Rapid Assessment of Large Trees in the Unprotected Bug Lake Old-Growth Forest, Algonquin Park, Ontario

Field Notes No. 2

Ancient Forest Exploration & Research (AFER)
(www.savealgonquinoldgrowth.org; www.ancientforest.org)

by P. Quinby, G. Quinby and S. McWilliams

September 20, 2018

"Large old trees are declining across much of the planet… Targeted research is needed to better understand their key threats and devise strategies to counter them. Without such initiatives, these iconic organisms and the many species dependent on them could be lost or greatly diminished." (Lindenmayer et al. 2012)

At *AFER* we:

- treat old-growth forests as "non-renewable resources", which is not consistent with the practice of mining them or logging them;
- we consider biodiversity conservation needs at local, provincial, federal and international scales;
- we support the Government of Canada's official commitment to increase protected areas in Canada to 17% of the land base (Government of Canada 2018); and
- we support the *New York Declaration on Forests* to ban logging of natural forests by 2030 (Climate Focus 2015).

Introduction

Ecosystem services provided by old-growth forests include *provisioning services* such as food and water; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling (Millennium Ecosystem Assessment 2005). Large and/or old trees that are typical of old-growth forests have been characterized as keystone ecological structures (e.g., unique wildlife habitat) in forests, savannas, farmlands, and urban landscapes (Lindenmayer et al. 2012).

In particular, "Because large-diameter trees constitute roughly half of the mature forest biomass worldwide, their dynamics and sensitivities to environmental change represent potentially large controls on global forest carbon cycling. [Protecting] …existing large-diameter trees or those that can soon reach large diameters [is] a simple way to conserve and potentially enhance ecosystem services" (Lutz et al. 2018). In fact, one large tree can remove the same amount of carbon from the atmosphere within a year as is contained in one mid-sized tree (Stephenson et al. 2014).

However, it is now generally accepted that old-growth forests in Ontario, south of the Boreal Forest region, are rare ecosystems at minimum. More likely, they are endangered, as has been documented for North America's old-growth red and eastern white pine forests (Quinby 1993, EAB 1994). In addition, "the loss of large old trees in many ecosystems around the world poses a threat to ecosystem integrity" (Lindenmayer et al. 2012).

The effective stewardship of old-growth forests and large old trees depends on an understanding of the composition and amount of what remains, where it is located, and how much is protected. The purpose of this project was to perform the first rapid assessment of large trees in the unprotected Bug Lake Old-Growth Forest located roughly 8 km northwest of Brent, Ontario (road access) located in the north-central portion of Algonquin Park.

Study Area

The Bug Lake Old-growth Forest is located roughly 2 km west of the northwest end of Cedar Lake, Algonquin Park (Figures 1 and 2). Public access to Bug Lake is provided by two backcountry portages; one runs southwest from the northwest end of Little Cedar Lake (820 m) and the other runs northeast from Ironwood Lake (760 m; see jeff'smap for Algonquin Park - http://www.algonquinmap.com/). At the broad-scale, this old-growth stand can be described as a tolerant hardwood-eastern hemlock forest landscape.

Methods and Results

The old-growth forest was accessed from the portage between Little Cedar Lake and Bug Lake on August 15, 2018 within the study area shown on Figure 2. The study area was primarily composed of a sugar maple-yellow birch-hemlock stand with scattered American beech on a hillside facing northeast and included an intermittent stream. A dense cluster of eastern hemlock trees was located at the crest of the hill along the Bug Lake shoreline at the end of the portage. Diameters of the trees in this eastern hemlock cluster ranged from roughly 25.0 to 65.3 cm dbh (diameter at breast height).

A total of 14 trees within 30 m of the portage were identified, located with a GPS, and measured for dbh ranging from 54.5 to 85.1 cm (Table 1). These large tree species included American beech, eastern hemlock, sugar maple and yellow birch (Table 1). Snags (mostly sugar maple) and logs with species and size variation were present in the areas surveyed and forest regeneration appeared to be healthy. No cut stumps were observed.

Based on the literature on age-diameter relationships for these tree species (Blum 1961, Leak 1985, Henry and Quinby 2006), it is highly unlikely that any of the 14 measured trees were younger than the minimum age specified for old growth by OMNR (2003). More likely, these large trees are all much older than the minimum age, however, this can only be determined by using an increment borer to extract a core for a ring count.

Figure 1. Regional Location of the Bug Lake Old-growth Forest

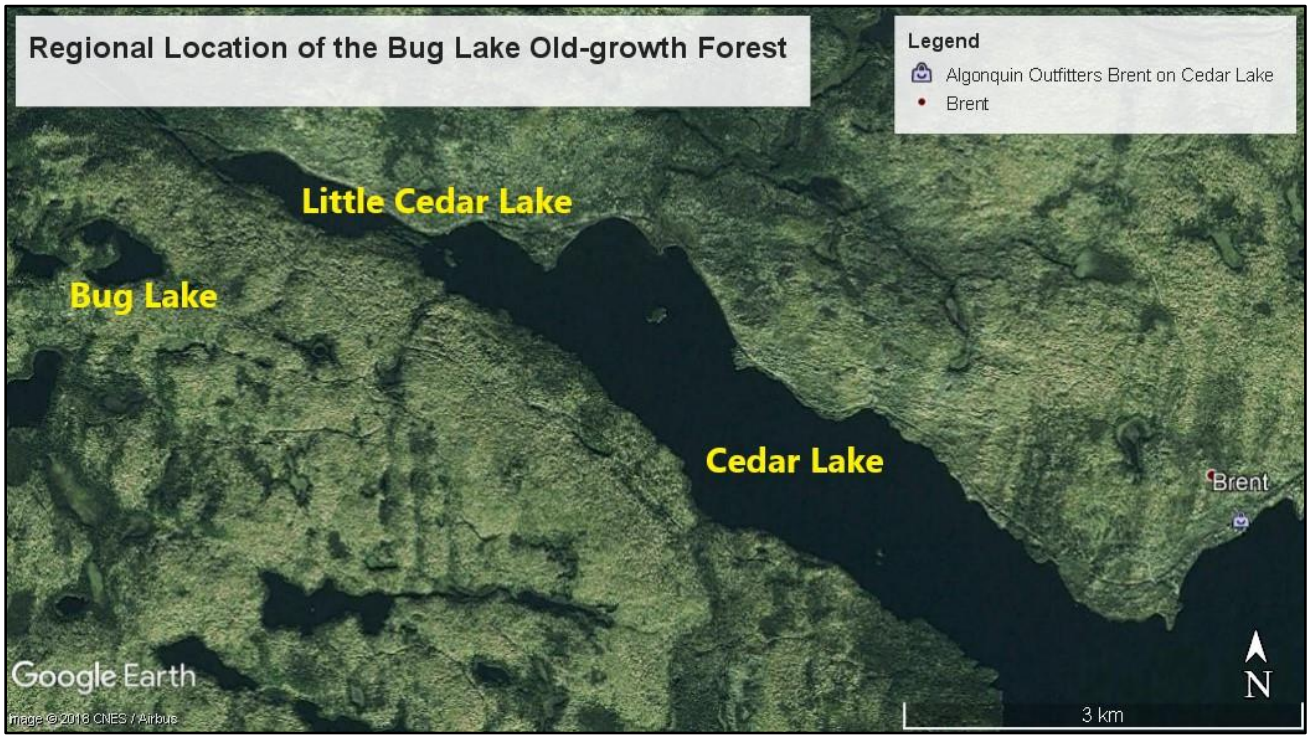

Figure 2. Bug Lake Old-growth Forest and Study Area

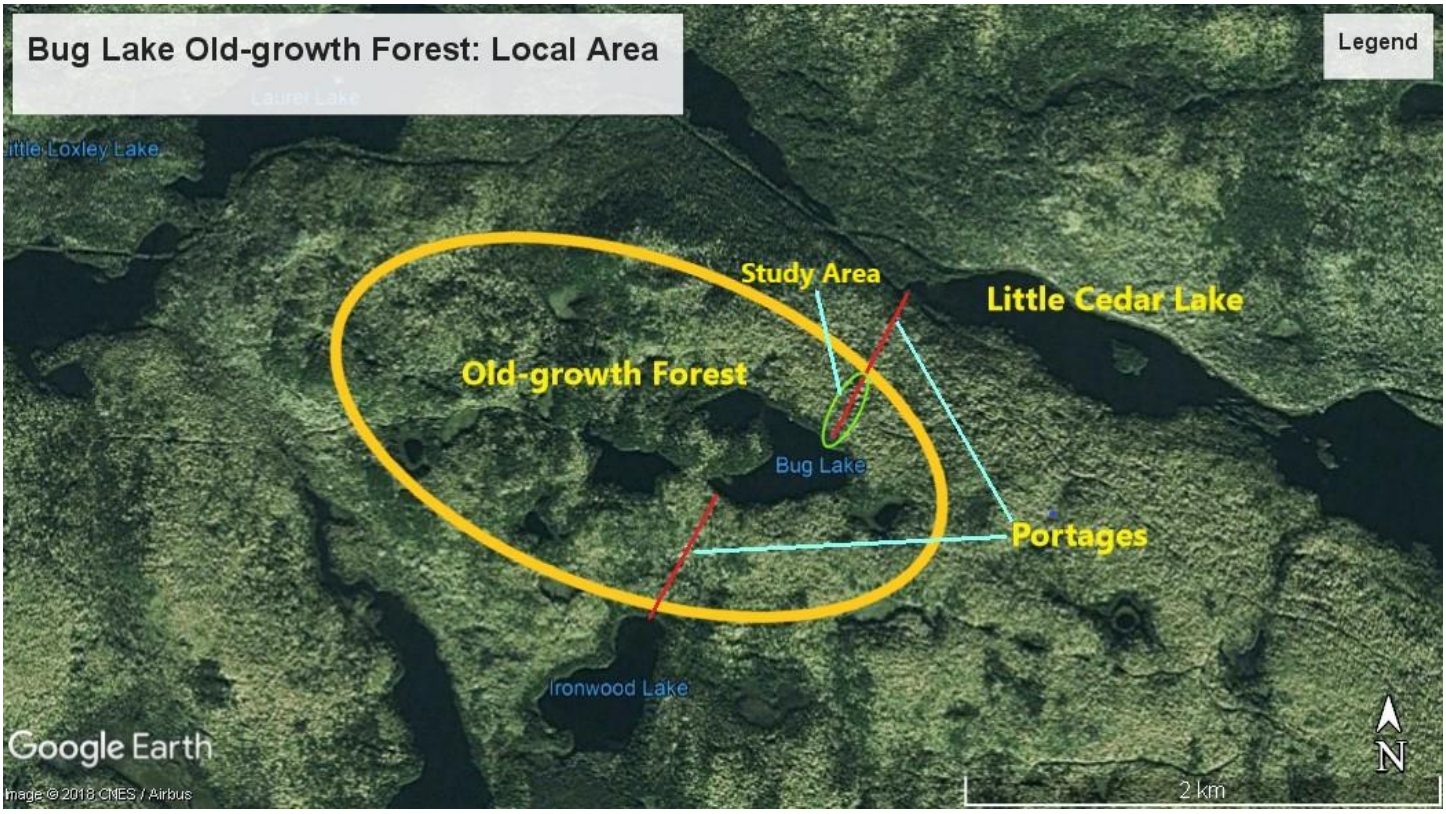

Table 1. Large, Old Trees Identified in the Bug Lake Old-growth Forest: Species, Diameter and Location (ordered as encountered)

No.	Species	DBH (cm)	Location (east, north)
1	Yellow Birch	71.6	17 T 687164, 5102321
2	Yellow Birch	54.5	17 T 687187, 5102348
3	Eastern Hemlock	58.5	17 T 687169, 5102359
4	Eastern Hemlock	65.1	17 T 687088, 5102395
5	Eastern Hemlock	58.5	17 T 687066, 5102412
6	American Beech	55.4	17 T 687047, 5102413
7	Yellow Birch	65.5	17 T 687015, 5102362
8	Yellow Birch	70.0	17 T 686988, 5102363
9	Yellow Birch	83.2	17 T 686933, 5102316
10	Sugar Maple	73.9	17 T 686893, 5102316
11	Sugar Maple	61.0	17 T 686877, 5102300
12	Sugar Maple	85.1	17 T 686866, 5102257
13	Yellow Birch	80.5	17 T 686833, 5102181
14	Eastern Hemlock	65.3	17 T 686833, 5102181

Photographs

Photo 1. Tree #1 - Yellow Birch (71.6 cm dbh)

Photo 2. Tree #13 - Yellow Birch (80.5 cm dbh)

Photo 3. Tree #6 - American Beech (55.4 cm dbh)

Photo 4. Tree #12 – Sugar Maple (85.1 cm dbh)

References

Blum, B. M. 1961. Age-size Relationships in All-aged Northern Hardwoods. ***Forest Research Note*** No. 125, U.S. Forest Service, Upper Darby, Pennsylvania.

Climate Focus. 2015. ***Progress on the New York Declaration on Forests – An Assessment Framework and Initial Report: Technical Annexes***. Goal 1: At least halve the rate of loss of natural forests globally by 2020 and strive to end natural forest loss by 2030. Prepared by Climate Focus, in collaboration with Environmental Defense Fund, Forest Trends, Global Alliance for Clean Cookstoves, Global Canopy Program and The Sustainability Consortium.

Environmental Assessment Board (EAB). 1994. ***Reasons for Decision and Decision: Class Environmental Assessment by the Ministry of Natural Resources for Timber Management***. Ontario Environmental Assessment Board, EA-87-02, 2300 Younge Street, Toronto, Ontario.

Government of Canada. 2018. ***Canada Biodiversity Targets 2020***. From: http://publications.gc.ca/collections/collection_2016/eccc/CW66-524-2016-eng.pdf. (accessed May 9, 2018)

Henry, M & P. Quinby. 2006. A Preliminary Survey of Old-Growth Forest Landscapes on the West Side of Algonquin Provincial Park, Ontario. ***Research Report*** No. 32, Ancient Forest Exploration & Research, Powassan, Ontario.

Leak, W. B. 1985. Relationships of Tree Age to Diameter in Old-Growth Northern Hardwoods and Spruce-Fir. U.S. Forest Service, ***Research Note*** NE-329, Broomall, Pennsylvania.

Lindenmayer, D. B., et al. 2012. Global decline in large old trees. ***Science*** 338:1305-1306.

Lutz, J. A., et al. 2018. Global importance of large-diameter trees. ***Global Ecology and Biogeography*** 2018:1–16. (DOI: 10.1111/geb.12747)

Millennium Ecosystem Assessment. 2005. ***Ecosystems and Human Well-being: Synthesis***. Island Press, Washington, D.C.

OMNR. 2003. ***Old-growth Forest Definitions for Ontario***. Ontario Ministry of Natural Resources (OMNR), Queen's Printer for Ontario, Toronto, Ontario.

Quinby, P. A. 1993. Old-growth eastern white pine forest: An endangered ecosystem. ***Forest Landscape Baselines*** No. 2, Ancient Forest Exploration & Research, Powassan, Ontario. (http://www.ancientforest.org/wp-content/uploads/2015/02/flb2.pdf)

Stephenson, N. L., et al. 2014. Rate of tree carbon accumulation increases continuously with tree size. ***Nature*** 507:90–93.