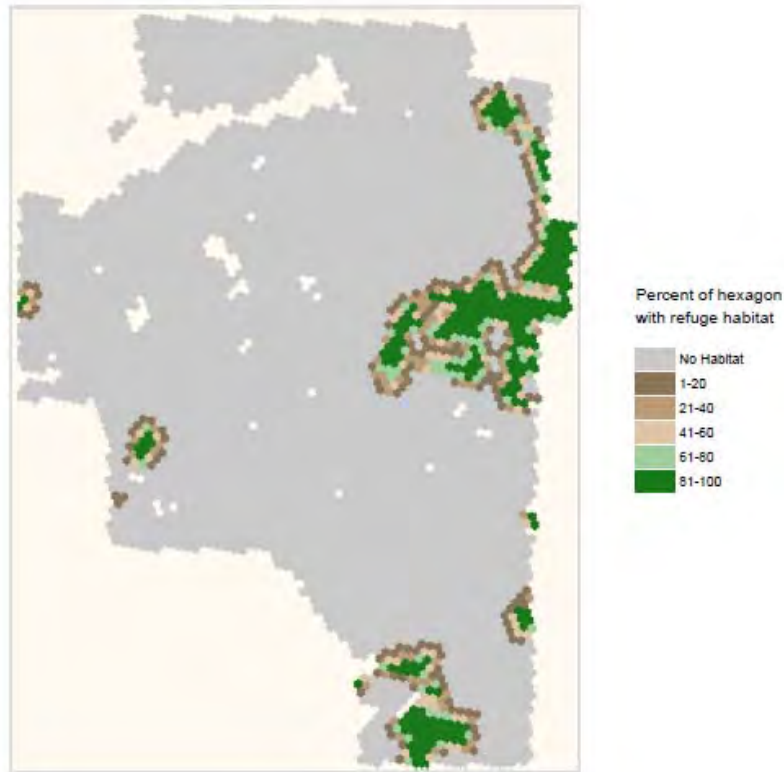


**Figure 18. Terrestrial lichens on rocky hilltops may provide small patches of woodland caribou habitat.**

The following assessment of Refuge Habitat, Winter Habitat, and Capable Habitat is based on output from Ontario's Landscape Tool (Elkie et al. 2009b). These analyses are more meaningfully conducted at a larger scale as part of the range assessment (see *Range Management*), but will give a preliminary picture of the status of caribou habitat in the study area.

#### *Refuge Habitat*

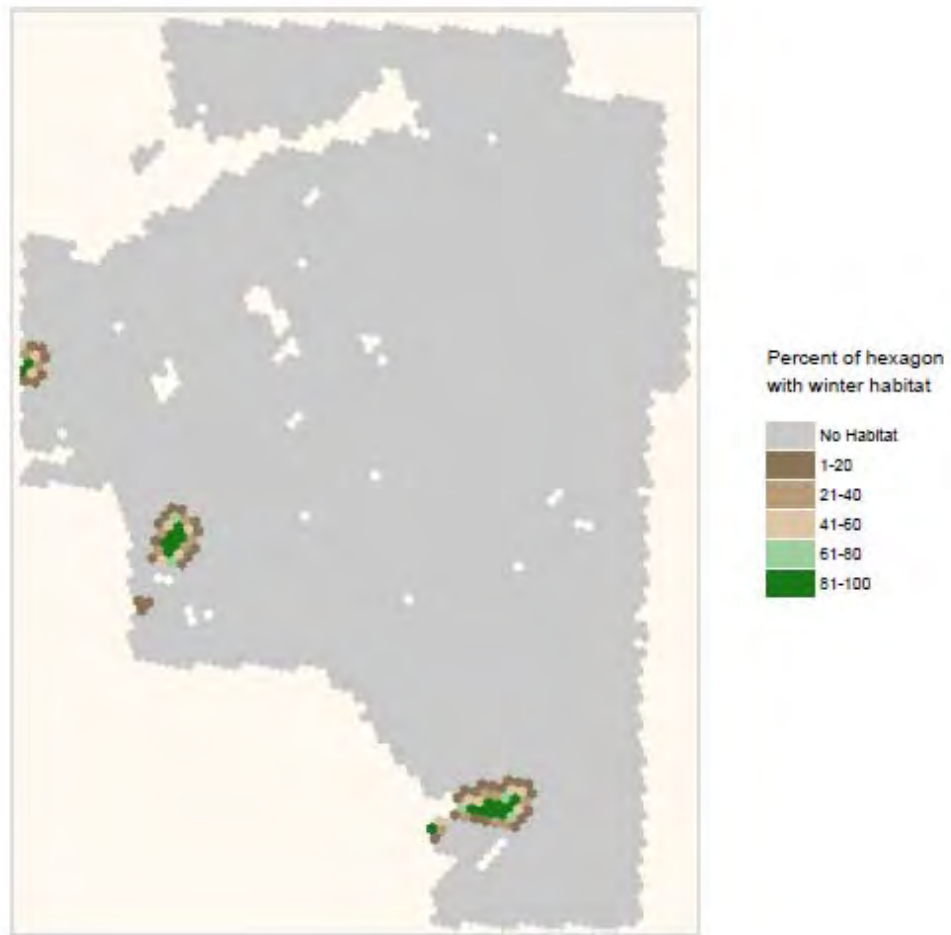
Refuge habitat consists of forest that may be suitable for caribou year-round and includes low productivity winter sites with lichen as well as well-stocked upland mature and old conifer with little lichen abundance. Soils may be productive to very productive but the conifer cover has suppressed the growth of shrubs and forbs preferred by moose and deer. Age of onset for refuge is generally 40-60 years in fire origin sites. Only 14% of the study area landbase was classified as refuge habitat with the largest areas along the eastern uplands and scattered pockets on the southeast boundary (where they overlap with winter habitat) (Figure 19).



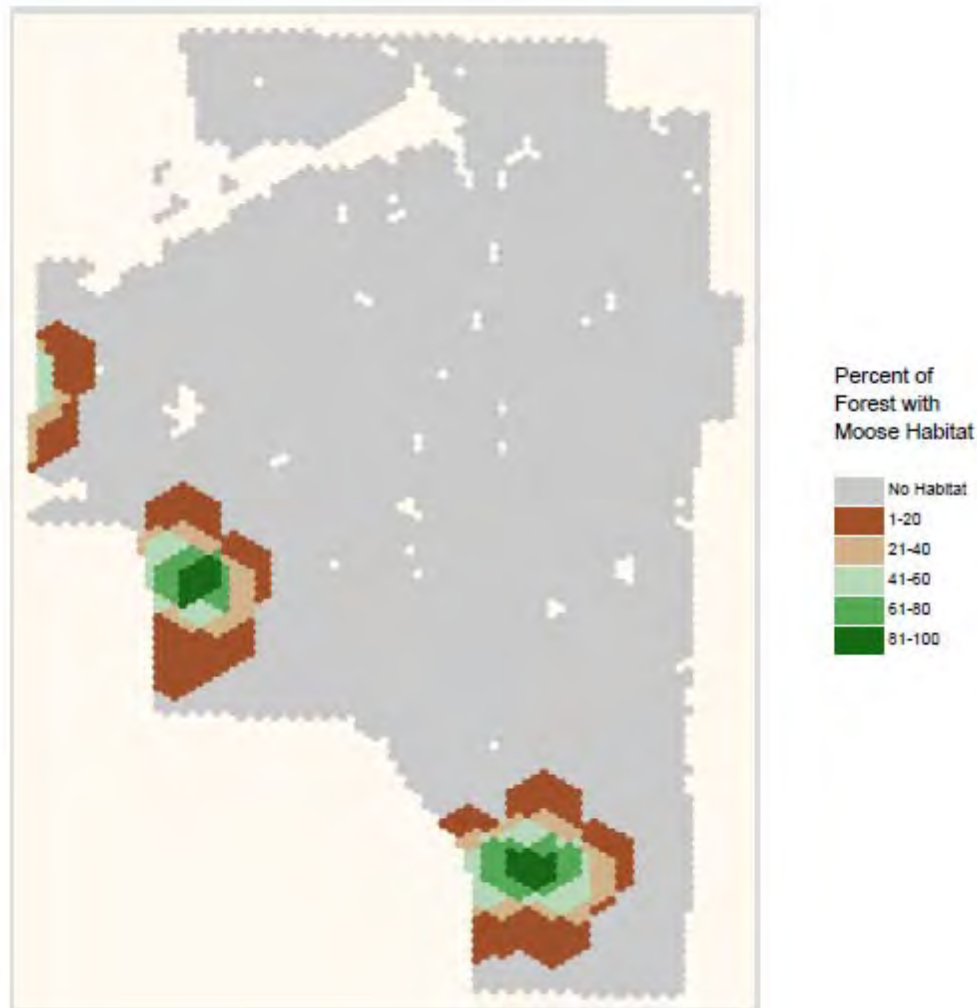
**Figure 19. Areas that are classified as refuge habitat of supporting caribou habitat within MPMG study area based on OMNR's Ontario Landscape Tool (Elkie et al. 2009). The outermost grey pixels approximate the study area boundary.**

#### *Winter Habitat*

Approximately 2% of the study area land base can be considered suitable winter habitat for caribou. Winter suitable habitat consists of mature and old upland conifer stands dominated by jack pine and black spruce, especially those on open stocked poorer site classes (i.e. lower productivity), and often rich in ground lichens (Elkie et al. 2009a). Although the model may indicate that 2% of the study area may be suitable winter habitat, this does not take into account constraints due to proximity to disturbance that may affect actual use by caribou. The winter habitat identified in Figure 20 are in close proximity to the highway and noise disturbance may deter use of this habitat by caribou. In addition, approximately 11% of the study area land base is considered suitable habitat for moose winter cover (Figure 21), and these areas overlap with potential caribou winter habitat. Increased risk of predation by wolves attracted by higher moose densities in these areas could further limit the suitability for caribou.



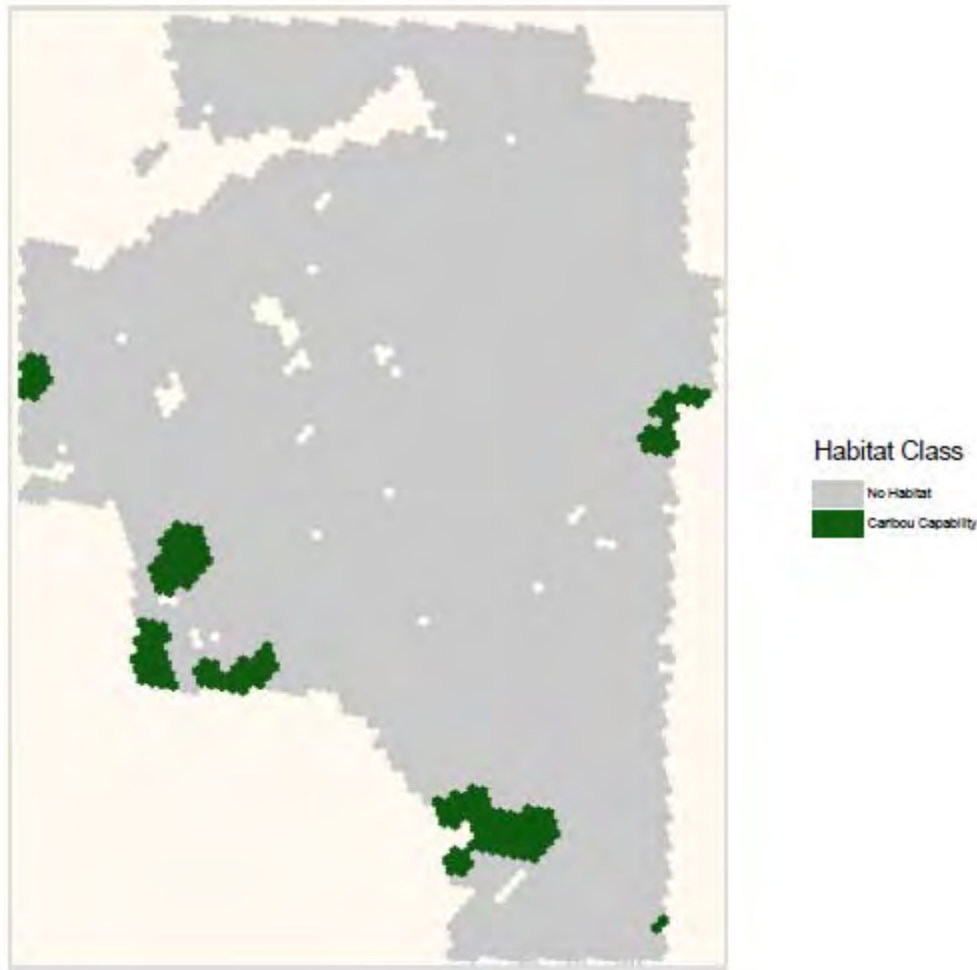
**Figure 20. Caribou winter habitat within MPGGM study area based on OMNR's Ontario Landscape Tool (Elkie et al. 2009). The outermost grey pixels approximate the study area boundary.**



**Figure 21. Forest Resource Inventory based suitability index for moose – winter cover (50 ha scale) based on OMNR's Ontario Landscape Tool (Elkie et al. 2009b). The outermost grey pixels approximate the study area boundary.**

### *Capable Habitat*

Areas that are classified as “capable” by the OMNR's Ontario Landscape Tool (OLT) are generally those where the soil and/or landform types that are conducive to perpetuating conifer dominated forest, and may provide suitable winter habitat in the future. They are characterized in the uplands by generally lower primary productivity, shallow soil, exposed bedrock, or if underlain by deeper and richer soils, they have a strong conifer legacy. In the lowlands, capability is characterized by black spruce lowland, bogs and fens. Capability is independent of tree/stand age since it represents potential of the stand to become suitable for winter habitat 40-60 years hence. Very little (4%) of the study area landbase is classified as capable (Figure 22).



**Figure 22. Areas that are classified as capable of supporting caribou winter habitat in the future within MPMGM study area based on OMNR's Ontario Landscape Tool (Elkie et al. 2009). The outermost grey pixels approximate the study area boundary.**

### **Landscape Scale**

On the landscape scale (roughly Terrace Bay to Pukaskwa National Park), key habitat components include landforms allowing connectivity between caribou subpopulations. North of the study area, management of the Lake Superior Uplands Linkage will focus on "specific landforms that may support temporary caribou occupancy or movement between continuous range and Lake Superior" (OMNR 2009).

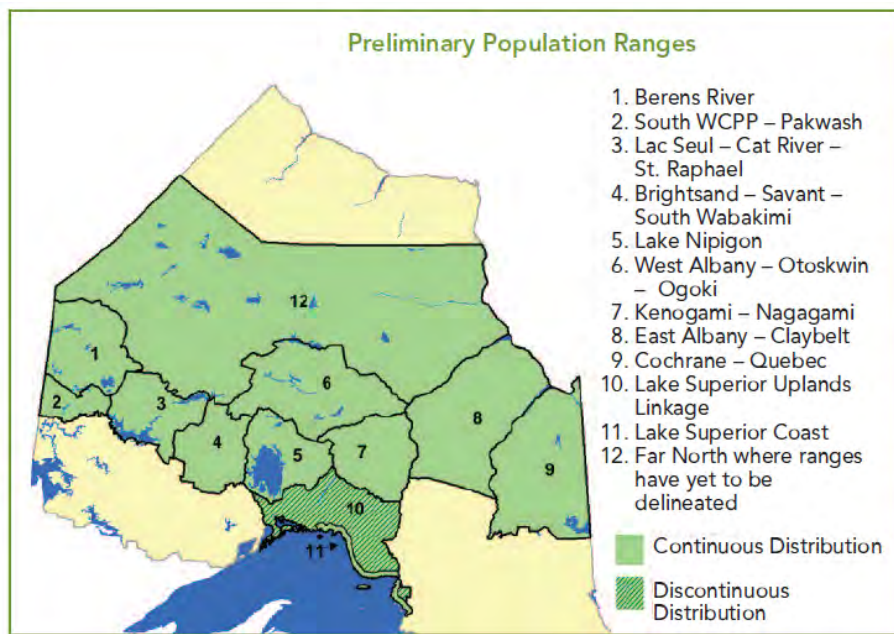
A preliminary caribou habitat disturbance assessment centred on the proposed mine site was completed for the surrounding landscape (as per 3.6.2 of the CCP) (Figure 24). This consisted of an assessment of existing disturbance adjacent to the study area to gain an impression of range quality and was not intended as a substitute for a full range assessment. The landscape surrounding the study area is most heavily disturbed along Lake Superior with the town site of Marathon, Highway 17 and several utility corridors. Most of the study area itself has a medium level of disturbance due to the presence of a hydro corridor, an old (but active) road network,

and active mining exploration. The lowest level of disturbance are northwest and east of the study area where there are relatively large blocks of more or less roadless, inaccessible forest.

The high level of disturbance along the Lake Superior coast south of the study area may restrict caribou movement in a north - south direction from Lake Superior but some relatively undisturbed patches north and east of the study area may constitute part of a potential travel corridor. The proposed mine development may restrict potential caribou movement along coast between Pukaskwa National Park at point west, if caribou have to swing farther north.

### Range Scale

The Woodland Caribou Conservation Plan (CCP) (OMNR 2009) identifies caribou "ranges" as the geographical basis for caribou management. The study area is within the "Lake Superior Coast" range, consisting of an approximately 10 km wide strip along the shoreline from Lake Superior Provincial Park to just west of Terrace Bay (Figure 23). Immediately north of the study area is the "Lake Superior Uplands Linkage" consisting of discontinuous caribou range.



**Figure 23. Preliminary delineation of local Woodland Caribou population ranges along the southern edge of the provincial extent of occurrence (OMNR 2009).**

OMNR is committed to conducting cumulative effects assessments for all caribou population ranges by May 2010. The results of this assessment will "...evaluate range quality in terms of thresholds, probability of persistence, and habitat composition and structure" (OMNR 2009). Additional disturbance in these ranges may push the range status to the point where it is insufficient to sustain caribou ("Code Red" in the CCP). A range assessment of Code Red may not allow for approval of further developments.

In summary, the study area itself lacks significant caribou winter or calving habitat, and there are no known records of caribou within about 20 km. However its position in the Lake Superior Coast Range means that the study area is considered to be caribou habitat. The area could function as a travel corridor connecting the Lake Superior coast with the Lake Superior Uplands and caribou ranges farther north.

The impacts of the proposed development and mitigation will need to be assessed at the range level, but this assessment will be unavailable until at least mid 2010. On a smaller scale, potential mitigation activities could include:

- removing roads or making roads impassable when no longer required
- minimizing road densities
- habitat rehabilitation in the form of reforestation of disturbed areas.

Marathon PGM Terrestrial Baseline Assessment 2009

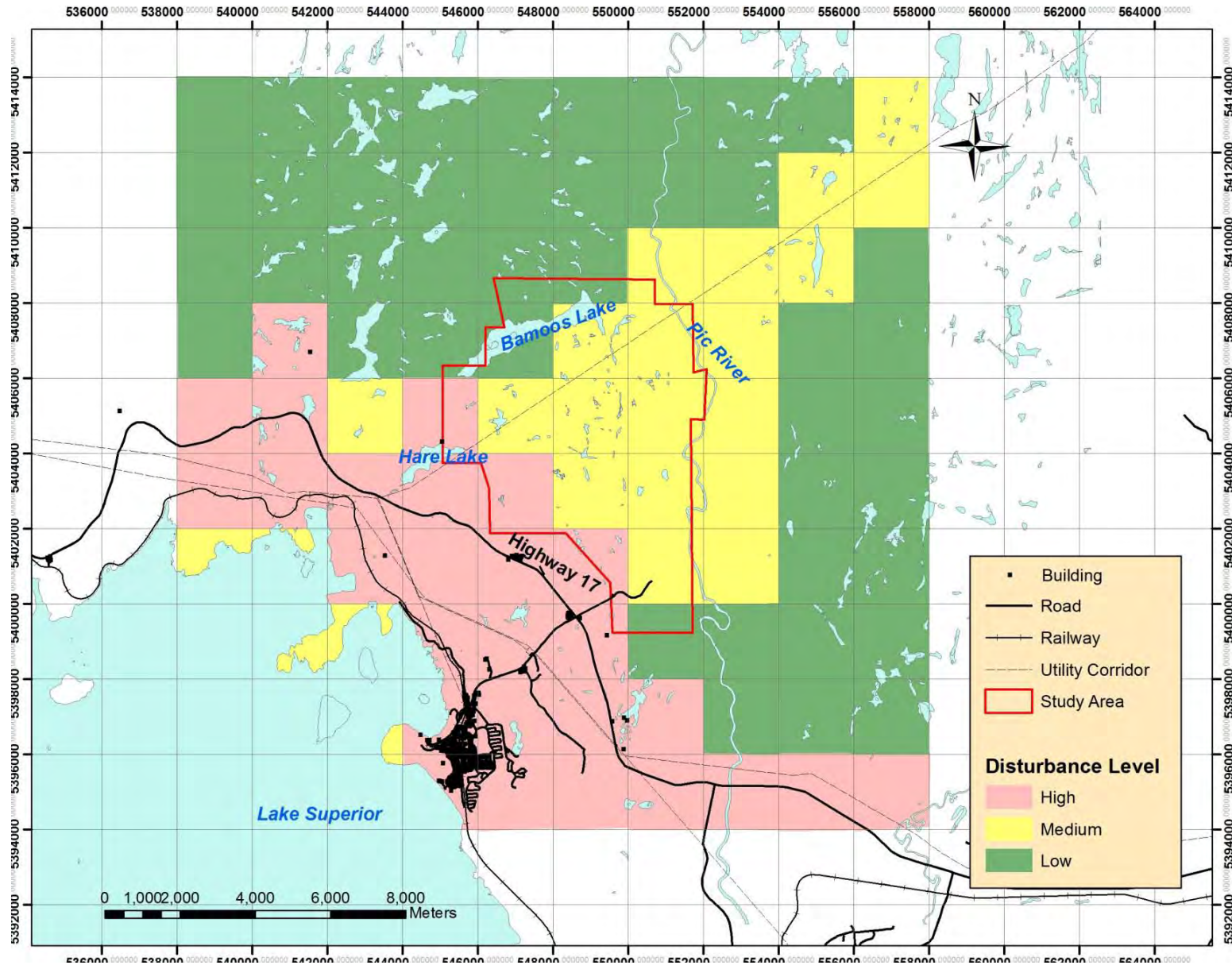


Figure 24. Preliminary woodland caribou habitat disturbance assessment based on 2 km X 2 km blocks.

## Acknowledgements

We thank Brian Ratcliff, Brian Fraser, Natalie Cormier and Dave Barker, Ray Tyhuis, Glen Hooper, Steve Kingston, Ted Armstrong, and Ray Mason.

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## Appendices

### Appendix 1. Vascular plant species of the Marathon PGM study area.

The following species were observed in the Marathon PGM study area in 2009. Taxonomic authority is Newmaster et al. (1998). "P" indicates provincially rare species (NHIC 2009). "R" indicates regionally rare species (i.e. rare in Thunder Bay District; TBFN 2003).

#### FAMILY EQUISETACEAE

*Equisetum arvense* L.  
*Equisetum hyemale* L.  
*Equisetum variegatum* Schleich. ex Fried., Weber & Mohr

#### FAMILY ASPLENIACEAE

*Asplenium trichomanes* L.

#### FAMILY DENNSTAEDTIACEAE

*Pteridium aquilinum* (L.) Kuhn

#### FAMILY DRYOPTERIDACEAE

*Cystopteris fragilis* (L.) Bernh.  
*Dryopteris carthusiana* (Vill.) H.P. Fuchs  
*Dryopteris expansa* (C. Presl.) Fraser-Jenk. &  
*Dryopteris fragrans* (L.) Schott  
*Gymnocarpium dryopteris* (L.) Newman  
*Matteuccia struthiopteris* (L.) Tod.  
*Onoclea sensibilis* L.  
P *Polystichum braunii* (Spenn.) Fée  
P *Woodsia alpina* (Bolton) S.F. Gray  
*Woodsia glabella* R. Br. ex Richardson  
*Woodsia ilvensis* (L.) R. Br.  
*Woodsia oregana* D.C. Eaton

#### FAMILY OSMUNDACEAE

*Osmunda claytoniana* L.

#### FAMILY POLYPODIACEAE

*Polypodium virginianum* L.

#### FAMILY PTERIDACEAE

*Cryptogramma stelleri* (S.G. Gmel.) Prantl.

#### FAMILY THELYPTERIDACEAE

*Phegopteris connectilis* (Michx.) Watt

#### FAMILY ISOETACEAE

*Isoetes echinospora* Durieu

#### Horsetail Family

Field Horsetail  
Rough Horsetail  
Variegated Horsetail

#### Spleenwort Family

Maidenhair Spleenwort

#### Bracken Fern Family

Bracken Fern

#### True Fern Family

Fragile Fern  
Spinulose Shield-fern  
Spreading Woodfern  
Fragrant Cliff Woodfern  
Oak Fern  
Ostrich Fern  
Sensitive Fern  
Braun's Holly Fern  
Northern Woodsia  
Smooth Woodsia  
Rusty Woodsia  
Western Cliff Fern

#### Flowering Fern Family

Interrupted Fern

#### Polypody Family

Rock Polypody

#### Brake Family

Fragile Rockbrake

#### Marsh Fern Family

Northern Beech Fern

#### Quillwort Family

Spiny-spore Quillwort

**FAMILY LYCOPODIACEAE**

- P *Huperzia appalachiana* Beitel & Mickel
- Lycopodiella inundata* (L.) Holub
- Lycopodium annotinum* L.
- Lycopodium clavatum* L.
- Lycopodium obscurum* L.

**FAMILY CUPRESSACEAE**

- Juniperus communis* L.
- Thuja occidentalis* L.

**FAMILY PINACEAE**

- Abies balsamea* (L.) Miller
- Picea glauca* (Moench) Voss
- Picea mariana* (Miller) B.S.P.

**FAMILY TAXACEAE**

- Taxus canadensis* Marshall

**FAMILY ALISMATACEAE**

- Sagittaria latifolia* Willd.

**FAMILY ARACEAE**

- Calla palustris* L.

**FAMILY CYPERACEAE**

- Carex adusta* Boott
- Carex aurea* Nutt.
- Carex bebbii* (L.H. Bailey) Olney ex Fern.
- Carex brunnescens* (Pers.) Poir. ex Lam.
- Carex buxbaumii* Wahlenb.
- Carex canescens* L.
- Carex chordorrhiza* Ehrh. ex L. f.
- Carex crinita* Lam.
- Carex deflexa* Hornem.
- Carex deweyana* Schwein.
- Carex houghtoniana* Torr. ex Dewey
- Carex interior* L.H. Bailey
- Carex lasiocarpa* Ehrh.
- Carex lenticularis* Michx.
- Carex leptonevia* (Fern.) Fern.
- Carex limosa* L.
- Carex magellanica* Lam.
- Carex michauxiana* Boeck.
- Carex oligosperma* Michx.
- Carex pauciflora* Lightf.

**Clubmoss Family**

- Appalachian Fir-clubmoss
- Northern Bog Clubmoss
- Stiff Clubmoss
- Running Pine
- Tree Clubmoss

**Juniper Family**

- Ground Juniper
- Eastern White Cedar

**Pine Family**

- Balsam Fir
- White Spruce
- Black Spruce

**Yew Family**

- Canadian Yew

**Water Plantain Family**

- Broadleaf Arrowhead

**Arum Family**

- Wild Calla

**Sedge Family**

- Crowded Sedge
- Golden-fruited Sedge
- Bebb's Sedge
- Brownish Sedge
- Buxbaum's Sedge
- Hoary Sedge
- Creeping Sedge
- Fringed Sedge
- Short-stemmed Sedge
- Short-scale Sedge
- Houghton's Sedge
- Inland Sedge
- Slender Sedge
- Shore Sedge
- Finely-nerved Sedge
- Mud Sedge
- Boreal Bog Sedge
- Michaux Sedge
- Few-seeded Sedge
- Few-flowered Sedge

*Carex peckii* Howe  
*Carex retrorsa* Schwein.  
*Carex stipata* Muhlenb. ex Willd.  
*Carex tenuiflora* Wahlenb.  
*Carex trisperma* Dewey  
*Carex utriculata* Boott  
*Carex viridula* Michx.  
*Carex vulpinoidea* Michx.  
*Dulichium arundinaceum* (L.) Britton  
*Eleocharis acicularis* (L.) Roem. & Schult.  
*Eleocharis ovata* (Roth) Roem. & Schult.  
*Eleocharis smallii* Britton  
*Scirpus atrovirens* Willd.  
*Scirpus cyperinus* (L.) Kunth  
*Scirpus microcarpus* C. Presl

#### **FAMILY ERIOCAULACEAE**

*Eriocaulon aquaticum* (Hill) Druce

#### **FAMILY IRIDACEAE**

*Sisyrinchium montanum* Greene

#### **FAMILY JUNCACEAE**

*Juncus effusus* L.  
*Juncus filiformis* L.  
*Juncus nodosus* L.  
*Juncus tenuis* Willd.  
*Luzula parviflora* (Ehrh.) Desv.

#### **FAMILY LILIACEAE**

*Clintonia borealis* (Aiton) Raf.  
*Lilium philadelphicum* L.  
*Maianthemum canadense* Desf.  
*Maianthemum racemosum* (L.) Link  
*Maianthemum stellatum* (L.) Link  
*Maianthemum trifolium* (L.) Sloboda  
*Streptopus amplexifolius* (L.) DC.  
*Streptopus lanceolatus* (Aiton) Reveal  
*Trillium cernuum* L.

#### **FAMILY ORCHIDACEAE**

*Cypripedium acaule* Aiton  
R *Listera convallarioides* (Sw.) Nutt. ex Ell.

#### **FAMILY POACEAE**

I *Agrostis gigantea* Roth

White-tinged Sedge  
Retrorse Sedge  
Stalk-grain Sedge  
Sparse-flowered Sedge  
Threeseeded Sedge  
Bottle Sedge  
Little Green Sedge  
Fox Sedge  
Three-way Sedge  
Least Spikerush  
Ovate Spikerush  
Creeping Spikerush  
Dark-green Bulrush  
Cottongrass Bulrush  
Red-tinge Bulrush

#### **Pipewort Family**

Seven-angled Pipewort

#### **Iris Family**

Strict Blue-eyed-grass

#### **Rush Family**

Soft Rush  
Thread Rush  
Knotted Rush  
Path Rush  
Small-flowered Woodrush

#### **Lily Family**

Blue Bead-lily  
Wood Lily  
Wild-lily-of-the-valley  
Feathery False Lily of the Valley  
Starflower False Solomon's-seal  
Three-leaf Solomon's-seal  
White Mandarin  
Rose Twisted-stalk  
Nodding Trillium

#### **Orchid Family**

Pink Lady's-slipper  
Broad-leaved Twayblade

#### **Grass Family**

Black Bentgrass

*Agrostis scabra* Willd.  
*Agrostis stolonifera* L.  
*Bromus ciliatus* L.  
*Calamagrostis canadensis* (Michx.) P. Beauv.  
*Cinna latifolia* (Trevir. ex Goepp.) Griseb. in  
*Danthonia spicata* (L.) P. Beauv. ex Roem. &  
*Deschampsia flexuosa* (L.) Trin.  
*Elymus trachycaulus* (Link) Gould  
*Glyceria borealis* (Nash) Batch.  
*Glyceria canadensis* (Michx.) Trin.  
*Glyceria grandis* S. Watson  
*Glyceria striata* (Lam) A.Hitchc.  
I *Lolium persicum* Boiss. & Hohen. ex Boiss.  
R *Milium effusum* L.  
R *Oryzopsis canadensis* (Poir.) Trin.  
*Panicum acuminatum* Sw.  
I *Phleum pratense* L.  
I *Poa annua* L.  
*Poa glauca* Vahl  
*Poa palustris* L.  
*Schizachne purpurascens* (Torr.) Swallen  
*Torreyochloa fernaldii* (A. Hitchc.) Church

#### **FAMILY POTAMOGETONACEAE**

*Potamogeton amplifolius* Tuckerm.  
P *Potamogeton confervoides* Reichb.  
*Potamogeton epihydrus* Raf.  
*Potamogeton gramineus* L.  
*Potamogeton natans* L.  
R *Potamogeton oakesianus* Robb.  
R *Potamogeton pusillus* L.  
*Potamogeton spirillus* Tuckerm.

#### **FAMILY SPARGANIACEAE**

*Sparganium angustifolium* Michx.  
*Sparganium emersum* Rehmman  
*Sparganium fluctuans* (Morong) Robinson

#### **FAMILY TYPHACEAE**

I *Typha angustifolia* L.  
*Typha latifolia* L.

Rough Bentgrass  
Spreading Bentgrass  
Fringed Brome  
Blue-joint Reedgrass  
Slender Wood Reedgrass  
Poverty Oatgrass  
Crinkled Hairgrass  
Wild-rye  
Small Floating Mannagrass  
Canada Mannagrass  
American Mannagrass  
Fowl Mannagrass  
Persian Ryegrass  
Tall Millet-grass  
Canada Mountain-ricegrass  
Panicgrass  
Meadow Timothy  
Annual Bluegrass  
Glaucous bluegrass  
Fowl Bluegrass  
Purple Oat  
Fernald's False Mannagrass

#### **Pondweed Family**

Large-leaf Pondweed  
Algae-like Pondweed  
Ribbon-leaf Pondweed  
Grassy Pondweed  
Floating Pondweed  
Oakes Pondweed  
Slender Pondweed  
Spiral Pondweed

#### **Bur-reed Family**

Many-stalked Bur-reed  
Greenfruit Bur-reed  
Floating Bur-reed

#### **Cat-tail Family**

Narrow-leaved Cattail  
Broad-leaf Cattail

**FAMILY ACERACEAE**

*Acer spicatum* Lam.

**FAMILY APIACEAE**

*Heracleum lanatum* Michx.

*Osmorhiza berterii* DC.

**FAMILY APOCYNACEAE**

*Apocynum androsaemifolium* L.

**FAMILY ARALIACEAE**

*Aralia hispida* Vent.

*Aralia nudicaulis* L.

**FAMILY ASTERACEAE**

*Achillea millefolium* L.

R *Ambrosia artemisiifolia* L.

*Anaphalis margaritacea* (L.) Benth. & Hook. f. ex  
C.B. Clarke

I *Chrysanthemum leucanthemum* L.

I *Cirsium vulgare* (Savi) Ten.

*Conyza canadensis* (L.) Cronquist

I *Crepis tectorum* L.

*Doellingeria umbellata* (Mill.) Nees

*Erigeron philadelphicus* L.

*Eupatorium maculatum* L.

*Eurybia macrophylla* (L.) Cass.

*Euthamia graminifolia* (L.) Nutt.

I *Hieracium aurantiacum* L.

R *Hieracium kalmii*

I *Hieracium piloselloides* Vill.

*Lactuca biennis* (Moench) Fern.

I *Matricaria maritima* L.

*Megalodonta beckii* (Torr. ex Spreng) Greene

*Packera aurea* (L.) A. & D. Löve

*Prenanthes alba* L.

*Solidago canadensis* L.

*Solidago gigantea* Aiton

*Solidago hispida* Muhlenb.

*Solidago juncea* Aiton

I *Sonchus arvensis* ssp. *uliginosus* L.

*Symphotrichum puniceum* (L.) A. & D. Löve

I *Tanacetum vulgare* L.

I *Taraxacum officinale* G. Weber

**Maple Family**

Mountain Maple

**Parsley Family**

Cow-parsnip

Sweet-cicely

**Dogbane Family**

Spreading Dogbane

**Ginseng Family**

Bristly Sarsaparilla

Wild Sarsaparilla

**Sunflower Family**

Yarrow

Annual Ragweed

Pearly Everlasting

Oxeye Daisy

Bull Thistle

Canadian Horseweed

Narrow-leaf Hawksbeard

Parasol Whitetop

Philadelphia Fleabane

Spotted Joepyeweed

Large-leaf Wood-aster

Flat-top Fragrant Goldenrod

Orange Hawkweed

Kalm's Hawkweed

Tall Hawkweed

Tall Blue Lettuce

Scentless Chamomile

Water-marigold

Golden Ragwort

White Rattlesnakeroot

Canada Goldenrod

Smooth Goldenrod

Hairy Goldenrod

Early Goldenrod

Moist Sowthistle

Swamp Aster

Common Tansy

Brown-seed Dandelion

**FAMILY BALSAMINACEAE**

*Impatiens capensis* Meerb.

**FAMILY BETULACEAE**

*Alnus viridis* (Villars) DC.

*Betula cordifolia* Regel

*Betula papyrifera* Marshall

*Corylus cornuta* Marshall

**FAMILY BORAGINACEAE**

*Mertensia paniculata* (Aiton) G. Don

**FAMILY BRASSICACEAE**

*Arabis divaricarpa* A. Nelson

*Cardamine parviflora* L.

*Cardamine pensylvanica* Muhlenb. ex Willd.

I *Conringia orientalis* (L.) Dumort.

R *Draba cana* Rydb.

I *Erysimum cheiranthoides* L.

*Rorippa palustris* (L.) Besser

**FAMILY CALLITRICHACEAE**

*Callitriche palustris* L.

**FAMILY CAMPANULACEAE**

*Campanula aparinoides* Pursh

*Campanula rotundifolia* L.

**FAMILY CAPRIFOLIACEAE**

*Diervilla lonicera* Miller

*Linnaea borealis* L.

*Lonicera canadensis* Bartram

*Lonicera involucrata* (Richardson) Banks

*Sambucus racemosa* L.

*Viburnum edule* (Michx.) Raf.

**FAMILY CARYOPHYLLACEAE**

*Cerastium nutans* Raf.

I *Silene vulgaris* (Moench) Garcke

I *Spergularia rubra* (L.) J. & C. Presl

*Stellaria borealis* Bigelow

**FAMILY CHENOPODIACEAE**

*Chenopodium album* L.

**FAMILY CLUSIACEAE**

*Hypericum ellipticum* Hook.

*Hypericum majus* (A. Gray) Britton

**Touch-me-not Family**

Spotted Jewel-weed

**Birch Family**

Green Alder

Heartleaf Birch

Paper Birch

Beaked Hazelnut

**Borage Family**

Tall Bluebells

**Mustard Family**

Limestone Rockcress

Small-flower Bitter-cress

Pennsylvania Bitter-cress

Hare's-ear Mustard

Hoary Draba

Worm-seed Mustard

Marsh Yellow Cress

**Water Starwort Family**

Vernal Water-starwort

**Harebell Family**

Marsh Bellflower

American Harebell

**Honeysuckle Family**

Northern Bush-honeysuckle

Twinflower

American Fly-honeysuckle

Fly-honeysuckle

European Red Elder

Squashberry

**Pink Family**

Nodding Chickweed

Maiden's Tears

Purple Sandspurry

Northern Stitchwort

**Goosefoot Family**

Goosefoot

**St. Johnswort Family**

Pale St. John's-wort

Larger Canadian St. John's-wort

- R *Hypericum mutilum* L.
- I *Hypericum perforatum* L.
- Triadenum fraseri* (Spach) Gleason

#### **FAMILY CORNACEAE**

- Cornus canadensis* L.
- Cornus rugosa* Lam.
- Cornus stolonifera* Michx.

#### **FAMILY DROSERACEAE**

- Drosera rotundifolia* L.

#### **FAMILY ERICACEAE**

- Andromeda polifolia* ssp. *glaucophylla* L.
- Chamaedaphne calyculata* (L.) Moench
- Epigaea repens* L.
- Gaultheria hispidula* (L.) Muhlenb. ex Bigelow
- Kalmia polifolia* Wangenh.
- Ledum groenlandicum* Oeder
- Vaccinium angustifolium* Aiton
- Vaccinium oxycoccos* L.
- Vaccinium vitis-idaea* L.

#### **FAMILY FABACEAE**

- Lathyrus ochroleucus* Hook.
- Lathyrus palustris* L.
- I *Lotus corniculatus* L.
- I *Medicago lupulina* L.
- I *Melilotus alba* Medik.
- I *Trifolium pratense* L.
- I *Trifolium repens* L.
- Vicia americana* Muhlenb. ex Willd.
- I *Vicia cracca* L.

#### **FAMILY FUMARIACEAE**

- Corydalis sempervirens* (L.) Pers.

#### **FAMILY GENTIANACEAE**

- Halenia deflexa* (Sm.) Griseb.

#### **FAMILY GERANIACEAE**

- Geranium bicknellii* Britton

#### **FAMILY GROSSULARIACEAE**

- Ribes glandulosum* Grauer
- Ribes hudsonianum* Richardson
- Ribes triste* Pall.

- Slender St. John's-wort
- Common St. John's-wort
- Marsh St. John's-wort

#### **Dogwood Family**

- Bunchberry
- Roundleaf Dogwood
- Red-osier Dogwood

#### **Sundew Family**

- Roundleaf Sundew

#### **Heath Family**

- Bog Rosemary
- Leatherleaf
- Trailing Arbutus
- Creeping Snowberry
- Pale Laurel
- Common Labrador Tea
- Late Lowbush Blueberry
- Small Cranberry
- Mountain Cranberry

#### **Pea Family**

- Pale Vetchling Peavine
- Vetchling Peavine
- Birds-foot Trefoil
- Black Medic
- White Sweetclover
- Red Clover
- White Clover
- American Purple Vetch
- Tufted Vetch

#### **Fumitory Family**

- Pale Corydalis

#### **Gentian Family**

- Spurred Gentian

#### **Geranium Family**

- Bicknell Northern Crane's-bill

#### **Currant Family**

- Skunk Currant
- Northern Black Currant
- Swamp Red Currant

**FAMILY HIPPURIDACEAE**

*Hippuris vulgaris* L.

**FAMILY LAMIACEAE**

- I *Galeopsis tetrahit* L.  
*Lycopus uniflorus* Michx.
- I *Melissa officinalis* L.  
*Mentha arvensis* L.  
*Prunella vulgaris* L.  
*Scutellaria galericulata* L.

**FAMILY LENTIBULARIACEAE**

*Utricularia intermedia* Hayne  
*Utricularia minor* L.  
*Utricularia vulgaris* L.

**FAMILY MONOTROPACEAE**

*Monotropa uniflora* L.

**FAMILY MYRICACEAE**

*Myrica gale* L.

**FAMILY NYMPHAEACEAE**

*Nuphar variegata* Durand in Clinton

**FAMILY ONAGRACEAE**

- Circaea alpina* L.
- Epilobium angustifolium* L.
- Epilobium ciliatum* Raf.
- R *Oenothera parviflora* L.

**FAMILY OXALIDACEAE**

*Oxalis acetosella* L.

**FAMILY PLANTAGINACEAE**

- P *Littorella americana* Fern.
- I *Plantago major* L.

**FAMILY POLYGONACEAE**

*Polygonum amphibium* L.  
*Polygonum cilinode* Michx.  
*Polygonum viviparum* L.

**FAMILY PRIMULACEAE**

*Lysimachia ciliata* L.  
*Lysimachia terrestris* (L.) B.S.P.  
*Primula mistassinica* Michx.  
*Trientalis borealis* Raf.

**Mare's-tail Family**

Common Mare's-tail

**Mint Family**

Brittle-stem Hempnettle  
Northern Bugleweed  
Garden Balm  
Corn Mint  
Self-heal  
Hooded Skullcap

**Bladderwort Family**

Flatleaf Bladderwort  
Lesser Bladderwort  
Greater Bladderwort

**Indian Pipe Family**

Indian-pipe

**Bayberry Family**

Sweet Bayberry

**Water Lily Family**

Yellow Cowlily

**Evening-primrose**

Small Enchanter's Nightshade  
Fireweed  
Hairy Willow-herb  
Northern Evening-primrose

**Wood Sorrel Family**

Irish Shamrock

**Plantain Family**

American Shore-grass  
Nipple-seed Plantain

**Buckwheat Family**

Water Smartweed  
Fringed Black Bindweed  
Viviparous Knotweed

**Primrose Family**

Fringed Loosestrife  
Swamp Loosestrife  
Bird's-eye Primrose  
Northern Starflower

**FAMILY PYROLACEAE**

*Moneses uniflora* (L.) A. Gray  
*Pyrola minor* L.

**FAMILY RANUNCULACEAE**

*Actaea rubra* (Aiton) Willd.  
*Anemone canadensis* L.  
*Anemone quinquefolia* L.  
*Aquilegia canadensis* L.  
*Caltha palustris* L.  
*Coptis trifolia* (L.) Salisb.  
*Ranunculus abortivus* L.  
| *Ranunculus acris* L.  
*Ranunculus flammula* L.  
*Ranunculus pennsylvanicus* L. f.  
*Thalictrum dasycarpum* Fischer & Avé-Lall.

**FAMILY ROSACEAE**

*Amelanchier bartramiana* (Tausch) M. Roem.  
*Fragaria vesca* L.  
*Fragaria virginiana* Miller  
*Geum aleppicum* Jacq.  
*Physocarpus opulifolius* (L.) Maxim.  
*Potentilla norvegica* L.  
*Potentilla palustris* (L.) Scop.  
*Potentilla tridentata* Sol. ex Aiton  
*Prunus pennsylvanica* L. f.  
*Rosa acicularis* Lindl.  
*Rosa blanda* Aiton  
*Rubus pubescens* Raf.  
*Sorbus americana* Marshall  
*Sorbus decora* (Sarg.) C.K. Schneid.

**FAMILY RUBIACEAE**

*Galium trifidum* L.

**FAMILY SALICACEAE**

*Populus balsamifera* L.  
*Populus tremuloides* Michx.  
*Salix eriocephala* Michx.  
*Salix humilis* Marshall  
*Salix pellita* Anderss. ex Schneider  
*Salix petiolaris* Sm.

**FAMILY SARRACENIACEAE**

*Sarracenia purpurea* L.

**Wintergreen Family**

One-flower Wintergreen  
Lesser Wintergreen

**Buttercup Family**

Red Baneberry  
Canada Anemone  
Wood Anemone  
Wild Columbine  
Marsh Marigold  
Goldthread  
Kidney-leaved Buttercup  
Tall Butter-cup  
Greater Creeping Spearwort  
Bristly Crowfoot  
Purple Meadowrue

**Rose Family**

Bartram Shadbush  
Woodland Strawberry  
Virginia Strawberry  
Yellow Avens  
Eastern Ninebark  
Norwegian Cinquefoil  
Marsh Cinquefoil  
Three-toothed Cinquefoil  
Pin Cherry  
Prickly Rose  
Smooth Rose  
Dwarf Raspberry  
American Mountain-ash  
Northern Mountain-ash

**Bedstraw Family**

Small Bedstraw

**Willow Family**

Balsam Poplar  
Trembling Aspen  
Heart-leaved Willow  
Tall Prairie Willow  
Satiny Willow  
Meadow Willow

**Pitcher Plant Family**

Northern Pitcher-plant

**FAMILY SAXIFRAGACEAE**

*Mitella nuda* L.

*Parnassia parviflora* DC.

*Saxifraga virginiana* Michx.

**FAMILY SCROPHULARIACEAE**

1 *Euphrasia stricta* D. Wolff ex Lehm.

*Melampyrum lineare* Desr.

*Rhinanthus minor* L.

*Veronica americana* (Raf.) Schwein. ex Benth.

*Veronica peregrina* ssp. *xalapensis* L.

**FAMILY VIOLACEAE**

*Viola pubescens* Aiton

**Saxifrage Family**

Naked Bishop's-cap

Small-flower Grass-of-parnassus

Virginia Saxifrage

**Figwort Family**

Drug Eyebright

American Cow-wheat

Yellow Rattle

American Speedwell

Neckweek

**Violet Family**

Downy Yellow Violet

## Appendix 2. Birds of the Marathon PGM study area.

The following species were observed or heard in or near the Marathon PGM study area. Taxonomic order and nomenclature follow AOU (1998). Species not observed in the 2009 study, but reported in Golder Associates Ltd. (2009) are indicated ▲. Additional species recorded on a Breeding Bird Survey (1976 to 2004) adjacent to the study area are indicated Δ.

### Nesting Evidence

Nest evidence codes follow the Ontario Breeding Bird Atlas (Cadman et al. 2007):

#### Possible nesting

H - Species observed in breeding season in suitable habitat.

S – Singing male present or breeding calls heard observed in breeding season in suitable habitat.

#### Probable nesting

A – Agitated behaviour.

#### Confirmed Nesting

CF - Adult carrying food to young

FY – Recently fledged young or downy young

NU – Nest used in current nesting season

### Conservation Status

\* Partners in Flight Priority Species (Ontario Partners in Flight 2006)

+ Species at Risk (COSEWIC or COSSARO listed species)

#### Loons

H Common Loon

#### Cormorants

Δ Double-crested Cormorant

#### Bitterns and Herons

Δ American Bittern

H Great Blue Heron

#### Ducks and Geese

▲ Canada Goose

Δ Wood Duck

Δ American Wigeon

H American Black Duck

H Mallard

Δ Blue-winged Teal

Δ Green-winged Teal

Δ Lesser Scaup

FY Common Goldeneye

FY Hooded Merganser

Δ Common Merganser

#### FAMILY GAVIIDAE

*Gavia immer*

#### FAMILY PHALACROCORIDAE

*Phalacrocorax auritus*

#### FAMILY ARDEIDAE

*Botaurus lentiginosus*

*Ardea herodias*

#### FAMILY ANATIDAE

*Branta canadensis*

*Aix sponsa*

*Anas americana*

*Anas rubripes*

*Anas platyrhynchos*

*Anas discors*

*Anas crecca*

*Aythya affinis*

*Bucephala clangula*

*Lophodytes cucullatus*

*Mergus merganser*

**Vultures**

- Δ Turkey Vulture

**Eagles and Hawks**

- \* Δ Sharp-shinned Hawk
- Δ Northern Goshawk
- H Broad-winged Hawk
- H Red-tailed Hawk

**Falcons**

- Δ American Kestrel
- H Merlin

**Grouse and Quail**

- \* H Ruffed Grouse
- FY Spruce Grouse

**Plovers**

- ▲ Killdeer

**Sandpipers**

- H Solitary Sandpiper
- H Spotted Sandpiper
- Δ Wilson's Snipe

**Gulls and Terns**

- Δ Ring-billed Gull
- Δ Herring Gull

**Doves and Pigeons**

- Δ Rock Pigeon
- Δ Mourning Dove

**Cuckoos**

- Δ Black-billed Cuckoo

**Goatsuckers**

- + Δ Common Nighthawk

**Hummingbirds**

- H Ruby-throated Hummingbird

**Kingfishers**

- \* NU Belted Kingfisher

**Woodpeckers**

- + Δ Red-headed Woodpecker
- \* H Yellow-bellied Sapsucker
- ▲ Downy Woodpecker
- H Hairy Woodpecker
- \* H Black-backed Woodpecker
- \* H Northern Flicker

**FAMILY CATHARTIDAE**

*Cathartes aura*

**FAMILY ACCIPITRIDAE**

*Accipiter striatus*  
*Accipiter gentilis*  
*Buteo platypterus*  
*Buteo jamaicensis*

**FAMILY FALCONIDAE**

*Falco sparverius*  
*Falco columbarius*

**FAMILY PHASIANIDAE**

*Bonasa umbellus*  
*Dendragapus canadensis*

**FAMILY CHARADRIIDAE**

*Charadrius vociferus*

**FAMILY SCOLOPACIDAE**

*Tringa solitaria*  
*Actitis macularia*  
*Gallinago delicata*

**FAMILY LARIDAE**

*Larus delawarensis*  
*Larus argentatus*

**FAMILY COLUMBIDAE**

*Columba livia*  
*Zenaida macroura*

**FAMILY CUCULIDAE**

*Coccyzus erythrophthalmus*

**FAMILY CAPRIMULGIDAE**

*Chordeiles minor*

**FAMILY TROCHILIDAE**

*Archilochus colubri*

**FAMILY ALCEDINIDAE**

*Ceryle alcyon*

**FAMILY PICIDAE**

*Melanerpes erythrocephalus*  
*Sphyrapicus varius*  
*Picoides pubescens*  
*Picoides villosus*  
*Picoides arcticus*  
*Colaptes auratus*

- H Pileated Woodpecker
- Tyrant Flycatchers**
- \* + H Olive-sided Flycatcher
- \* ▲ Yellow-bellied Flycatcher
- \* S Alder Flycatcher
- S Least Flycatcher
- Δ Eastern Kingbird
- Swallows**
- Δ Tree Swallow
- Δ Northern Rough-winged Swallow
- Δ Bank Swallow
- Δ Cliff Swallow
- Δ Barn Swallow
- Jays, Crows and Ravens**
- H Gray Jay
- Δ Blue Jay
- H American Crow
- NE Common Raven
- Chickadees**
- H Black-capped Chickadee
- H Boreal Chickadee
- Nuthatches**
- H Red-breasted Nuthatch
- Creepers**
- ▲ Brown Creeper
- Wrens**
- Δ House Wren
- \* S Winter Wren
- Kinglets**
- S Golden-crowned Kinglet
- \* S Ruby-crowned Kinglet
- Thrushes**
- Δ Eastern Bluebird
- S Veery
- S Swainson's Thrush
- S Hermit Thrush
- S American Robin
- Mockingbirds and Thrashers**
- Δ Gray Catbird
- Δ Brown Thrasher

- Dryocopus pileatus*
- FAMILY TYRANNIDAE**
- Contopus borealis*
- Empidonax flaviventris*
- Empidonax alorum*
- Empidonax minimus*
- Tyrannus tyrannus*
- FAMILY HIRUNDINIDAE**
- Tachycineta bicolor*
- Stelgidopteryx serripennis*
- Riparia riparia*
- Hirundo pyrrhonota*
- Hirundo rustica*
- FAMILY CORVIDAE**
- Perisoreus canadensis*
- Cyanocitta cristata*
- Corvus brachyrhynchos*
- Corvus corax*
- FAMILY PARIDAE**
- Parus atricapillus*
- Parus hudsonicus*
- FAMILY SITTIDAE**
- Sitta canadensis*
- FAMILY CERTHIIDAE**
- Certhia americana*
- FAMILY TROGLODYTIDAE**
- Troglodytes aedon*
- Troglodytes troglodytes*
- FAMILY REGULIDAE**
- Regulus satrapa*
- Regulus calendula*
- FAMILY TURDIDAE**
- Sialia sialis*
- Catharus fuscescens*
- Catharus ustulatus*
- Catharus guttatus*
- Turdus migratorius*
- FAMILY MIMIDAE**
- Dumetella carolinensis*
- Toxostoma rufum*

**Waxwings**

H Cedar Waxwing

**Starlings**

Δ European Starling

**Vireos**

- \* S Blue-headed Vireo
- \* S Philadelphia Vireo
- S Red-eyed Vireo

**Wood-warblers**

- \* S Tennessee Warbler
- \* S Nashville Warbler
- S Northern Parula
- ▲ Yellow Warbler
- \* S Chestnut-sided Warbler
- \* S Magnolia Warbler
- \* Δ Cape May Warbler
- S Black-throated Blue Warbler
- S Yellow-rumped Warbler
- S Palm Warbler
- \* S Black-throated Green Warbler
- \* S Blackburnian Warbler
- \* S Bay-breasted Warbler
- CF American Redstart
- \* S Ovenbird
- S Northern Waterthrush
- \* Δ Connecticut Warbler
- \* S Mourning Warbler
- S Common Yellowthroat
- ▲ Wilson's Warbler
- \* + A Canada Warbler

**Cardinals and Allies**

- ▲ Rose-breasted Grosbeak
- Δ Indigo Bunting

**Emberizids**

- S Chipping Sparrow
- Δ Clay-colored Sparrow
- Δ Vesper Sparrow
- Δ Savannah Sparrow
- ▲ Fox Sparrow
- Δ Song Sparrow
- Δ Lincoln's Sparrow
- \* S Swamp Sparrow
- \* S White-throated Sparrow
- S Dark-eyed Junco

**FAMILY BOMBYCILLIDAE**

*Bombycilla cedrorum*

**FAMILY STURNIDAE**

*Sturnus vulgaris*

**FAMILY VIREONIDAE**

*Vireo solitarius*  
*Vireo philadelphicus*  
*Vireo olivaceus*

**FAMILY PARULIDAE**

*Vermivora peregrina*  
*Vermivora ruficapilla*  
*Parula americana*  
*Dendroica petechia*  
*Dendroica pensylvanica*  
*Dendroica magnolia*  
*Dendroica tigrina*  
*Dendroica caerulescens*  
*Dendroica coronata*  
*Dendroica palmarum*  
*Dendroica virens*  
*Dendroica fusca*  
*Dendroica castanea*  
*Setophaga ruticilla*  
*Seiurus aurocapillus*  
*Seiurus noveboracensis*  
*Oporornis agilis*  
*Oporornis philadelphia*  
*Geothlypis trichas*  
*Wilsonia pusilla*  
*Wilsonia canadensis*

**FAMILY CARDINALIDAE**

*Pheucticus ludovicianus*  
*Passerina cyanea*

**FAMILY EMBERIZIDAE**

*Spizella passerina*  
*Spizella pallida*  
*Poocetes gramineus*  
*Passerculus sandwichensis*  
*Passerella iliaca*  
*Melospiza melodia*  
*Melospiza lincolni*  
*Melospiza georgiana*  
*Zonotrichia albicollis*  
*Junco hyemalis*

**New World Blackbirds**

- Δ Bobolink
- Δ Red-winged Blackbird
- \* + FY Rusty Blackbird
- Δ Brewer's Blackbird
- Δ Common Grackle
- Δ Brown-headed Cowbird

**Finches**

- \* S Purple Finch
- Δ Red Crossbill
- Δ White-winged Crossbill
- S Pine Siskin
- Δ American Goldfinch
- \* H Evening Grosbeak

**FAMILY ICTERIDAE**

- Dolichonyx oryzivorus*
- Agelaius phoeniceus*
- Euphagus carolinus*
- Euphagus cyanocephalus*
- Quiscalus quiscula*
- Molothrus ater*

**FAMILY FRINGILLIDAE**

- Carpodacus purpureus*
- Loxia curvirostra*
- Loxia leucoptera*
- Carduelis pinus*
- Carduelis tristis*
- Coccothraustes vespertinus*

**Appendix 3. Mammals of the Marathon PGM study area.**

The following species were observed in the Marathon PGM study area in 2009. Taxonomic order and nomenclature follow Banfield (1974).

**Rabbits and Hares**

Snowshoe Hare

**FAMILY LEPORIDAE**

*Lepus americanus*

**Squirrels**

Least Chipmunk

Red Squirrel

**FAMILY SCIURIDAE**

*Tamias minimus*

*Tamiasciurus hudsonicus*

**Beavers**

Beaver

**FAMILY CASTORIDAE**

*Castor canadensis*

**New World Porcupines**

Porcupine

**FAMILY ERITHIZONTIDAE**

*Erethizon dorsatum*

**Dogs**

Timber Wolf

Red Fox

**FAMILY CANIDAE**

*Canis lupus*

*Vulpes vulpes*

**Bears**

Black Bear

**FAMILY URSIDAE**

*Ursus americanus*

**Weasels and Their Allies**

River Otter

Marten

**FAMILY MUSTELIDAE**

*Lutra canadensis*

*Martes americana*

**Deer**

Moose

**FAMILY CERVIDAE**

*Alces alces*

**Appendix 4. Amphibians of the Marathon PGM study area.**

The following species were observed or heard in or near the Marathon PGM study area in 2009. Taxonomic order and nomenclature follow Conant and Collins (1991).

**Lungless Salamanders**

Northern Redback Salamander

**FAMILY PLETHODONTIDAE**

*Plethodon cinereus*

**Mole Salamanders**

Blue-spotted Salamander

**FAMILY AMBYSTOMATIDAE**

*Ambystoma laterale*

**Toads**

Eastern American Toad

**FAMILY BUFONIDAE**

*Bufo americanus americanus*

**Treefrogs**

Northern Spring Peeper

**FAMILY HYLIDAE**

*Pseudacris crucifer crucifer*

**True Frogs**

Green Frog

Mink Frog

Wood Frog

**FAMILY RANIDAE**

*Rana clamitans melanota*

*Rana septentrionalis*

*Rana sylvatica*

**Appendix 5. Butterflies of the Marathon PGM study area.**

The following species were observed or heard in or near the Marathon PGM study area in 2009.

**Skippers**

Common Roadside Skipper

Peck's Skipper

**FAMILY HESPERIIDAE**

*Amblyscirtes vialis*

*Polites peckius*

**Swallowtails**

Canadian Tiger Swallowtail

**FAMILY PAPILIONIDAE**

*Papilio glaucus canadensis*

**Whites and Sulphurs**

Pink-edged Sulphur

Mustard White

**FAMILY PIERIDAE**

*Colias interior*

*Pieris oleracea*

**Coppers, Hairstreaks and Blues**

Dorcas Copper

**FAMILY LYCAENIDAE**

*Epidemia dorcas*

**Brushfoots**

White Admiral

Mourning Cloak

Northern Crescent

Hoary Comma

Great Spangled Fritillary

Red Admiral

**FAMILY NYMPHALIDAE**

*Basilarchia arthemis*

*Nymphalis antiopa*

*Phycoides cocyta*

*Polygonia gracilis*

*Speyeria cylebe*

*Vanessa atalanta*

**Appendix 6. Dragonflies and Damselflies of the Marathon PGM study area.**

The following species were observed or heard in or near the Marathon PGM study area in 2009.

*Dragonflies*

**Darners**

Canada Darner  
Variable Darner

**FAMILY AESHNIDAE**

*Aeshna canadensis*  
*Aeshna interrupta*

**Emeralds**

American Emerald  
Racket-tailed Emerald  
Ocellated Emerald

**FAMILY CORDULIIDAE**

*Cordulia shurtleffi*  
*Dorocordulia libera*  
*Somatochlora minor*

**Clubtails**

Dragonhunter  
Zebra Clubtail

**FAMILY GOMPHIDAE**

*Hagenius brevistylus*  
*Stylurus scudderi*

**Skimmers**

Hudsonian Whiteface  
Variable Whiteface  
Chalk-fronted Skimmer  
Four-spotted Skimmer  
Band-winged Meadowfly

**FAMILY LIBELLULIDAE**

*Leucorrhinia hudsonica*  
*Leucorrhinia proxima*  
*Libellula julia*  
*Libellula quadrimaculata*  
*Sympetrum semicinctorum*

*Damselflies*

**Bluets**

Subarctic Bluet  
Boreal Bluet  
Northern Bluet  
Hagen's Bluet  
Eastern Forktail  
Sedge Sprite

**FAMILY COENAGRIONIDAE**

*Coenagrion interrogatum*  
*Enallagma boreale*  
*Enallagma cyathigerum*  
*Enallagma hageni*  
*Ischnura verticalis*  
*Nehalennia irene*

**Spreadwings**

Common Spreadwing

**FAMILY LESTIDAE**

*Lestes disjunctus*

**Appendix 7. Helicopter survey March 20 2009. Track sightings. Marathon PGM study area.**

<b>Waypoint</b>	<b>Easting</b>	<b>Northing</b>	<b>Species</b>
422	552460.0772	5401776.677	Moose Track
423	551927.0839	5407677.134	Moose Track
424	551439.1962	5410671.662	Potential Peregrine Cliff
426	550980.7348	5403464.464	Otter Track
427	550722.5931	5399806.224	Unknown Track
428	550464.6212	5401036.176	Wolf Track
429	550376.7762	5403589.614	Moose Track
430	550471.7272	5405852.019	Fox Track
431	550464.3567	5406648.047	Fox Track
432	549988.3402	5407769.612	Unknown Track
433	549658.9298	5408304.359	Unknown Track
434	548363.2322	5409668.978	Otter Track
435	549312.5736	5405813.068	Fox Track
436	549342.5635	5405143.894	Unknown Track
437	549287.7211	5404241.841	Snowshoe Hare Track
438	549205.7424	5401783.375	Fox Track
439	549226.8858	5400273.54	Snowshoe Hare Track
440	548430.4309	5400150.588	Fox Track
441	548241.2046	5401252.232	Fox Track
442	548766.5902	5401572.356	Otter Track
443	548500.6092	5404700.333	Otter Track
444	548253.4712	5406099.807	Unknown Track
445	547409.1706	5409443.22	Unknown Track
446	546334.1314	5409645.773	Otter Track
447	546902.7762	5407539.821	Otter Track
448	547352.8143	5405969.499	Moose Track
449	547370.9153	5404377.407	Otter Track
450	547361.7871	5403884.099	Moose Track
451	547713.8653	5402444.478	Otter Track
452	546159.516	5404260.905	Otter Track
453	546188.3544	5405656.373	Wolf Track
454	546238.0209	5407146.911	Otter Track
455	543664.2203	5409474.649	Potential Peregrine Cliff
456	544866.0555	5408210.523	Snowshoe Hare Track
457	545612.6777	5404554.977	Otter Track
458	544363.3313	5402743.54	Fox Track
459	544193.4329	5403535.438	Potential Peregrine Cliff
460	542837.9231	5407017.616	Potential Peregrine Cliff

**Appendix 8. Rare species locations at Marathon PGM study area, 2009.**

Common Name	Scientific Name	Date	Easting	Northing	Observer
Common Ragweed	<i>Ambrosia artemisiifolia</i>	06-Aug-09	550440	5405800	AGH
Whitlowgrass	<i>Draba cana</i>	05-Aug-09	546618	5406889	AGH
Northern St. Johnswort	<i>Hypericum mutilum</i>	06-Aug-09	548136	5403376	AGH
Broad-lipped Twayblade	<i>Listera convallarioides</i>	16-Jul-09	550748	5405958	AGH
Wood Millet Grass	<i>Milium effusum</i>	04-Aug-09	549216	5403852	AGH
Wood Millet Grass	<i>Milium effusum</i>	15-Jul-09	550870	5402600	AGH
Small-flowered Evening Primrose	<i>Oenothera parviflora</i>	17-Jul-09	548897	5404411	AGH
Canadian Mountain Rice	<i>Oryzopsis canadensis</i>	16-Jul-09	550664	5403490	AGH
Oakes' Pondweed	<i>Potamogeton oakesianus</i>	17-Jul-09	548587	5404096	AGH
Oakes' Pondweed	<i>Potamogeton oakesianus</i>	06-Aug-09	547936	5403292	AGH
Oakes' Pondweed	<i>Potamogeton oakesianus</i>	24-Aug-09	548934	5404289	AGH
Oakes' Pondweed	<i>Potamogeton oakesianus</i>	24-Aug-09	548927	5404538	AGH
Oakes' Pondweed	<i>Potamogeton oakesianus</i>	06-Aug-09	548268	5403327	AGH
Slender Pondweed	<i>Potamogeton pusillus</i>	17-Jul-09	548897	5404411	AGH
Narrow-leaved Cattail	<i>Typha angustifolia</i>	17-Jul-09	549610	5403918	AGH
Marsh Speedwell	<i>Veronica scutellata</i>	25-Aug-09	549278	5402644	AGH
Appalachian Firmoss	<i>Huperzia appalachiana</i>	05-Aug-09	548875	5407566	AGH
Shore Plantain	<i>Littorella americana</i>	07-Aug-09	543934	5403309	AGH
Braun's Holly Fern	<i>Polystichum braunii</i>	18-Jul-09	549460	5404968	AGH
Alga Pondweed	<i>Potamogeton confervoides</i>	24-Aug-09	548934	5404289	AGH
Alga Pondweed	<i>Potamogeton confervoides</i>	06-Aug-09	548136	5403376	AGH
Northern Woodsia	<i>Woodsia alpina</i>	17-Jul-09	549342	5403777	AGH
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550575	5401057	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	16-Jul-09	550903	5403688	AGH
Canada Warbler	<i>Wilsonia canadensis</i>	18-Jul-09	550026	5405058	AGH
Canada Warbler	<i>Wilsonia canadensis</i>	18-Jul-09	549986	5404990	AGH
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550083	5402099	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550248	5402001	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	15-Jul-09	549496	5403835	AGH
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550306	5401712	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	20-Jun-09	549600	5403353	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550577	5400925	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550479	5400757	RFF

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Common Name	Scientific Name	Date	Easting	Northing	Observer
Canada Warbler	<i>Wilsonia canadensis</i>	17-Jul-09	548947	5404544	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	17-Jul-09	548906	5404335	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	18-Jul-09	549743	5406060	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	18-Jul-09	549695	5406269	RFF
Canada Warbler	<i>Wilsonia canadensis</i>	21-Jun-09	550248	5402001	RFF
Olive-sided Flycatcher	<i>Contopus borealis</i>	18-Jul-09	549695	5406269	RFF
Rusty Blackbird	<i>Euphagus carolinus</i>	15-Jul-09	550204	5405309	AGH

**Appendix 9. Forest Bird Monitoring data. Marathon PGM study area 2009. Refer to Appendix 10 for locations and dates.**

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
1	Ovenbird	1	1					2
1	Blue-winged Teal		1					1
1	Red-eyed Vireo	1		1				2
1	Black-throated Green Warbler	2						2
1	Winter Wren	1						1
1	Chipping Sparrow	1						1
2	Winter Wren			2				2
2	Blackburnian Warbler	1						1
2	Black-throated Green Warbler	2						2
2	Swainson's Thrush	1		1				2
2	Philadelphia Vireo	1						1
2	Ovenbird	1						1
2	Mourning Warbler	1						1
2	American Redstart	1						1
2	Bay-breasted Warbler	1						1
2	White-throated Sparrow			2				2
3	Swainson's Thrush	1		1				2
3	Mourning Warbler	1						1
3	Black-throated Green Warbler	1						1
3	Magnolia Warbler	1						1
3	Red-eyed Vireo				1			1
3	Blue Jay	1						1
3	Winter Wren	1						1
3	Tennessee Warbler	1						1
3	Chestnut-sided Warbler				1			1
3	American Redstart	1						1
3	Canada Warbler						1	1
3	White-throated Sparrow	1						1
4	Swainson's Thrush			1				1
4	White-throated Sparrow	1						1
4	Veery			1				1
4	Black-throated Green Warbler	3						3
4	Winter Wren	1						1
4	Least Flycatcher	1						1
4	American Redstart	1						1
4	Northern Parula	1						1

## Marathon PGM Terrestrial Baseline Assessment 2009

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
4	Ovenbird	1						1
5	Winter Wren	1						1
5	White-throated Sparrow			2				2
5	American Redstart	2						2
5	Black-throated Green Warbler	3						3
5	Pine Siskin	1						1
5	Red-eyed Vireo	1						1
5	Nashville Warbler	1						1
5	American Robin	1						1
5	Mourning Warbler	1						1
5	Red-eyed Vireo	1						1
5	Common Goldeneye			1				1
6	White-throated Sparrow			2				2
6	Swainson's Thrush	1						1
6	Tennessee Warbler	1						1
6	American Redstart	1						1
6	Winter Wren			1				1
6	Red-eyed Vireo	1						1
6	Black-throated Green Warbler	1						1
6	Pine Siskin	1						1
6	American Robin	1		1				2
6	Least Flycatcher	1						1
6	Northern Parula	1						1
6	Chipping Sparrow	1						1
7	Black-throated Green Warbler	3						3
7	Mourning Warbler	2			1			3
7	Nashville Warbler	1						1
7	Winter Wren			2				2
7	Hermit Thrush			1				1
7	White-throated Sparrow	3		1				4
7	Veery			1				1
7	Least Flycatcher	1						1
7	American Redstart	1						1
7	American Robin				1			1
7	Swainson's Thrush			1				1
8	Black-throated Green Warbler	1					1	2
8	White-throated Sparrow	3						3
8	Nashville Warbler	1						1
8	Alder Flycatcher	1						1

## Marathon PGM Terrestrial Baseline Assessment 2009

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
8	Red-eyed Vireo	1			1			2
8	Magnolia Warbler	1						1
8	Mourning Warbler	1			1			2
8	Blue Jay						1	1
8	Swainson's Thrush	1						1
8	American Redstart	1						1
8	Yellow-bellied Sapsucker	1						1
8	Blue-headed Vireo				1			1
8	Chestnut-sided Warbler	1						1
9	Common Raven			1				1
9	White-throated Sparrow	3						3
9	Winter Wren			1	1			2
9	Nashville Warbler	1						1
9	Swainson's Thrush	2						2
9	Magnolia Warbler	1						1
9	Black-throated Green Warbler	1						1
9	American Redstart	1						1
9	Mourning Warbler	1						1
9	American Robin				1			1
9	Hairy Woodpecker	1						1
9	Nashville Warbler				1			1
10	American Redstart	2						2
10	Magnolia Warbler	1						1
10	Swainson's Thrush	1			1			2
10	Black-throated Green Warbler				1			1
10	Common Raven			1				1
10	Winter Wren	1			1			2
10	White-throated Sparrow	3						3
10	Ruby-crowned Kinglet	1						1
10	American Robin	1						1
10	Yellow-rumped Warbler	1						1
10	Tennessee Warbler	1						1
11	Common Raven			1				1
11	Black-throated Green Warbler	4						4
11	Red-eyed Vireo				1			1
11	Pine Siskin	1						1
11	Magnolia Warbler	1						1
11	White-throated Sparrow			2		1		3
11	Northern Waterthrush	1						1

## Marathon PGM Terrestrial Baseline Assessment 2009

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
11	Red-breasted Nuthatch	1						1
11	Swainson's Thrush			1				1
11	Winter Wren	1		1				2
11	Nashville Warbler	1						1
11	American Redstart	1						1
12	White-throated Sparrow	1		2				3
12	American Redstart	1						1
12	Spotted Sandpiper	1						1
12	Nashville Warbler	1						1
12	Mourning Warbler	2						2
12	Red-eyed Vireo	2						2
12	Winter Wren	1		1				2
12	Hairy Woodpecker	1						1
12	Black-throated Green Warbler	1						1
12	Swainson's Thrush	1						1
13	White-throated Sparrow	2		1				3
13	Nashville Warbler				1			1
13	Mourning Warbler	1						1
13	Red-eyed Vireo	1						1
13	Swainson's Thrush				1			1
13	American Robin	2						2
13	Magnolia Warbler	1						1
13	Black-throated Green Warbler	2						2
13	Canada Warbler	2						2
13	Least Flycatcher	1						1
14	Blue Jay	1						1
14	Red-eyed Vireo	2						2
14	Chipping Sparrow	1						1
14	Northern Waterthrush						1	1
14	Nashville Warbler	1						1
14	White-throated Sparrow			1				1
14	Ovenbird	1			1			2
14	Black-throated Green Warbler	2						2
14	American Redstart				1			1
14	Red-breasted Nuthatch	1						1
14	Winter Wren	1						1
14	Magnolia Warbler	1						1
14	Swainson's Thrush	1						1
14	Winter Wren	1						1

## Marathon PGM Terrestrial Baseline Assessment 2009

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
15	Black-throated Green Warbler	3						3
15	Swainson's Thrush	2						2
15	Least Flycatcher	2						2
15	Winter Wren	1						1
15	Magnolia Warbler	1						1
15	Northern Parula	1						1
16	White-throated Sparrow	2						2
16	Nashville Warbler	2						2
16	Hermit Thrush	1						1
16	Swainson's Thrush	2						2
16	Winter Wren	2						2
16	Red-eyed Vireo	1						1
16	Ovenbird	1						1
16	Least Flycatcher	1						1
17	American Redstart				1			1
17	Bay-breasted Warbler					1		1
17	Red-eyed Vireo		2					2
17	Winter Wren		1	1				2
17	Least Flycatcher		1					1
17	Black-and-White Warbler		1					1
17	Veery		1					1
17	Pine Siskin					1		1
17	White-throated Sparrow						1	1
17	Hermit Thrush						1	1
17	Palm Warbler			1				1
18	Least Flycatcher		1					1
18	Black-throated Green Warbler					1		1
18	Yellow-rumped Warbler		1					1
18	White-throated Sparrow			1		1		2
18	Winter Wren			1		1		2
18	Mourning Warbler			1				1
18	Hermit Thrush			1				1
18	Red-eyed Vireo			1				1
19	Magnolia Warbler				1			1
19	Golden-crowned Kinglet				1			1
19	Yellow-rumped Warbler				1			1
19	Ovenbird					1		1
19	Black-and-White Warbler		1					1
19	Ruffed Grouse		1					1

## Marathon PGM Terrestrial Baseline Assessment 2009

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
19	Least Flycatcher		1	1				2
19	White-throated Sparrow			1				1
19	Winter Wren			1			1	2
19	Swainson's Thrush			1				1
19	Red-eyed Vireo						1	1
19	Hermit Thrush						1	1
20	Canada Warbler							0
20	White-throated Sparrow	2	2					4
20	American Redstart				1			1
20	Ruby-crowned Kinglet		2					2
21	American Redstart	1						1
21	Swainson's Thrush	1		1				2
21	Magnolia Warbler				1			1
21	White-throated Sparrow		2				1	3
21	Ovenbird		1					1
21	Black-throated Green Warbler		1			2		3
21	American Robin	1				1		2
21	Golden-crowned Kinglet					1		1
21	Nashville Warbler					1		1
21	Least Flycatcher						1	1
21	Hermit Thrush						1	1
22	Golden-crowned Kinglet	1						1
22	Black-throated Green Warbler	1	1					2
22	Black-and-White Warbler		1					1
22	American Redstart					1		1
22	White-throated Sparrow		2	1				3
22	Least Flycatcher		1			1		2
22	Winter Wren		1					1
22	Northern Flicker			1				1
22	Swainson's Thrush			1			1	2
22	American Robin			1				1
23	Black-throated Green Warbler	1						1
23	American Redstart	1			1			2
23	Black-capped Chickadee				1			1
23	Bay-breasted Warbler	1						1
23	White-throated Sparrow		2					2
23	Red-eyed Vireo					2		2
23	American Robin		1	1		1		3
23	Winter Wren		1					1

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Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
24	Common Yellowthroat	1						1
24	Alder Flycatcher	1						1
24	American Redstart	1			1			2
24	Magnolia Warbler	1						1
24	White-throated Sparrow		1	1		1		3
24	Evening Grosbeak				1			1
24	Cedar Waxwing	5						5
24	Winter Wren		1					1
24	Blue Jay		1					1
25	Black-throated Green Warbler	1			1			2
25	White-throated Sparrow		3					3
25	Magnolia Warbler				1			1
25	Veery				1			1
25	Red-eyed Vireo		1					1
25	Nashville Warbler					1		1
25	American Redstart		1					1
25	American Robin					2		2
25	Swainson's Thrush			1				1
26	Black-capped Chickadee	2						2
26	White-throated Sparrow	1	2					3
26	Yellow-rumped Warbler	1						1
26	Red-eyed Vireo	1				2		3
26	Mourning Warbler		1		1			2
26	Black-and-White Warbler				1			1
26	Black-throated Green Warbler					1		1
26	Cedar Waxwing					3		3
26	Red-breasted Nuthatch		1					1
26	American Robin						1	1
26	Common Raven			1				1
27	Yellow-rumped Warbler	2						2
27	Nashville Warbler	1						1
27	American Robin		1					1
27	Black-throated Green Warbler		1			1		2
27	Red-eyed Vireo		1					1
27	Chipping Sparrow					1		1
27	Pine Siskin		1					1
27	White-throated Sparrow		1					1
27	Swainson's Thrush		1					1
27	Common Raven			1				1

## Marathon PGM Terrestrial Baseline Assessment 2009

Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
28	Mourning Warbler	1						1
28	Nashville Warbler		1					1
28	Winter Wren		2	1			1	4
28	American Robin			1			1	2
28	Ovenbird		1					1
28	American Redstart					1		1
29	White-throated Sparrow	1		1		1		3
29	Winter Wren			2				2
29	Black-throated Green Warbler		2					2
29	Swainson's Thrush			2				2
30	White-throated Sparrow	1						1
30	Least Flycatcher	1				1		2
30	American Redstart		1					1
30	Yellow-rumped Warbler				1			1
30	Black-and-White Warbler		1					1
30	Northern Parula		1					1
30	Winter Wren		1	1			1	3
30	Swainson's Thrush			1				1
31	Black-throated Green Warbler	1	1					2
31	Magnolia Warbler	1						1
31	Canada Warbler					1		1
31	Bay-breasted Warbler		1					1
31	Least Flycatcher			1				1
31	Hairy Woodpecker					1		1
31	American Robin						1	1
31	Swainson's Thrush						1	1
33	Red-breasted Nuthatch	1						1
33	White-throated Sparrow		1					1
33	Ovenbird		2					2
33	Winter Wren		1			1		2
33	Ruffed Grouse					1		1
33	Yellow-rumped Warbler					1		1
33	Swainson's Thrush			3				3
33	American Redstart		1			1		2
33	American Robin					1		1
33	Black-throated Green Warbler					1		1
34	Magnolia Warbler	1						1
34	White-throated Sparrow		1			2	1	4
34	American Redstart				1			1

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Plot	Species	0 to 5 minutes			5 to 10 minutes			Total
		0 - 50 m	50-100 m	>100 m	0 - 50 m	51 - 100 m	>100 m	
34	Black-throated Green Warbler	1						1
34	Nashville Warbler		1					1
34	Bay-breasted Warbler		1					1
34	Least Flycatcher		1	1				2
34	Pileated Woodpecker			1				1

**Appendix 10. Forest Bird Monitoring details. Marathon PGM study area 2009. Observers were Robert Foster (RFF) and Brian Ratcliff (BR).**

Date	Observer	Plot	WP	UTM Zone	UTM Easting	UTM Northing
June 20, 2009	RFF	1	187	16	550446	5402602
June 20, 2009	RFF	2	188	16	549617	5403283
June 20, 2009	RFF	3	189	16	549617	5403283
June 20, 2009	RFF	4	191	16	549778	5403514
June 20, 2009	RFF	5	192	16	550153	5404213
June 20, 2009	RFF	6	194	16	550037	5404475
June 20, 2009	RFF	7	195	16	550319	5405276
June 20, 2009	RFF	8	197	16	550516	5405519
June 20, 2009	RFF	9	198	16	550515	5406388
June 20, 2009	RFF	10	199	16	550559	5406634
June 20, 2009	RFF	11	200	16	550085	5407319
June 20, 2009	RFF	12	204	16	550703	5405686
June 21, 2009	RFF	13	208	16	550299	5404395
June 21, 2009	RFF	14	209	16	550548	5404443
June 21, 2009	RFF	15	210	16	550511	5404654
June 21, 2009	RFF	16	211	16	550661	5404822
June 20, 2009	BR	17	12	16	550762	5402618
June 20, 2009	BR	18	13	16	550069	5402613
June 20, 2009	BR	19	14	16	549693	5403025
June 20, 2009	BR	20	15	16	550039	5403767
June 20, 2009	BR	21	16	16	550262	5403934
June 20, 2009	BR	22	17	16	550245	5404767
June 20, 2009	BR	23	18	16	550319	5405024
June 20, 2009	BR	24	19	16	550466	5405811
June 20, 2009	BR	25	20	16	550546	5406125
June 20, 2009	BR	26	21	16	550218	5406784
June 20, 2009	BR	27	22	16	550176	5407055
June 21, 2009	BR	28	26	16	550048	5404028
June 21, 2009	BR	29	27	16	549812	5403880
June 21, 2009	BR	30	28	16	549563	5403835
June 21, 2009	BR	31	29	16	549305	5403838
June 21, 2009	BR	33	30	16	551029	5402547
June 21, 2009	BR	34	31	16	551317	5402580