

1 **How will Forest Management Impact Coniferous Migratory Bird Habitat in** 2 **Algonquin Provincial Park?**

3
4 David Euler Ph.D.

5 **Abstract**

6 The current forest management plan for Algonquin Park seems to put the harvest of wood as the most
7 important objective with very little concern for migratory birds that nest in the Park. Algonquin Park has a
8 long history of logging, in the general area before it was formed, and continuing after it was established in
9 1893. From a biological perspective, logging does not have to be inimical to the healthy functioning of
10 Algonquin Park or any Park. Normal evolutionary processes that occur in nature can continue, as long as
11 logging is accomplished within the bounds of sustainable management practices. However, logging as
12 currently practiced in Algonquin Park is not sustainable in any normal meaning of that term, and the
13 current Forest Management Plan will slowly, but inexorably, degrade the habitat for some migratory birds
14 in the Park. The purpose of this paper is to consider the impact of logging on selected migratory bird
15 habitat in the Park. The central hypothesis of this paper is that if this Plan is carried out as described in the
16 current approved version, it will contribute to a loss of migratory bird populations and their habitat.

17 **Introduction**

18 Algonquin Park is a Provincial Park located on the Precambrian Shield, southwest of the Ottawa River
19 and east of Georgian Bay in south-central Ontario (Figure 1). It has a long history of logging, starting in
20 the area before the Park was formed and continuing to the present. An extensive historical review of the
21 Park and its logging history is provided in Epp (2009). Forest management occurs in the “Recreation
22 Utilization (R/U) Zone” which covers about 78% of the over 760,000 hectares comprising Algonquin
23 Park. Although the actual timber harvest occurs within the R/U zone on slightly more than 421,000 ha,
24 logging activity such as hauling, aggregate extraction for road construction and maintenance can occur

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25 over the entire R/U Zone. An area totaling 167,000 ha (22%) within the Park is zoned for wilderness,
26 recreation, research and historical purposes where timber harvesting is not allowed.

27

28 The Algonquin Provincial Park Management Plan (1998) emphasizes the need for sustainable
29 management of all forest resources (page 10):

30 The protection of the Park's significant natural, cultural and recreational values is
31 paramount. Within this parameter the renewable resources of Algonquin Park are and
32 will continue to be managed on a sustainable basis. Management Plans have or will be
33 prepared for all resource uses in the Park to ensure that the Park's resources are managed
34 in this manner.
35

36 From a biological perspective, logging does not have to be inimical to the healthy functioning of
37 Algonquin Park or any Park. Normal evolutionary processes that occur in nature can continue, as long as
38 logging is accomplished within the bounds of sustainable management practices. However, logging as
39 currently practiced in Algonquin Park is not sustainable in any normal meaning of that term, and the
40 current Forest Management Plan will slowly, but inexorably, degrade the habitat for certain migratory
41 birds in the Park.

42

43 The hypothesis in this paper is that the 2010-2020 approved Forest Management Plan (FMP) for
44 Algonquin Park will permit a high harvest of conifer trees which will result in degradation of habitat for
45 the suite of migratory birds that are commonly associated with these trees. This hypothesis should be
46 tested in a carefully designed study that would provide assurance that migratory bird habitat in the
47 Algonquin Park will be conserved.

48 **The Study Area**

49 There are two different topographic complexes in Algonquin Park – the Precambrian uplands, on the west
50 side of the Park, and the Ottawa Lowlands that slope down to the Ottawa River on the east side
51 (Cumming 2009). The dividing line between the two topographic regions is very similar to the dividing

52 line between the two ecodistricts in which the Park is situated: 5E-9 on the west side (i.e., Algonquin
53 uplands) and 5E-10 on the east side (i.e., eastern slope of the Ottawa Valley). The division generally runs
54 along a northwest/southeast gradient. Each ecodistrict has very different forest types. Ecodistrict 5E-9 is
55 essentially synonymous with the west side tolerant hardwood forests, while Ecodistrict 5E-10 is
56 associated with the white pine (*Pinus strobus L.*) dominated forests on the Park's east side (Cumming
57 2009).

58
59 The silty soils of the Precambrian uplands support a luxuriant forest dominated by tolerant hardwoods,
60 primarily sugar maple (*Acer saccharum* Marsh.) and secondarily, beech (*Fagus grandifolia* Ehrh.), and
61 occur mostly in Ecodistrict 5E-9. Eastern hemlock (*Tsuga canadensis* Carrière) is another trademark
62 species and Martin (1959) considered it to form a true climax forest on these silty soils. The tolerant
63 hardwood group, which is composed almost entirely of maple-dominated stands, accounts for the largest
64 individual portion, (approximately 300,000 ha) of the total productive forest area. Eastern hemlock stands
65 cover about 40,000 ha and spruce (*Picea spp.*) and balsam fir (*Abies balsamifera* (L.)) stands occur over a
66 little less than 50,000 ha. The intolerant hardwoods, (*Populus tremuloides* Michx.) and white birch
67 (*Betula papyrifera* Marsh.), are found mainly on the east side of the Park but also occur where there have
68 been disturbances in the west side. They account for 50,000 ha. The red (*P. resinosa* Ait.) and white pine
69 forest unit covers some 100,000 ha, on the east side of the Park. Other conifers include tamarack [*Larix*
70 *laricina* (Du Roe) K. Koch], jack pine (*P. banksiana* Lamb.) and eastern white cedar (*Thuja occidentalis*
71 (L.)), and represents a part of the forest that is strongly of a boreal forest character. A detailed description
72 of all the Forest Units is given in Cumming (2009).

73 **Methods**

74 The Ministry of Natural Resources has a long and complicated planning manual (Ontario 2004) that
75 directs staff how to prepare a Forest Management Plan. I studied the 2010-2020 approved Forest

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76 Management Plan for Algonquin Provincial Park for the projected impact that it will have on selected
77 migratory bird habitat if it is carried out as indicated in the plan. Both the planning manual and the plan
78 itself are available for public examination.¹

79

80 I was also an alternative member of the Local Citizen Committee and attended numerous meetings with
81 the Plan Author and Ministry of Natural Resources staff to discuss the Forest Management Plan during
82 the preparation period from late in 2007 to 2010.

83 **Results**

84 **Eastern Hemlock Harvest**

85 Table FMP-19 in the FMP, titled “Forecast (10-year) and Planned (5-year) Wood Utilization by Mill”,
86 reveals a commitment to a high harvest of hemlock. During the ten years this plan will be in place, the
87 intent is to harvest 580,000 m³ of hemlock. Of this amount only about 150,000 m³ is needed to supply all
88 the demand for hemlock to the mills surrounding the Park (Table 1). In addition to meeting the demand
89 for local mills, the Plan calls for more than 150,000 m³ to be sold for pulp on the open market, and more
90 than 260,000 m³ for saw logs to be sold on the open market to generate revenue that will accrue as
91 Crown revenue.

92 The Forest Management Plan will allow about 1,000 ha from the 26,000 ha of the Hemlock Forest Unit to
93 be harvested each year using the Group Selection Silviculture System. Hemlock stands mature to about 42
94 m²/ha basal area and after that very little wood is added. The Group Selection harvesting system reduces
95 the basal area of these stands to about 32 m²/ha to achieve maximum growth rates following the harvest.
96 As well, each hectare of the Forest Unit is harvested every 25 years, and thus the age distribution of the

¹ The Algonquin Forest Management Plan is located at www.ontario.ca/forestplans and background information as to the plan development process is available from the Algonquin Forestry Authority at www.algonquinforestry.on.ca. The Planning Manual is available at www.mnr.gov.on.ca/en/Business/Forests/Publication/MNR_E000215P.html and can be consulted for details.

97 trees is reduced and most of the trees will never reach the old growth stage, the most valuable stage for
98 migratory birds, as Martin (1960) recorded.

99

100 In addition to the harvest in the Hemlock Forest Unit, well over 350,000 m³ of hemlock will be harvested
101 from other Forest Units. The Hardwood Uniform Shelterwood, the Mixedwood Uniform Shelterwood, the
102 Spruce-Fir Uniform Shelterwood and the Hardwood Selection Units all contribute to the hemlock harvest,
103 (Table FMP-17 in the FMP). In these Units hemlock occurs in single trees or small groups of trees often
104 on cooler north-facing slopes. Regeneration in these stands is very difficult and the Silvicultural Ground
105 Rules in the Plan, Table FMP-5, make little or no provision for regeneration of these hemlock trees that
106 are cut within the tolerant hardwood forests. Thus there is a general loss of hemlock throughout the Park
107 as these trees are cut. The loss of these trees also represents a major loss of habitat for migratory birds.

108

109 **Harvest of Red and White Pine**

110 The projected volume of red and white pine to be harvested over the 10 years of the Plan amounts to over
111 1,500,000 m³, mostly from the White Pine Forest Unit, managed using the Uniform Shelterwood system
112 (FMP-19). Both white and red pine occurs in various other Units in the Park as well and these Units also
113 contribute to the total volume of white pine harvested.

114

115 As with hemlock, the harvest of red and white pine is considerably in excess of the amount needed to
116 meet the commitment to local mills. Table 2 illustrates the amount of pine volume needed to meet the
117 demand from local mills, and compares that to the amount to be sold on the open market.

118 **Harvest of Other Conifers**

119 The other conifers in the harvest include: red pine, jack pine, white spruce [*Picea glauca* (Moench) Voss]
120 and black spruce, [*P. mariana* (Mill.) BSP], balsam fir, tamarack and eastern white pine and in total will

121 supply over 1,000,000 m³ of volume to the harvest. However, only about half of the total volume forecast
122 to be harvested is needed to supply local mills, the rest will be sold on the open market, (FMP-19).

123 **Discussion**

124 **How Important is Conifer Habitat for Migratory Birds in Algonquin Park?**

125 Martin (1960) surveyed bird communities in Algonquin Park over two field seasons in 1952 and 1953.

126 He was able to determine that distinct bird communities were present in forest types he classified as bog,
127 boreal forest, deciduous forest, and hemlock forest. The bog, boreal forest and hemlock stands were
128 composed of primarily conifer species, while the deciduous forest stands were maple and beech with
129 scattered pine within them. He found 286 territorial males per 100 acres (40.5 ha) of 13 different species
130 in bogs, 232 territorial males per 100 acres (40.5 ha) of 32 species in boreal forest stands, 279 territorial
131 males per 100 acres (40.5 ha) of 28 species in hemlock stands, and 168 territorial males per 100 acres
132 (40.5 ha) of 18 species in hardwood stands.

133

134 Most striking in Martin's study (1960) was the density of some species found in the hemlock community
135 compared to those found in other communities. He recorded 102 blackburnian warbler (*Dendroica fusca*)
136 males per 100 acres (40.5 ha) in the hemlock forest, compared with a maximum of 15 in other forest
137 types. Also recorded most frequently in hemlock forests were black-throated green warbler (*D. virens*)
138 (28 in hemlock, compared to a maximum of 20 in other communities), slate-coloured junco (*Junco*
139 *hyemalis*) (13 in hemlock, max. 4 elsewhere), red-breasted nuthatch (*Sitta canadensis*) (10 hemlock, max.
140 4 elsewhere) and Brown Creeper (*Certhia americana*) (7 in hemlock, maximum of 2 in other stands. In
141 addition, three species: blue-headed vireo (*Vireo solitaries*), winter wren (*Troglodytes hiemalis*) and
142 parula warbler (*Parula americana*) were found only in the hemlock community in the Park.

143

144 Several other species of warblers require mature conifer for breeding and nest in the other conifer forest
145 areas within Algonquin Park. Examples include: Pine Warbler (*D. pinus*), Cape May Warbler (*D.*

146 *tigrina*), Yellow-rumped Warbler (*D. coronate*), Black-throated Green Warbler and Blackburnian
147 Warbler (Cadman 2007).

148

149 **Historic Conifer Habitat for Migratory Birds in Algonquin Park.**

150 **Eastern Hemlock**

151 Eastern hemlock was once a major component of the forest in Algonquin Park. In his study of Algonquin
152 Park in 1952 and 1953, Martin (1960) maintained that a maple-hemlock-yellow birch forest would exist
153 on the west side of the Park, if natural succession was allowed to proceed unhindered by human
154 management. Evidence from the pollen record shows that hemlock was a major part of the Park area
155 about 6,000 years ago; a large die-off happened about 4,500 years ago, followed by a resurgence of this
156 species from about 1,000 years before present to the beginning of industrial forestry (Hass and
157 McAndrew 2000). However, even at its lowest point about 4,500 years ago, it was still 5% of the forest
158 at that time. Today it is about 3.3% of the Park area. In Quinn's (2004) review of the presettlement forest
159 and wildlife in Algonquin Park he wrote, "Hemlock was apparently a major component of the
160 resettlement forest, being the first or second dominant species in 26 of 38 studies of the composition of
161 primary northern hardwood forests (Table 2)." Based on the data in the historical record, Quinn cited
162 studies which estimated that the hemlock-yellow birch ecosite has declined by 62% (from 12.75% of to
163 4.72% of the area) since 1890.

164

165 **White Pine**

166

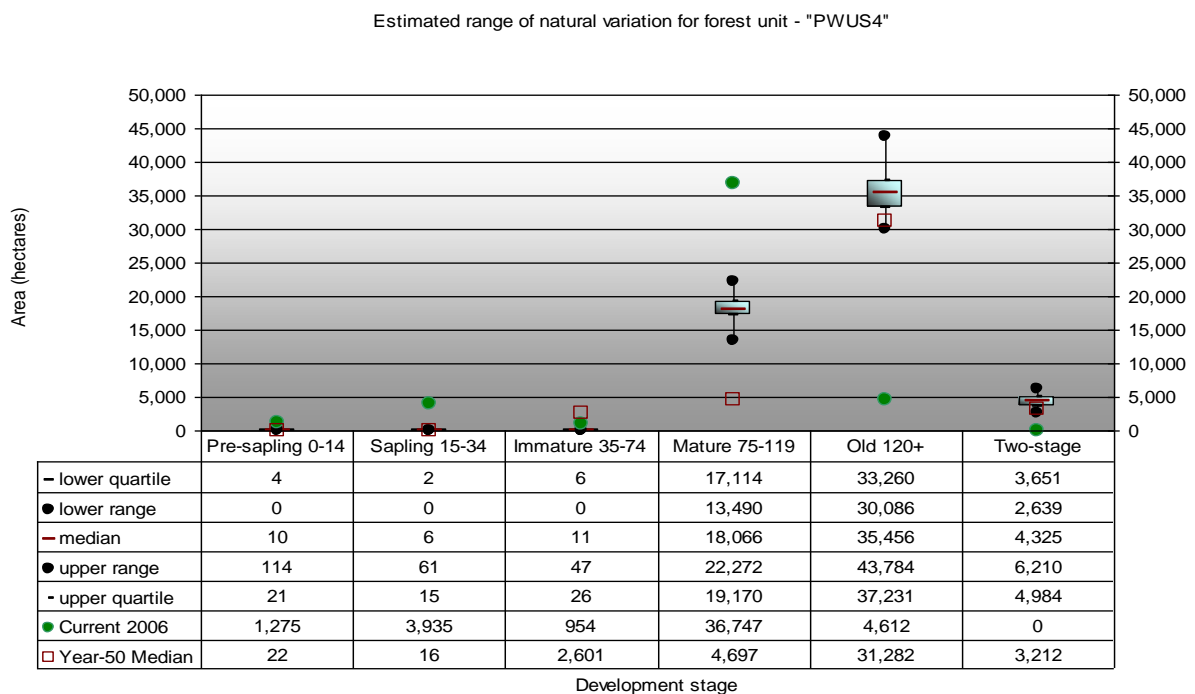
167 Many years of forest management in Algonquin Park have reduced the amount of white pine to almost
168 negligible amounts (Thompson et al. 2006). Stump and tree densities suggest that the number of white
169 pine trees has been reduced by 88%, from about 3 to >8 trees/ha to <1 pine per ha in mixed and deciduous
170 stands (Thompson et al. 2006). There is very little attempt to maintain pines within the western half of the
171 Park where they were once abundant. Current management of white pine in the Algonquin Park Forest is
172 primarily Uniform Shelterwood on the eastern half and maintains most of this species in mature and

173 younger stands, with very little in the old growth stage. This happens because the Uniform Shelterwood
 174 management approach tends to restrict the amount of old growth on the landscape, primarily because the
 175 most economic value occurs before the old growth stage. In the absence of management for wood fibre
 176 there would be 7 or 8 times as much old growth pine on the landscape as currently exists, and the area of
 177 the Park where pines grow would be considerably larger (Thompson 2006).

178
 179 Figure 2 shows the age class structure of White Pine that could be expected in the Algonquin Park forest
 180 if it was not managed for forestry. The “box and whisker” icons in Figure 2 illustrate the age structure of
 181 white pine stands, under natural forces of disturbances and regeneration, with median, upper and lower
 182 ranges of estimates given by these symbols. Under natural evolution processes, about 30% of the White
 183 Pine would be in the mature age class and about 60% in the old growth age class. In contrast, the green
 184 dots represent the actual amount of pine in each age class present in the Park in 2006.

185 **Figure 2**

186



187

188

189 **Other Conifers**

190 There is considerable literature on the abundance of other conifer in the historic forest in Algonquin Park.
191 Williams (2009) summarized this literature and reviewed the extent of change in the conifer composition
192 of the Park. Without doubt, the selection harvest system used in the hardwood parts of the Park has
193 favoured the abundance of maple and discriminated against the other conifers that existed in the Park
194 before the advent of modern forest practices. In Table 1, page 22 of the text of the current FMP,
195 (Cumming 2009) the abundance of maple has risen from 16.5% of the Ontario Crown Land Survey
196 Composition, taken from historic surveyor's notes, circa 1858-1893, to over 40% of the current Forest
197 Resource Inventory (FRI) of the Park. With the almost complete exclusion of fire from the Park, and little
198 effort to regenerate conifer on the west side of the Park, sugar maple continues to dominate these
199 hardwood sites.

200 **Concern for Populations of Migratory Birds**

201 Concern for possible declines in migratory songbird populations has been expressed in several
202 publications (Terborgh 1989, Böhning-Gaese et al. 1993, Sauer et al. 2008, Stutchbury 2007), with
203 habitat loss on overwintering grounds in Central and South America, fragmentation and loss of breeding
204 areas in Canada and the continental United States, and migration mortality, identified as key causal
205 agents. At the same time, there is also evidence attesting to the role of forest management in Canada
206 contributing to this habitat loss (Schmiegelow and Mönkkönen 2002, Wedeles and Donnelly 2004). This
207 is a complex problem with many unknowns and with a pressing need for more research (Blancher et al.
208 2009, Faaborg 2010). However, as Faaborg et al. (2010) point out, it is imperative that managers be
209 concerned and even though much remains to be learned about the population status of these birds, habitat
210 should be conserved as part of an overall proactive approach to their management.

211 **Emulating Natural Disturbances in Algonquin Park**

212 **The Crown Forest Sustainability Act**

213 The Crown Forest Sustainability Act established two principles that govern forest management in Ontario
214 and indicated that a planning manual should be prepared that implemented these principles [(Remple et
215 al. 2011), page 2]]:

216 *The Forest Management Planning Manual shall provide for determinations of the*
217 *sustainability of Crown forests in a manner consistent with the following principles:*
218 *1. Large, healthy, diverse and productive Crown forests and their associated ecological*
219 *processes and biological diversity should be conserved.*
220 *2. The long term health and vigour of Crown forests should be provided for by using*
221 *forest practices that, within the limits of silvicultural requirements, emulate natural*
222 *disturbances and landscape patterns while minimizing adverse effects on plant life,*
223 *animal life, water, soil, air and social and economic values, including recreational values*
224 *and heritage values. 1994, c. 25, s. 2 (3).*

225
226 The first principle mandates that the determination of forest sustainability should be based on
227 whether or not ecological processes and patterns of biodiversity are conserved. The second
228 principle directs that this conservation should be achieved through emulation of natural
229 disturbances and landscape patterns, but while minimizing adverse effects on other values.

230
231 Guidance from the Crown Forest Sustainability Act requires foresters in Algonquin Park to undertake
232 management practices that emulate natural disturbances which will conserve biological diversity and
233 maintain the health and vigour of Crown Forests. This would include measures to restore conifer species
234 in age classes similar to those that existed prior to the era of industrial forestry, under the natural events
235 that emulate natural disturbances.

236 **The Landbird Conservation Plan**

237 The Ontario Government and the Federal Government have cooperated to produce a “Landbird
238 Conservation Plan” for all the Bird Conservation Regions (BCRs) in Canada (Ontario Partners in Flight
239 2008). Algonquin Park is part of BCR 12 and the Landbird Conservation Plan reviews all the species in
240 that region and assigns them a conservation priority based on their population trend and the trend of loss
241 or gain in their habitat. The entire plan is available for a review of the status of landbirds in this region,
242 however seven species that require conifer forests are listed as priority species and managers are asked to

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243 consider the impact of human management on these species. The priority species for conifer forests in
244 BCR 12 are: Bay-breasted Warbler (*D. castanea*) Blackburnian Warbler, Black-throated Green
245 Warbler, Connecticut Warbler, (*Oporornis agilis*) Great Gray Owl, (*Strix nebulosa*) Purple Finch,
246 (*Carpodacus purpureus*) and Red Crossbill (*Loxia curvirostra*).

247

248 The Landbird Conservation Plan approach to setting habitat goals is based on the following idea (page 45)
249 which is consistent with the Crown Forest Sustainability Act approach to forest management:

250 This coarse filter, landscape-level approach assumes that the availability of suitable coniferous
251 forest habitats is the main factor limiting populations of most coniferous forest landbirds in this
252 region. As long as their breeding habitat objectives (i.e., the amount of suitable habitat exceeds a
253 minimum threshold) can be satisfied, then presumably the species' populations will be adequately
254 conserved within their ERNV. (Estimated Range of Natural Variation)

255

256 The breeding habitat objective for the priority coniferous species in BCR 12 is:

257 *Maintain the supply of suitable coniferous forest habitat in each ecoregion within the estimated*
258 *range of natural variation through a combination of natural disturbances and forest management*

261 *practices that emulate natural disturbance patterns.(page 46)*

263

264 **Restoring Conifer Habitat for Migratory Birds**

265 Compared to the historical amount of breeding habitat for conifer-nesting warblers, there is a small
266 fraction of that habitat available in the current forest of Algonquin Park. Furthermore the FMP allows a
267 very high harvest of the conifer trees in the Park and does not make an effort to begin the process of
268 restoring pine, hemlock or other conifers to the landscape in amounts similar to historical levels that
269 would be within the range of natural variation.

270

271 In the FMP Analysis Package, Appendix 3, pages 3 through 13 an evaluation is made of the impact on
272 harvest volume of leaving old growth in the Park and allowed the amount of old growth to increase over
273 the Plan's management period of 100 years. The analysis includes all forest units and all species of trees.

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274 Two management options are evaluated; the first allows for the amount of old growth that would occur
275 under a natural disturbance regime, and the second choice reduces the amount of old growth to 75% of
276 the natural level.

277
278 The conclusion on page 8 and page 13 of the Analysis Package is very clear and provides the motive for
279 the high harvest of conifer trees. The impact of maintaining old growth throughout the Park at 100% of
280 the natural benchmark level will mean a 23% reduction in total harvest area and a 29% reduction in
281 harvest volume. Keeping old growth at 75% of the natural benchmark level will mean a smaller reduction
282 in total harvest areas and a reduction in total harvest volume by 9% and 11% respectively.

283
284 The Planning Team for the FMP selected the option of reducing old growth to 75% of the natural
285 benchmark level. This decision will be especially significant in the conifer Units because the old growth
286 in these units will be at 75% of the natural benchmark, and the impact on bird habitat will be high. This
287 decision is directly contrary to the principles in the Crown Forest Sustainability Act and does not support
288 the goals of the Landbird Conservation Plan.

289
290 An effort could be made to restore many of the conifers towards a forest that resembles a forest that
291 evolved under a natural disturbance scenario (Thompson 2006, Martin 1959). All the traditional
292 silviculture approaches would be available at various times and places including: seeding, planting,
293 tending, scarification and other techniques that will be appropriate for the conditions in the Park. Prior to
294 the current industrial era, fire was one of the major forces that renewed the forests in Algonquin Park in
295 addition to wind storms and insect outbreaks (Quinn 2004). Fire management may be limited in
296 Algonquin due to its high cost and the use of the Park by thousands of visitors every year, although it can
297 be used under carefully selected circumstances. Given the special nature of Algonquin Park, forest

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298 managers must take both the Crown Forest Sustainability Act seriously and help achieve the goals of the
299 Landbird Conservation Plan.

300 **Summary**

301 Canadian forest managers have a responsibility to conserve habitat for migratory birds as part of the forest
302 management planning process. In addition, Algonquin Park is not just another Crown Management Unit,
303 that is treated in the same manner as any other Forest Management Unit which requires a forest
304 management plan. The original mandate of the Park was to "... reserve and set apart as a public park and
305 forest reservation, fish and game preserve, health resort and pleasure ground for the benefit, advantage
306 and enjoyment of the people of the Province." (Epp 2009). Park managers have a responsibility to treat
307 the Park Forest as a special unit where the desire to harvest wood is not given predominance over the
308 needs of habitat for wildlife. The current forest management plan for Algonquin Park seems to put the
309 harvest of wood as the most important objective with very little concern for the migratory birds that nest
310 in the Park area.

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313 be completed)

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391 Table 1- The amount of hemlock committed to mills adjacent to Algonquin Park and the amount that will
392 be sold on the open market to provide revenue to the general treasury, FMP-19.

393 Mill	Hemlock 394 Committed	Product
395 McRae Lumber	73,000m ³	Sawlogs
396 Murray Bros	37,000m ³	Sawlogs

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397	Commonwealth P.	27,000m ³	Sawlogs
398	McRae Lumber	11,280m ³	Pulp
399	Murray Bros	<u>1,440m³</u>	
400	total	149,720m ³	
401			
402	Open Market	263,028m ³	Sawlogs
403	Open Market	158,721m ³	Pulp
404	Open Market	<u>9,455m³</u>	Undersize, defective
405	Total	431,204m ³	

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411 Table 2 The amount of white and red pine committed to mills adjacent to Algonquin Park and the amount
 412 that will be sold on the open market to provide revenue to the general treasury, FMP-19.

413	Mill	White Pine	Product
414		Committed	
415	McRae Lumber	117,300m ³	Sawlogs
416	Murray Bros	367,000m ³	Sawlogs
417	Commonwealth P.	185,000m ³	Sawlogs
418	Dament & C.	256,000m ³	Sawlogs
419	McRae Lumber	<u>31,960m³</u>	Pulp
420	Total	957,260m ³	
421			
422			
423	Open Market	185,660m ³	Sawlogs
424	Open Market	322,369m ³	Pulp
425	Open Market	<u>17,643m³</u>	Undersize, defective
426	Total	525,672m ³	

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