

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Eyvindson, Kyle; Duflot, Rémi; Triviño, Mária; Blattert, Clemens; Potterf, Mária; Mönkkönen, Mikko

Title: High boreal forest multifunctionality requires continuous cover forestry as a dominant management

Year: 2021

Version: Accepted version (Final draft)

Copyright: © 2020 Elsevier Ltd. All rights reserved.

Rights: CC BY-NC-ND 4.0

Rights url: <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Please cite the original version:

Eyvindson, K., Duflot, R., Triviño, M., Blattert, C., Potterf, M., & Mönkkönen, M. (2021). High boreal forest multifunctionality requires continuous cover forestry as a dominant management. *Land Use Policy*, 100, 104918. <https://doi.org/10.1016/j.landusepol.2020.104918>

1 Appendix A – Forest management alternatives

2 For this analysis, a maximum of 58 forest management alternatives for each forest stand were
3 considered. The actual number of alternatives applied on each stand varied, and this was
4 dependent on the initial stand characteristics. Generally we followed the management
5 alternatives of the “best practices guide” for forest management in Finland (Äijälä et al. 2014).
6 Of the 58 management alternatives, 17 of these were variations on rotation forest management
7 (RF), where clear felling followed by planting is a key feature of these management alternatives.
8 The majority (40) of the management alternatives generated were variations on the continuous
9 cover forest management (CCF), where the primary harvesting is to selectively cut the largest
10 trees from the forest and allow ingrowth to regenerate the forest stand. We allowed four
11 variations on the target basal area to determine when selective harvesting was to occur, and we
12 delayed the starting to conduct selective harvesting by up to 45 years. In addition, we allowed an
13 alternative where no management actions would be taken in the forest (*set aside*). The
14 abbreviations of the management alternatives are listed in table S1.

15 The forest management actions for the RF management alternatives were structured
16 through decision rules for when to harvest, thin or perform other silvicultural actions (Äijälä et
17 al. 2014). The decision rules were based on the site type, the height of the dominant tree species
18 and the age of the stand. The timing of the final felling depended on reaching a specific dominant
19 height (greater than 16 or 14 m high), and an age greater than a specific threshold (70 or 90
20 years). A structure of silvicultural activities to promote regeneration are taken, such as site
21 preparation followed by artificial regeneration. To generate a range of management alternatives,
22 variations on the decision rules are made; aimed to shorten and lengthen the rotation length, and

1 various alternatives to promote ecological values (limiting thinning or increasing retention trees
2 following clearfelling).

3 In a similar fashion, the CCF management alternatives were generated through a
4 structured decision tree. The harvesting actions in all CCF management alternatives are based on
5 thinning from above, and promotion of natural regeneration to restock the stand. The decision to
6 conduct thinnings were based on the stand basal area, with a specific threshold dependent on the
7 productivity of the site. To generate a variety of CCF management alternatives, we adjusted the
8 basal area threshold, and we delayed the initial implementation of CCF by up to 45 years, with
9 delays of 5-year increments.

10

11 References:

12 Äijälä, O., Koistinen, A., Sved, J., Vanhatalo, K., & Väisänen, P. (2014). Hyvän metsänhoidon
13 suositukset [Good forest management recommendations]. *Forestry Development Center*
14 *Tapio [In Finnish]*

15

1

Abbreviation	Title	Actions	Timing
SA	Set aside	No management	-
CCF_0	Continuous cover forestry	Thinning from above, with 4 predefined harvesting thresholds	No Delay
CCF_5	-"-	-"-	5 year delay
CCF_10	-"-	-"-	10 year delay
CCF_15	-"-	-"-	15 year delay
CCF_20	-"-	-"-	20 year delay
CCF_25	-"-	-"-	25 year delay
CCF_30	-"-	-"-	30 year delay
CCF_35	-"-	-"-	35 year delay
CCF_40	-"-	-"-	40 year delay
CCF_45	-"-	-"-	45 year delay
SR5	Short rotation harvesting	Clear felling, no thinnings prior to clearfelling	5 years early
TH	Rotation harvesting	-"-	No Delay
LRH5	Long rotation harvesting	-"-	5 year delay
LRH10	Long rotation harvesting	-"-	10 year delay
LRH15	Long rotation harvesting	-"-	15 year delay
LRH30	Long rotation harvesting	-"-	30 year delay
SRT5	Short rotation thinning	Thinning followed by clear felling	5 years early
TT		-"-	No Delay
LRT5	Long rotation thinning	-"-	5 year delay
LRT10	Long rotation thinning	-"-	10 year delay
LRT15	Long rotation thinning	-"-	15 year delay
LRT30	Long rotation thinning	-"-	30 year delay
THwoT	Harvesting without thinnings	Clear felling, no thinnings prior or after clearfelling	No Delay
THwoT10	Harvesting without thinnings	-"-	10 year delay
THwoTM20	Harvesting without thinnings	-"-	20 years early
THNS	Nature focused rotation harvesting	Same as TH, 30 retention trees per ha left	No Delay
TTN	Nature focused rotation thinning	Same as TT, 30 retention trees per ha left	No Delay

2

3 Table S1. Description of management alternatives.