

Appendix 2: Free Growing Multi-story Acceptability Criteria

FS 660 2008/3/18

| Location of damage | Type of damage | Tree being assessed is UNACCEPTABLE if: | Host species | Possible damage agents & damage agent codes | Comments |
|--------------------|---|--|--------------|--|---|
| Stem | WOUND (including sunscald and girdling) | Refer to table X for layers 1-4. | All | squirrel AS, beaver AZ, vole AV, porcupine AP, hare AH, Warrens root collar weevil IWW, fire NB, windthrow NW, sunscald NZ, logging TL, mechanical TT. | A wound is defined as an injury in which the cambium is dead or completely removed from the tree exposing the sapwood. Measure the wound across the widest point of the exposed sapwood (or dead cambium when the tree is damaged by sunscald). Healed over wounds (=scars) are acceptable. |
| Stem | DECAY | Any pathological indicator(s) are present. This may include conk, blind conk, frost crack, or rotten branches. | All | various decay fungi DD. | |
| Stem | DEFORMATION (including crook, fork, and dead or broken top) | <ul style="list-style-type: none"> These criteria apply to layer 1 & 2 trees only. For layers 3 & 4 use the even-aged damage criteria. A crook displaces the portion of the stem above the defect by >50% from the line of growth formed by the stem below the point of defect in the bottom 2/3rds of the stem only. A fork occurs above stump height in the bottom 2/3rds of the stem only. A dead or broken top extends more than 20% of the stem length or the live crown is removed. | All | defoliators ID, white pine (spruce) weevil IWS, lodgepole pine terminal weevil IWP, cattle AC, deer AD, elk AE, moose AM, frost NG, hail NH, snow NY, drought ND, logging TL, mechanical TT, Dwarf mistletoes (see below). | |
| Stem | INFECTION (including cankers, and galls) | Any infection occurs on the stem. | All | comandra blister rust DSC, stalactiform blister rust DSS, white pine blister rust DSB, western gall rust DSG, atropellis canker DSA, exploding canker DTNT, Dwarf mistletoes (see below). | Note: Wounds caused by rodent feeding around rust cankers should have stem rust recorded as the causal agent. |
| Branch | INFECTION (cankers) | These criteria apply to layer 2, 3 & 4 trees only. An infection occurs on a live branch less than 60 cm from the stem. | Pw, Pl, Py | white pine blister rust DSB, comandra blister rust DSC, stalactiform blister rust DSS. | Branch infections on layer 1 trees can be ignored. |
| Branch | GALLS | These criteria apply to layer 2, 3 & 4 trees only. A gall rust infection occurs on a live branch less than 5 cm from the stem. | Pl, Py | western gall rust DSG. | Branch infections on layer 1 trees can be ignored. |

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26. Free growing damage criteria for multi-layered conifer stands (pg. 1)

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| Location of damage | Type of damage | Tree being assessed is UNACCEPTABLE if: | Host species | Possible damage agents & damage agent codes | Comments |
|--------------------|---------------------------|---|----------------|--|--|
| Foliage | DEFOLIATION | <ul style="list-style-type: none"> For defoliating insects: > 80% of foliage has been removed, lost or damaged due to foliage disease. For foliar diseases: > 50% of foliage has been removed, lost or damaged | All | defoliators ID, foliage diseases DF. | |
| Stem or Branch | ADELGID GOUTING | Any adelgid gouting occurs on a stem or branch. | Ba, Bg, Bl | balsam woolly adelgid IAB. | Gouting is defined as excessive swelling on a branch or shoot caused by balsam woolly adelgid and is often accompanied by misshapen needles and buds. It is most common on branch tips and at nodes near the ends of branches. Consult a recent distribution map to identify the geographic extent of this pest. |
| Stem or Branch | DWARF MISTLETOE INFECTION | <ul style="list-style-type: none"> These criteria apply to layer 2, 3 & 4 trees: Any infection occurs on the stem or a live branch, or A susceptible tree is located within 10 m of a higher layer tree that is infected with dwarf mistletoe. <p>These criteria apply to layer 1 trees:</p> <ul style="list-style-type: none"> Hawksworth rating >3, or severe stem infections (major swelling or deformity) present. | Hw, Pl, Lw, Fd | hemlock dwarf mistletoe DMH, lodgepole pine dwarf mistletoe DMP, larch dwarf mistletoe DML, Douglas-fir dwarf mistletoe DMF. | Note: To confirm infection, the surveyor must observe mistletoe aerial shoots or basal cups on regeneration or on live or dead fallen brooms. The Hawksworth rating system is described in the FPC Dwarf Mistletoe Management Guidebook. |

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| TREE SPECIES | SHORT TERM RETENTION ² (Layers 1 & 2) | LONG-TERM RETENTION ³ (Layers 1 & 2) | UNEVEN-AGED ⁴ (Layers 1 & 2) | LAYERS 3 & 4 |
|-------------------------------|--|--|--|--------------|
| B, H, Lw, Ss and Cw <60 years | W.>33%C., or MRW 1m, or G. | W.>33%C., or MRW 1m, or G. 1 W.>400cm ² | W.>33%C., or MRW 1m, or G. 1 W.>400cm ² | See table 21 |
| Cy, Sx and Cw >60 years | W.>33%C., or MRW 1m, or G. | W.>33%C., or MRW 1m, or G. 1 W.>400cm ² | W.>33%C., or MRW 1m, or G. 1 W.>400cm ² | |
| Fd, Pw | W.>50% C. | W.>33%C., or MRW 1m, or G. | W.>33%C., or MRW 1m, or G. 1 W.>400cm ² | |
| Pl, Py | W.>50% C. | W.>50% C. | W.>33%C., or MRW 1m, or G. | |

TABLE X. Tree wounding criteria for layers 1-4. Trees are unacceptable if any ONE criterion is met.

STAND MANAGEMENT OBJECTIVE¹

W. = Wound C = Circumference G = Gouge⁵
MRW = Major Root Wound within 1 m of the stem.

¹ The stand management objective should be specified in the site plan. Where it is not, the criteria for uneven-aged management should be applied.
² Where tree will be removed within 20 years.
³ Where tree will be removed in more than 20 years.
⁴ Where stand is managed in a true uneven state.
⁵ A gouge involves a wound where penetration is into the sapwood or deeper.

26. Free growing damage criteria for multi-layered conifer stands (pg. 2)

Single Entry Dispersed Retention System

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| Location of damage | Type of damage | Tree being assessed is UNACCEPTABLE if: | Host species | Possible damage agents & damage agent codes | Comments |
|--|--------------------------|---|--------------------------|--|---|
| Roots | ROOT DISEASE | <ul style="list-style-type: none"> Sign(s) or definitive combinations of symptoms of root disease are observed. | All | armillaria root disease DRA, laminated root rot DRL, tomentosus root rot DRT, annosus root disease DRN, blackstain root disease DRB. | Signs are direct evidence of the pathogenic fungus including fruiting bodies, distinctive mycelium or rhizomorphs. Symptoms include foliar thinning or chlorosis, pronounced resin flow near the root collar, reduced recent leader growth, a distress cone crop, and wood decay or stain. Symptoms alone are not usually sufficient to identify root disease. Both signs and symptoms may be detected from old stumps, root balls, or other post-harvest remains. |
| Layer 1 Layer 2 Layer 3 Layer 4 | Infected trees or stumps | <ul style="list-style-type: none"> Infected conifer found in plot. See Table Y for well-spaced tree net down calculation by layer. | All | armillaria root disease DRA. | Note: All conifer species are considered susceptible. Broadleaf species are considered not susceptible for survey purposes only. Example: How to apply net down for root disease. If root disease-infected trees are found in the plot: 1. Determine the number of healthy, well-spaced trees in each layer using the prescribed minimum inter-tree distance (MITD) (e.g., 3 layer 1, 3 layer 3 and 4 layer 4 = 10 healthy, well-spaced) ignoring the M-value; 2. Count the number of infected trees (e.g., 1 layer 1 tree and 1 layer 3 tree); 3. Working from the uppermost layer down, apply the multiplier in Table Y to each lower layer. Subtract the resultant from each layer in turn, for susceptible species only (e.g., if all trees are susceptible, 1 infected layer 1 tree removes 1 healthy, well-spaced layer 1 tree plus 3 layer 3 trees plus 4 layer 4 trees). Note the effects are cumulative, not exclusive and lower layers do not effect higher layers; 4. Calculate the remaining healthy, well-spaced trees once all removals due to infected trees are completed (e.g. 10 - 8 = 2). The result is the maximum number of free growing trees tallied for the plot. |
| | | <ul style="list-style-type: none"> Infected conifer found in plot. See Table Y for well-spaced tree net down calculation. | Fd, Sx, Se Lw, Ba, Bg | laminated root rot DRL. | Note: Bl, Cw, Pl, Pw, Py and broadleaf species are considered not susceptible for survey purposes only. |
| | | <ul style="list-style-type: none"> Infected conifer or stump found in plot. See Table Y for well-spaced tree net down calculation. | Se, Sx, Pl | tomentosus root rot DRT. | Note: Ba, Bl, Cw, Fd, Pw, Py and broadleaf species are considered not susceptible for survey purposes only. |
| | | <ul style="list-style-type: none"> Infected conifer found in plot. See Table Y for well-spaced tree net down calculation. | Ba, Hw, Ss | annosus root rot DRN. | Note: Bg, Bl, Cw, Cy, Fd, Hm, Pl, Pw, Py, Sx and broadleaf species are considered not susceptible for survey purposes only. |

Table Y Deductions from number of acceptable well spaced uninfected stems for trees infected by root disease in uneven-aged stand layers. Multiplier to determine number of trees to be deducted from:

| Layer | Layer 1 | Layer 2 | Layer 3 | Layer 4 |
|---------|---------|---------|---------|---------|
| Layer 1 | 1 | 2 | 3 | 4 |
| Layer 2 | - | 2 | 3 | 4 |
| Layer 3 | - | - | 2 | 3 |
| Layer 4 | - | - | - | 2 |

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26. Free growing damage criteria for multi-layered conifer stands (pg. 3)

Taken from Sections 21 and 26 FS 660

http://www.for.gov.bc.ca/hfp/silviculture/Silviculture_Surveys.html,
<http://www.for.gov.bc.ca/isb/forms/lib/FS660.PDF>