A Rapid Old-growth Forest Survey to Assess for Old Trees, Evidence of Logging and Coarse Woody Debris in the Heart of the Catchacoma Forest: A Citizen Science Project

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Catchacoma Old-growth Forest, photo by L. Collings

"These results show that the heart of Catchacoma is not an even-aged forest that requires even-aged management; rather they show that this area has been self-replacing for at least four centuries, and likely dates back almost to glacial recession." Peter Quinby, Ph.D. (May 2021)

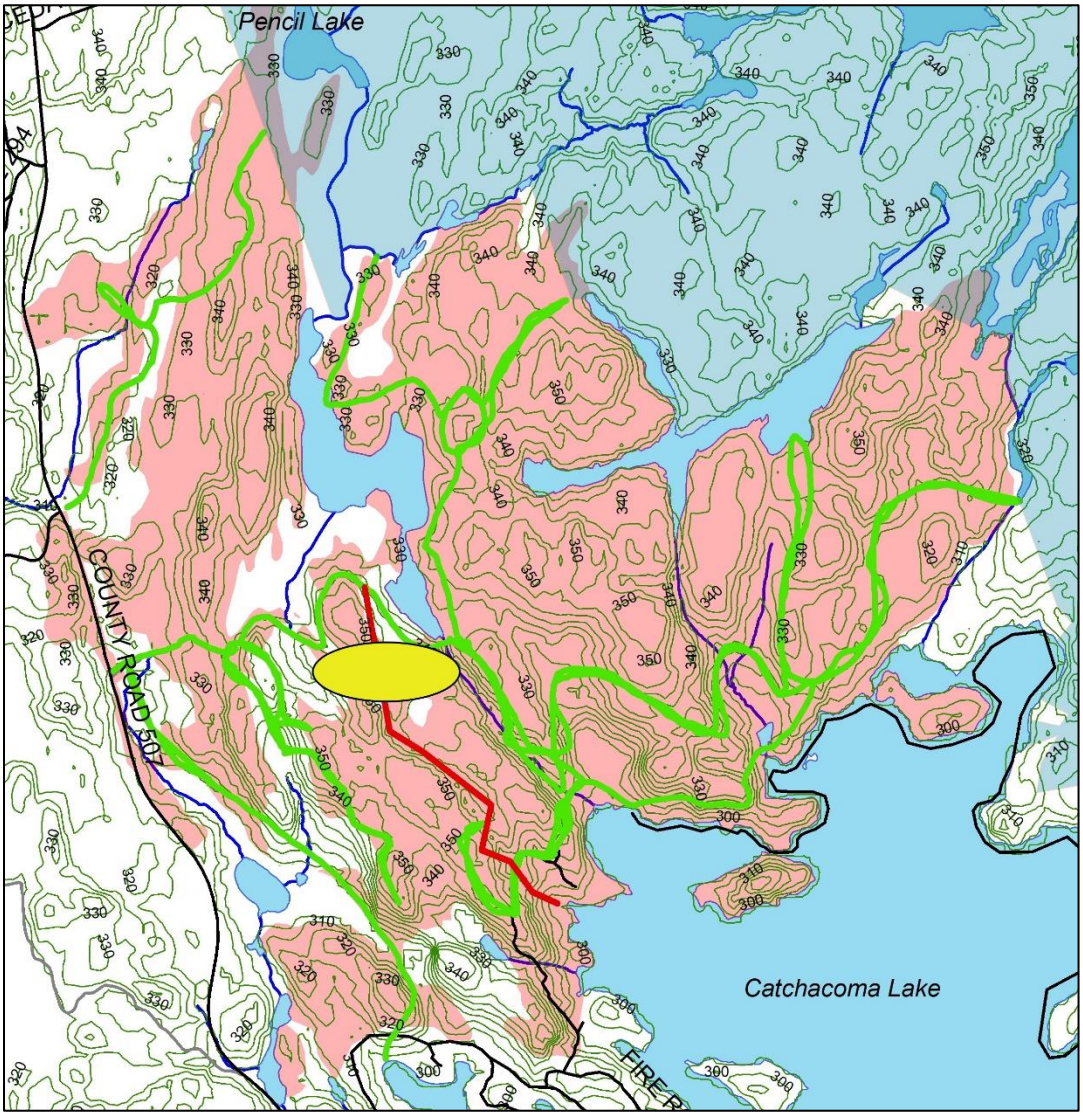
Introduction

In March of 2019, Ancient Forest Exploration & Research (AFER) began work on a one-year project to assess and describe old-growth forests (OGF) in Peterborough County funded by the Ontario Trillium Foundation. One of the most significant findings from this project was the identification of the Catchacoma Forest as Canada's largest known eastern hemlock OGF (Figure 1; Quinby 2019) with an estimated size of 662 ha (1,655 ac).

Despite this finding of national significance, and despite confirmation of the common presence of OGF features (old trees, snags, logs, low stump density; Dewar 2020, Quinby et al. 2020), the sustainable forestry licence holder (Bancroft Minden Forest Company - BMFC) and the Ministry of Natural Resources and Forestry (MNRF) ignored these standard conservation values and requests by scientists and conservationists to put a moratorium on logging this area. Instead of delaying logging in order to further investigate the natural heritage value of this forest, a significant portion (~25 ha; ~62 ac) of this unique and valuable forested landscape was logged during fall and winter of 2019-20. An adjacent area of similar size was also logged during the fall and winter of 2020-21.

Adding to the field data describing the presence of old-growth in the Catchacoma Forest (Dewar 2020, Quinby et al. 2020), this field study further documents the presence of OGF trees, low cut stump density, and the presence of a significant amount of coarse woody debris (CWD; logs and fallen trees) within the study area.

FIGURE 1 - Location of Protocol 2 Surveys in the Catchacoma Old-growth Forest
(pink = Catchacoma Forest; yellow = approximate survey area; green & red = trails)



Methods

Data collection in 10 randomly-selected plots (6 x 50 m each; 3,000 m^2 total) located in the heart of the Catchacoma Forest (Figure 1) was carried out by students in the Youth Leadership in Sustainability (YLS) class (grades 11 and 12) of the Kawartha Pine Ridge District School Board in Peterborough, Ontario taught by Cameron Douglas in October of 2019. Students (23) were allocated to five groups of 4-5 students and each group was supervised by an experienced outdoor educator/naturalist. Two full days of training (classroom and field) were provided to students on establishing plots, assessing habitat features and evidence of logging, tree species identification, measuring tree dbh (10+ cm dbh), and evaluation of CWD. Six trees were cored and aged by staff. Students provided approximately 550 person-hours of field effort for this project, the equivalent of roughly 16 weeks (35 hrs/week) of work for one person.

Results

Habitat Conditions – all slope positions, slope aspects (except east), and steepness types were sampled during this OGF survey (Table 1). In addition, only two plots were void of CWD; thus 80% of the area sampled had a significant amount of logs and fallen trees. Fifty percent of the plots had a high amount of CWD (Table 1).

TABLE 1
Protocol 2 OGF Surveys Conducted by AFER & YLS – Catchacoma Forest-North: Plot Habitat Conditions and Downed Woody Debris
(Oct. 8, 2019; 10 plots; 6x50 m; 3,000 m^2 sampled along 500 m of transect)

New Plot	Old Plot	Slope Position	Slope Aspect	Steepness	Downed Woody Debris
1	1A	valley	north	low	none
2	2A	upper slope	south	high	some small fallen trees
3	3A	upper slope	west	medium	a few fallen trees
4	4A	hilltop	west	low	a few fallen trees
5	5A	mid-slope	southwest	medium	many moss-covered logs; lots of fallen trees along entire transect
6	1B	lower slope	south	medium	many medium-sized fallen trees
7	2B	hilltop	n/a	n/a	many small and medium-sized logs
8	3B	mid-slope	south	low	none
9	4B	unknown	unknown	unknown	lots of fallen trees
10	5B	valley	southwest	low	many moss-covered logs and fallen trees

Percentage of Old-growth Forest Trees
Of the 68 trees assessed for dbh (Table 2), 69% (47 trees) were eastern hemlock; other tree species included American beech, red maple, red oak, sugar maple, white pine, and yellow birch. Of these assessed trees, 38% (26 trees) met the OGF minimum dbh (Quinby 2020) for an OGF live tree density of 87/ha.

We used data from Larson et al. (1999) describing 38 of the finest old-growth forests in southern Ontario (SO) to evaluate our results. In terms of percentage of OGF trees within an OGF, this Catchacoma study area is at 38%, whereas the minimum for SO is 2%, the maximum is 54%, and the mean is 23%. Thus, compared to Larson el al.'s (1999) OGF standards, the Catchacoma Forest (38%) is far above the SO mean (23%) in terms of percent of old-growth forest trees within an OGF. We would like to compare our estimate of OGF live tree density with the SO range and mean, however, Larson et al. (1999) did not quantify this metric.

TABLE 2
Protocol 2 OGF Surveys Conducted by AFER & YLS - Catchacoma Forest-North: Tree Diameter and Cut Stump Presence
(Oct. 8, 2019, 10 plots, 6x50 m; 3,000 m^2 sampled; bolded dbh values = meets OGF minimum size; dgl = diameter at ground level)

New Plot	Old Plot	Tree Species	Tree DBH	Cut Stumps
1	1A	American beech	**37.0**	none
1	1A	eastern hemlock	**40.0**	unknown[1]
1	1A	red maple	**41.0**	hemlock[2]
2	2A	eastern hemlock	**40.3**	none
2	2A	yellow birch	35.6	none
3	3A	eastern hemlock	39.5	none
3	3A	eastern hemlock	39.2	none
3	3A	eastern hemlock	39.0	none
3	3A	eastern hemlock	32.7	none
3	3A	eastern hemlock	31.6	none
3	3A	eastern hemlock	30.0	none
3	3A	eastern hemlock	26.0	none
3	3A	red maple	32.8	none
3	3A	white pine	46.5	white pine[3]
3	3A	white pine	44.4	none
3	3A	white pine	41.2	none
3	3A	white pine	34.5	none
4	4A	eastern hemlock	32.0	none
4	4A	eastern hemlock	32.0	none
4	4A	eastern hemlock	28.0	none
4	4A	eastern hemlock	27.0	none
4	4A	red oak	22.5	none
4	4A	red oak	20.5	none
4	4A	sugar maple	15.0	none
4	4A	white pine	46.0	none
5	5A	eastern hemlock	**42.5**	none
5	5A	eastern hemlock	**40.0**	none
5	5A	eastern hemlock	39.0	none
5	5A	eastern hemlock	36.0	none
5	5A	eastern hemlock	34.5	none
5	5A	eastern hemlock	33.0	none
6	1B	eastern hemlock	**56.0**	none

6	1B	eastern hemlock	**44.0**	none
6	1B	red maple	**41.5**	none
6	1B	red maple	**41.0**	none
7	2B	eastern hemlock	**49.1**	none
7	2B	eastern hemlock	**44.4**	none
7	2B	eastern hemlock	**41.5**	none
7	2B	eastern hemlock	**40.7**	none
8	3B	eastern hemlock	**50.0**	none
8	3B	eastern hemlock	**47.5**	none
8	3B	eastern hemlock	**47.0**	none
8	3B	eastern hemlock	**43.0**	none
8	3B	eastern hemlock	**42.0**	none
8	3B	eastern hemlock	**41.0**	none
8	3B	eastern hemlock	39.5	none
8	3B	eastern hemlock	37.5	none
8	3B	eastern hemlock	37.5	none
8	3B	eastern hemlock	36.0	none
8	3B	eastern hemlock	35.0	none
8	3B	eastern hemlock	31.5	none
8	3B	eastern hemlock	23.0	none
8	3B	red maple	26.0	none
8	3B	red oak	42.0	none
8	3B	red oak	41.0	none
9	4B	eastern hemlock	**58.0**	none
9	4B	eastern hemlock	**53.5**	none
9	4B	eastern hemlock	**50.0**	none
9	4B	eastern hemlock	37.0	none
9	4B	eastern hemlock	36.0	none
9	4B	eastern hemlock	36.0	none
9	4B	eastern hemlock	32.0	none
9	4B	red maple	31.0	none
10	5B	eastern hemlock	**73.0**	none
10	5B	eastern hemlock	**40.0**	none
10	5B	red maple	26.0	none
10	5B	yellow birch	**53.0**	none
10	5B	yellow birch	39.9	none

NOTES: 1 - stump dgl=100 cm; 2 - stump dgl=40 cm; 3 - stump dgl=40 cm

Cut Stumps - From Larson et al. (1999), maximum cut stump density was 64/ha, the minimum was 0/ha, and the mean was 19/ha. For our study area, the cut stump density was 10/ha, which is far below the mean cut stump density (19/ha) for SO. Based on this comparison, we rate the study area as having "high ecological integrity".

Tree Ages - We aged three eastern hemlocks, two white pines and a red oak, whose ages span three different centuries. Of the trees cored, the ages ranged from 114 to 375 yrs (Table 3; 2021 ages) and dbh values (indicators of age) ranged from 15 to 73 cm, representing an extremely large age range typical of uneven-aged forests. Yet these field data do not fully describe the age distribution in this forest since there are numerous patches of seedlings, saplings, and young trees scattered throughout the study area (YLS Observations; Quinby et al. 2020) that were not quantified in this study. See the cover photo for an example of eastern hemlock trees of all ages from seedling to OGF trees in the Catchacoma Forest.

These results show that the heart of Catchacoma is not an even-aged forest that requires even-aged management; rather they show that this area has been self-replacing for at least four centuries, and likely dates back almost to glacial recession.

TABLE 3
Protocol 2 OGF Surveys Conducted by AFER & YLS
- Catchacoma Forest-North: Ages of Six Trees
(Oct. 8, 2019; 10 plots; 6x50 m; 3,000 m^2 sampled)

Tree Species	Old Plot	DBH (cm)	Final Age in 2021 (yrs)	Ring Count (yrs)	Missing Core L (cm)	Missing Core (yrs)	Yrs to 4.5 ft
eastern hemlock	5B	73.0	375	239	25	110	24
eastern hemlock	4B	60.0	232	206	0	0	24
white pine	4A	49.3	195	178	0	0	15
eastern hemlock	5A	44.0	185	159	0	0	24
red oak	3B	40.8	141	124	0	0	15
white pine	4A	46.0	114	97	0	0	15

Acknowledgements

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