
**APPENDIX 12; FOREST HEALTH PLAN & STRATEGIES AND TACTICS FOR
DWARF MISTLETOE MANAGEMENT IN TFL15**

APPENDIX 2.

Strategies and Tactics for Dwarf Mistletoes' Management in Tree Farm Licence 15

Based upon a Weyerhaeuser Canada, Okanagan Falls Division, Position Paper entitled "Dwarf Mistletoe Management and Realities in TFL 15, An Ecological Perspective" (November, 1998) and incorporation of comments and recommendations from the Ministry of Forests, Penticton District (December 1998, February 1999) and Regional Pathologist (January, February 1999).

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Executive Summary

Forest fires have played a significant role in shaping the landscape of Tree Farm Licence 15, including dwarf mistletoe incidence and intensity. Current fire suppression practices however, have impacted upon the natural fire regime and have altered dwarf mistletoe levels. In the absence of fire, dwarf mistletoe has responded by increasing in both incidence and intensity across the landscape. Recent surveys for pest incidence found dwarf mistletoe in 66% of the mature and 40% of the immature stands surveyed in the central and northern portion of TFL 15. Similar results, if not higher, are expected for the southern half once the surveys have been completed in 1999. Free-growing guidelines for dwarf mistletoe pose significant challenges to managers of TFL 15, given the incidence of lodgepole pine dwarf mistletoe, Douglas-fir dwarf mistletoe, larch dwarf mistletoe, secondary hosts, stand attributes of TFL 15, and other resource objectives (i.e. mule deer winter range).

Management strategies and tactics to reduce the risk have been identified which recognize that dwarf mistletoe is a significant component of this ecosystem and may require acceptance at free-growing. These strategies and tactics are based upon resource objectives for the site and dwarf mistletoe presence in leave trees, residuals and/or in perimeter trees. Professional accountability will ensure that the selected tactic(s) meet both resource objectives for the site and landscape level objectives. Tactics aimed at reducing the risk to the regenerating stand will include favouring of non-host species during silviculture treatments, girdling or removing leave trees within 10 years of harvest, removal of residuals, and promoting a species mix where silvically appropriate. Careful consideration will be given to silviculture systems, site preparation methods, and cutblock designs, in order to minimize the risk. Where site conditions permit, and provided landscape level objectives are met, secondary and tertiary species, may be assigned to "preferred species" category, in areas where species options are limited due to dwarf mistletoe species present.

Background

A Position Paper entitled “Dwarf Mistletoe Management and Realities in TFL 15, An Ecological Perspective” was presented to Penticton, Ministry of Forests, district staff in early November, 1998. A hard copy of the paper was distributed to these individuals for review at this time. This paper incorporates comments and recommendations from a meeting held with District staff in early December and late February.

The Position

Historically, dwarf mistletoe was directly related to fire incidence and intensity. At higher elevations the more intense fires led to lower dwarf mistletoe levels, through better “cleansing effects”, while the lower intensity fires left islands of infected trees. These islands helped perpetuate dwarf mistletoe in the next stand. More frequent and lower intensity fires, common to lower elevations stands, were often fueled by dwarf mistletoe brooms found on the forest floor. Subsequent dwarf mistletoe levels were determined by the spatial distribution of infected mature trees and susceptibility of the regenerating stand. Current fire suppression activities however, have altered this pattern and resulted in an increase in both incidence and intensity of dwarf mistletoe across the landscape.

While all portions of the TFL may have one or a combination of dwarf mistletoe species present, the *acceptable* practice should not only be based upon *acceptable* species but also on *acceptance* of dwarf mistletoe. The ecological significance and historical role of dwarf mistletoes must be incorporated into management tactics. These tactics should be geared towards minimizing future hazard and risk. This is a more feasible and realistic option, given the incidence and severity of dwarf mistletoe in TFL 15; one which recognizes that dwarf mistletoe is an integral and significant component of these ecosystems and that certain volume losses must be accepted. Loss factors, however, for dwarf mistletoes have already been incorporated in to a TFL analysis (Appendix 1).

The long-term objective is to manage at a landscape level, but the uniqueness of each proposed cutblock demands an awareness of forest health issues at a stand level. Ultimately the prescription is based on landscape level objectives (once defined) which have already taken into consideration the significance and role of forest health in these ecosystems. Monitoring plots should be established (pending funding) to gain a better understanding of ecosystem dynamics as they apply to forest productivity and dwarf mistletoe. In addition, data from three years of surveys for pest incidence on the TFL, will be analyzed upon completion (winter 2000). This analysis may indicate relationships between ecosystems and dwarf mistletoe incidence and intensity and help refine hazard and risk on the TFL.

Overview of Strategies

Strategies for stand management were developed based upon dwarf mistletoe presence and resource objectives for the site, and *are applicable only to stands where dwarf mistletoe has been identified as a hazard. Otherwise the current free-growing guidelines will apply.* Hazard is defined as the potential impact dwarf mistletoe could have on a stand given certain attributes. Risk refers to the probability that dwarf mistletoe will have an impact on volume or management objectives, given incidence and hazard. The following key components will be incorporated into each of the strategies recommended:

- probability of accepting dwarf mistletoe-infected regeneration in stands where other resource objectives have been identified for the site;
- possibility of accepting dwarf mistletoe-infected regeneration in stands with timber objectives, especially where presence of more than one species of dwarf mistletoe and silvical constraints limits “preferred species” (including secondary and tertiary species) options;
- clumping leave trees where possible;
- mixed species management where silvically appropriate;
- slashing only of advanced regeneration when infections have been noted in residuals, *or* suppressed or stagnant residuals (common in lodgepole pine types) *or* trees which are showing poor growth due to other forest health factors;
- reducing the perimeter to block ratio by removing or minimizing “fingers” and making use of natural barriers such as roads;
- favouring non-host species during silviculture treatments;
- pruning of western larch, where feasible;
- girdling of leave trees, if required, by 10 years post-harvest; and
- monitoring (pending funding).

Careful consideration will be given to silviculture systems, site preparation methods and preferred species options. Acceptance of dwarf mistletoe at free-growing will be determined by the District Manager and will be based upon the management objectives, and tactics implemented to reduce the risk. These strategies and tactics are outlined below and represented in a flowchart fashion

(Figure 1 and 2). Acceptance at free-growing will not require modifications to free-growing survey methodology, but rather to free-growing survey criteria i.e. stems with dwarf mistletoe will be accepted or host trees within 10M of an infected overstorey tree.

The outlined strategies and tactics recognize gaps in the literature regarding impact upon secondary hosts. Therefore secondary hosts are treated the same as primary hosts and assessed accordingly. Furthermore, intensification of dwarf mistletoes over time is poorly understood. Intensification refers to the increased levels of dwarf mistletoe on a tree and within a stand. Intensification is directly related to the time since infection and influenced by both the hazard and risk. The establishment of monitoring plots may serve as an avenue to bridge these gaps, as impact and susceptibility data are collected and reviewed.

Dwarf Mistletoe Assessment

Dwarf mistletoe hazard and risk, management strategies and free-growing expectations must be acknowledged in both higher level and stand level plans. Management Plans and Forest Development plans should outline the dwarf mistletoe hazard and provide an overview of strategies based upon management objectives. The Silviculture Prescription should clearly state the management objectives for the site, dwarf mistletoe hazard and risk, dwarf mistletoe strategies and free-growing expectations i.e. acceptance of dwarf mistletoe-infected stems at free-growing. Where other resource issues conflict with dwarf mistletoe management, the expected forest health impacts should also be noted in the Silviculture Prescription.

Management tactics will only be implemented in stands where dwarf mistletoe has been noted in one of the following: perimeter trees, leave trees, advanced residuals or wildlife tree patches. This can be accomplished through walkthrough surveys and incorporated into Silviculture Prescriptions. Perimeter trees are defined as those within 10M of the stand edge, therefore cutblock boundaries should be carefully examined.

Harvested Areas

Strategy

In harvested areas, dwarf mistletoe generally exists in overstory residuals, perimeter, veterans or small patches of non-commercial trees. Harvested stands should be assessed prior to 10 years post harvest. The opportunity for assessment would occur during the next scheduled silviculture entry. The exception are those stands which are Licensee-funded blocks which were harvested prior to January 1990. These stands would require stand-alone surveys, since the next silviculture entry would occur beyond 10 years post-harvest. These surveys would identify which stands had dwarf mistletoe by assessing leave and/or perimeter trees.

Management strategies implemented to deal with mountain pine beetle in the late 80's and early 90's have influenced the incidence and intensity of dwarf mistletoe in TFL 15. Emphasis at that time was removal of beetle-infested wood in a timely manner, with little regard to the impacts of other forest health concerns. While these small patch clearcuts dealt with the mountain pine beetle risk they may have increased the dwarf mistletoe risk. Lodgepole pine dwarf mistletoe may have to be accepted in these small patch clearcuts as the objective was mountain pine beetle management.

TACTICS FOR STANDS WITH OTHER RESOURCE OBJECTIVES

In stands where surveys of leave trees or the perimeter have identified dwarf mistletoe, the options are to maintain leave trees or advanced residuals as discussed with the Ministry of Environment, Lands and Parks (MELP), consider favouring a non-host species during silviculture treatments and/or promoting a species mix. Amendments to Silviculture Prescriptions (SP) may be necessary. There will be a *probable* need to accept dwarf mistletoe (DM) at free-growing (FG) if DM has been identified in the leave trees or perimeter (Figure 1).

TACTICS FOR STANDS WITH TIMBER OBJECTIVES

If dwarf mistletoe is present in the leave trees or the perimeter then consideration should be given to the following: 1) removing the leave trees prior to 10 years post-harvest; 2) favouring non-host species during silviculture treatments (where silvically appropriate); and 3) slashing of residual host species if dwarf mistletoe has been identified in the residuals. In extreme cases, where the dwarf mistletoe levels in leave trees or veterans are high, DMR¹ 5 or 6, then consideration should also be given to slashing all regenerating host species and fill-planting with non-host species (Figure 1).

Amendments to SP's may be necessary and there will be a *possible* need to accept DM at FG. For instance, in some cases the prescription may state that "8-10 disease-free trees/ha will be left". In stands where dwarf mistletoe has been identified, the prescription will require an amendment stating the tactics which will be implemented to reduce the risk (Figure 1).

Approved Prescriptions but not Harvested, Future SP's and Those under Review

Strategy

The opportunity to reduce the dwarf mistletoe risk exists through careful consideration to silviculture systems, cutblock configuration, site preparation methods, removal of the adjacent risk within 10 years (provided green-up conditions have been achieved), and where applicable, spatial distribution of leave trees or wildlife tree patches. Additionally identifying "acceptable species" as "preferred species" at the SP stage provides more options at the free-growing stage. Care must be taken however, to ensure that; 1) potential losses caused by poorer performance of "acceptable species" does not exceed potential dwarf mistletoe losses; 2) the resultant stand reflects species composition and patterns intrinsic to that ecosystem; and 3) the resultant landscape coincides with biodiversity objectives.

Dwarf mistletoe levels will be (re)-evaluated for prescriptions which have been approved and not harvested, those under review and future SP's. Amendments to the former prescriptions may be necessary to reflect changes in slashing, species composition or retention of overstory trees. Where leave trees have been prescribed every effort will be made to ensure that these trees have the lowest levels of dwarf mistletoe. Increased light conditions post-harvest, may however intensify the level on the tree. Girdling these leave trees 10 years post-harvest will reduce or eliminate the risk. This approach maintains structural diversity, wildlife trees and coarse woody debris requirements. This scenario is suitable for areas with wildlife tree patches or leave tree requirements.

¹ Hawksworth 6-class dwarf mistletoe rating scale

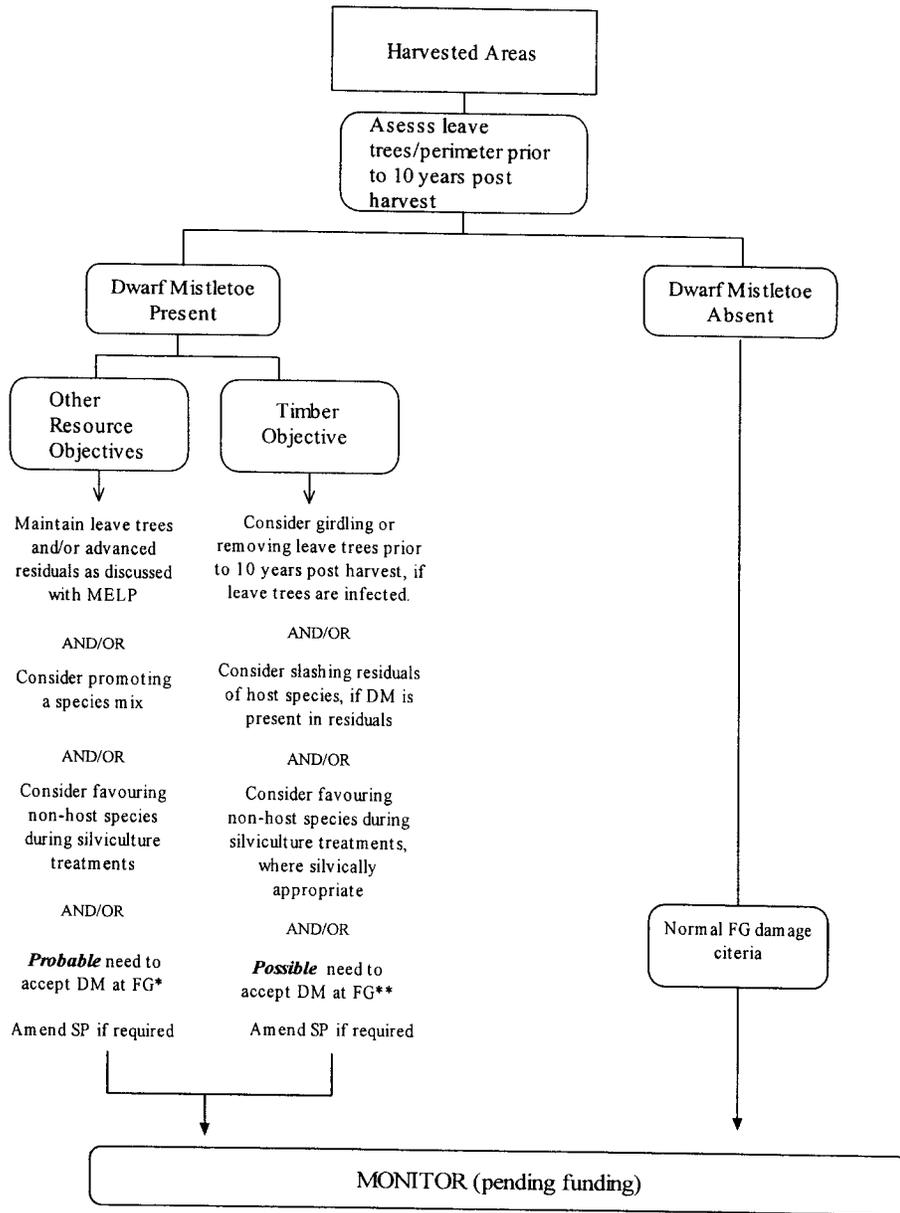
TACTICS FOR STANDS WITH OTHER RESOURCE OBJECTIVES

Where silvically possible, a species mix should be prescribed for the site to reduce the dwarf mistletoe hazard and offset any losses. Buffer planting does not effectively reduce the hazard and is therefore not recommended. Favoring non-host species during silviculture treatments will also reduce both the hazard and the risk. The objective of such treatments is to produce a free-growing stand and should not be considered as a remedial treatment since dwarf mistletoe-infected trees may still be acceptable. Guidance will be sought from the MELP regarding maintenance of leave trees and/or advanced residuals. There will be a *probable* need to accept DM at free-growing (Figure 2).

TACTICS FOR STANDS WITH TIMBER OBJECTIVES

In stands where dwarf mistletoe has been identified the following tactics should be considered: 1) promoting a species mix, where silvically appropriate; 2) slashing residuals of host species if dwarf mistletoe has been identified on residuals; 3) favouring non-host species during silviculture treatments, where silvically appropriate; and 4) girdling or removing leave trees prior to 10 years post-harvest. There will be a *possible* need to accept DM at free-growing, especially in stands where more than one species of dwarf mistletoe have been identified, and silvical constraints limit the options of "preferred species" (Figure 2).

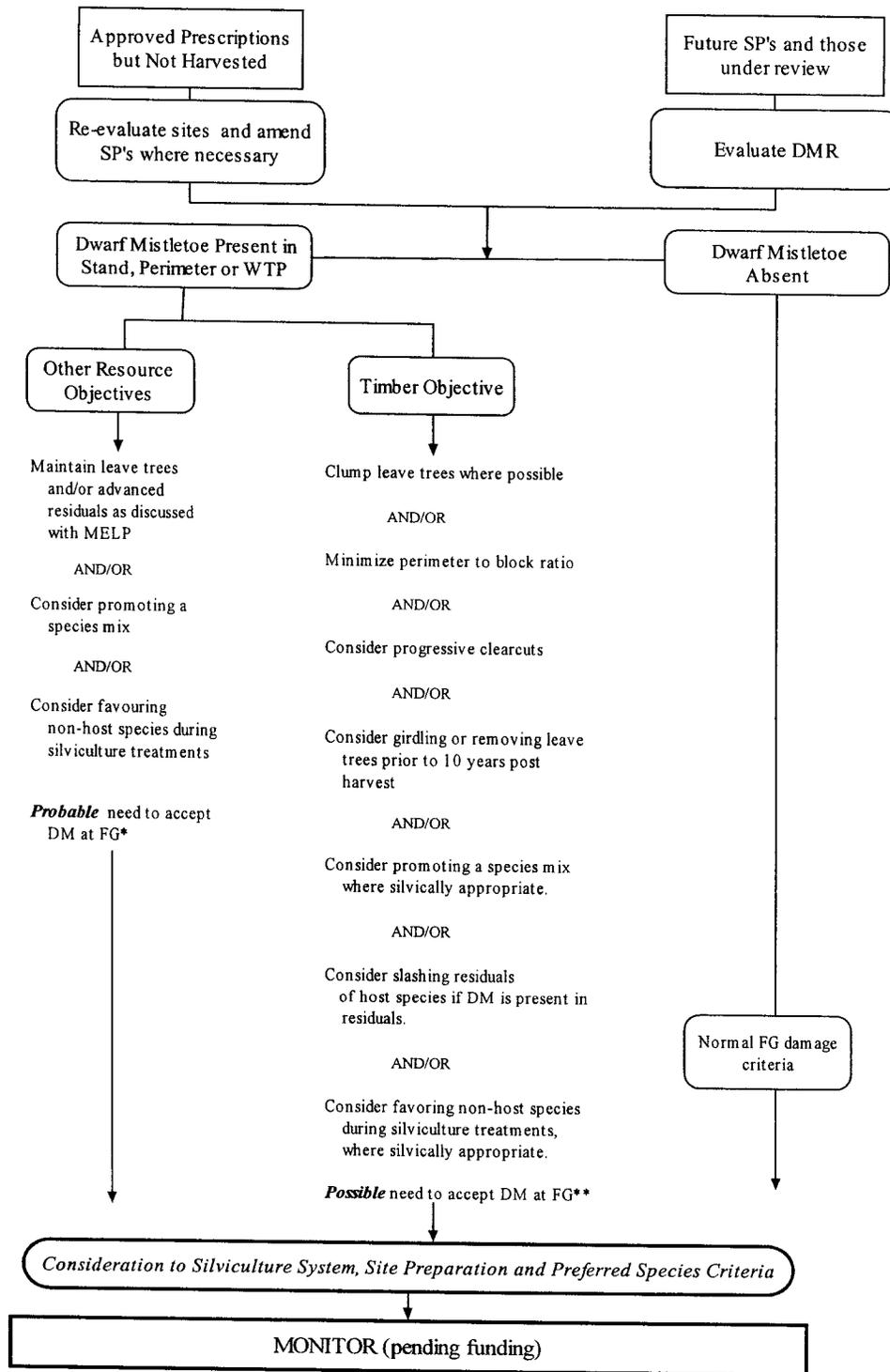
Figure 1. Dwarf Mistletoe Strategies and Tactics for Harvested Stands (February 1999).



* managing for other resources will likely lead to presence of DM in next crop.

** managing for timber resources will be done to minimize mistletoe impact but may not eradicate DM. dwarf mistletoe acceptance may be required in stands managed for mountain pine beetle

Figure 2. Dwarf Mistletoe Strategies and Tactics for Approved Prescriptions but not Harvested, Future SP's and Those Under Review, (February 1999).



* managing for other resources will likely lead to presence of DM in next crop.

** managing for timber resources will be done to minimize mistletoe impact but may not eradicate DM.

Appendix 1. Loss factors incorporated into TFL analysis.

- 1) VDYP is used for existing mature stands and unmanaged immature stands; specific DWB factors for TFL 15.
- 2) TIPSY is used for managed stands and there is a disease factor in OAF2.
- 3) 400+ hectares of dwarf mistletoe infected stands were classified NSR to SR as part of the reinventory process and a VAF of .85 (i.e. a volume reduction of 15%) was applied to the volumes in these stands.
- 4) Part of the losses and leaves in the TSR are attributable to dwarf mistletoe volume losses.