Omineca Regional Wildlife Tree Patch (WTP) Retention Guideline

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Issue:

Wildlife trees patches (WTP) are important stand level habitat features which provide vertical stand structure and a source of coarse woody debris. WTP are a valuable ecological component on all cutblocks. There are challenges in delivering the WTPs to achieve ecological objectives within certain operational constraints. This document provides recommendations on planning and retention of WTPs.

Background:

In a managed landscape, maintenance of biodiversity requires measures taken at the **stand** level to retain stand structure. Key stand structure elements include standing dead trees, coarse woody debris (CWD), large living trees, tree species diversity, vegetation diversity, and structural diversity(both vertical and horizontal). Wildlife trees are important components to stand structure and are characterized by large size for site, evidence of wildlife use (e.g. nesting cavities dens), species type (e.g. wolf Douglas fir or large cottonwood), valuable location, declining or dead condition and relative scarcity. Wildlife trees serve as critical habitat for a wide variety of organisms (Lofroth 1998).

General Guiding Principles

The ecological foundation for the WTP strategy in managed forests is built on natural forest disturbance patterns (Delong; Delong, 1998). Major stand renewing events, such as large wild fires or large scale forest insect infestations, are a natural feature of unmanaged forests. These large scale events are rarely uniform in their impact on the forest and invariably leave undamaged stands of forest (Delong 1998). These “naturally occurring” residual trees or clumps of trees are reflected as wildlife tree and tree patches in managed cut-blocks. As forestry replaces natural processes as the dominate influence on forest stand renewal, it is necessary to ensure that management for stand level biodiversity occurs on all cut blocks. The current approach is to mimic natural processes in managed stands.

Ideally, WTPs are designed to persist in the surrounding or adjacent regenerating stand/forest for the rotation of the stand/forest. During this time, many of the trees will die from natural causes, including insect attack, disease and fire. As dead standing trees (snags), these trees continue to provide habitat and biodiversity values, albeit different from those of living trees. Eventually dead wildlife trees fall and contribute to coarse woody debris (CWD). As trees decay, they provide a variety/succession of ecological values including security and resting habitat, forage production, nutrient cycling, and moisture retention. A comprehensive description of the values associated with CWD is discussed by Lofroth (1998).

Retention of wildlife trees in patches or clumps is the preferred method of achieving the biodiversity and habitat objectives. A WTP can range in size from an individual tree to a clump of several hectares in area. Individual trees provide habitat (perching, denning, roosting and foraging sites) and biodiversity (CWD, nutrient cycling) values when appropriately distributed across a cutblock. However, WTPs are most valuable when they are composed of a stand of trees and associated vegetation greater than 0.25 ha in area (Bunnell et al, 2004). An intact patch provides all the values of an individual tree plus areas of undisturbed forest floor, a collection of undamaged and naturally occurring vegetation community, more vertical complexity (i.e. more canopy layers) and better windfirmness. The patch should be a remnant or representation of the pre-harvest forest. The patch provides additional habitat values over individual trees, including security (hiding) cover for a wider variety of species; thermal cover from heat, cold and wind; and snow interception. For example, research indicates that clear-cut blocks with retention patches have significantly higher bird use than clear-cut blocks without retention patches (MacKenzie and Steventon 1996, Seip and Parker 1997). Generally, habitat values improve as the patch size increases. Further research suggests that some bird species (e.g. western tanager, red-breasted nuthatch) require a minimum patch size of 3 ha for each breeding pair's territory.

To mimic natural conditions, WTPs should be composed of vegetation representative of the harvested area, with a range of tree diameters favouring larger diameters where possible, and with densities typical of the stand. A range of tree sizes helps accommodate the habitat needs of a wider variety of organisms. Moreover, a range of tree ages helps to ensure a longer term supply of large dying and dead trees to become prime wildlife trees and CWD. Non-forested and non-commercial forested areas may be included in WTPs, but only to the degree that they are representative of the pre-harvest forest stand. For example, small brush patches or wetlands that are too small to be included in the forest inventory may be included if found in association with an upland forest WTP. Retaining the range of forest and vegetation community helps ensure the species diversity is maintained at the stand level and over the larger landscape. A more complete discussion on how to select wildlife trees is contained in Appendix A.

The Biodiversity Guidebook (BGB) (MOF 1995) (Table 20a, b) and the Landscape Unit Planning Guide (MOF1999) (Table A3.1, A3.2) lay out a method to identify the percentage of the cutblock area that is required as WTPs The WTP retention percentages outlined in the tables are based on natural forest ecology and considers the amount of forest available to harvest and the harvesting to date. It uses the Landscape Unit as the basis on which to do retention percentage calculations. The guidebook does not indicate how the retention should be distributed, except it should be " well distributed across the landscape".

The optimal WT retention strategy contains a mix of patch sizes from individual WT to patches of several hectares in size, with larger patches forming the majority of the retention. The BGB states that WTPs should be a **maximum** of 500m apart or from other suitable leave areas outside the cut block. On average, separation should be significantly shorter. The guidebook indicates that this distance is based on "territory size and dispersal requirements of wildlife". The scientific literature has identified maximum dispersal distances into opening, such as cutblocks, for a variety of wildlife, including moose (<60-200m) (MNR 1990), deer (<100m) (Bunnell 1990, Timmerman 1991), elk (<200m) (Brunt 1990, Timmerman 1991), marten (<23-150m) (Lofroth and Steventon 1990, Buskirk and Ruggiero 1994), fisher (avoid open areas), chickadees (25-100m) (St. Clair et al 2000). One function of the WTPs is to enable animal movement across disturbed/managed landscapes. As such, the WTP helps reduce habitat fragmentation and isolation of animals to only a portion of their possible range. WTP distribution should consider animal dispersal limitations. The guidebook discusses using retention patches around the edge of cutblocks or even outside the cutblock if they are well suited (e.g. riparian reserves) and "provided the inter-patch spacing requirements are met". Wildlife trees situated closer together are better than widely spread. The distance between WTPs can be kept below the maximum through a combination of block design, wildlife tree patch location, riparian reserves and management zone retention. Individual wildlife trees should be concentrated in part of a cut-block where distances between WTPs are near the maximum allowable separation.

It is desirable to have some WTPs retained on or adjacent to all cutblocks. WTPs are a stand level element and typically should be distributed in a regular(balanced) pattern on each cutblock. However, operational, ecological and topographic factors suggest that some flexibility in reaching WTP% target would be desirable. For example, on some cutblocks it may be difficult to locate sufficient windfirm locations to achieve the target % while better opportunities for windfirm WTPs exist on adjacent blocks. With these operational considerations in mind and if the retention target can be met at the landscape level, then individual block retention can vary. This flexibility must be exercised within certain bounds, to help ensure WTPs occur on nearly all blocks, and only under certain specified circumstances. It is expected that flexibility will be needed more on smaller blocks. For example, large cut blocks (i.e. greater than 100ha) are expected to have enough wind firm opportunities (e.g. age class edges, stand type edges, topographic features) to achieve the retention target.

Recommended General Practices:

1) WTPs should be retained on each cutblock to the retention percentage identified in Landscape Unit Plans (LUP) or the Biodiversity Guidebook. Where flexibility in WTP is warranted, it will be exercised only within certain bounds and in combination with other measures designed to offset impacts to habitat values.

The circumstances where flexibility in WTP% may be is warranted include:

- localized areas with demonstrated high windthrow hazards where suitable locations for windfirm WTPs are limited, or
- areas of extensive tracts of forest types prone to windthrow (e.g. shallow rooted forest types) that can be managed in concert with harvest blocks in the same LU and biogeoclimatic subzone area which contain more windfirm forest types (e.g. deep rooted Douglas fir or thrifty mature forest types) or ecologically better opportunities for WTPs (e.g. extensive S4 stream network), or
- on harvest blocks less than 6 ha, or
- areas under severe current attack by insects or disease and where most or all of the area with current attack will be harvested before the insect departs or disease runs its course.

The range of acceptable flexibility is set by the objectives desired for WTPs. WTPs are designed to provide a regular pattern of representative mature forest stands that provide stand structure and wildlife (including fish) habitat at the stand/cutblock level. Blocks greater than 100ha with severely limited WTP retention can not be judged as helping to achieve the objective. Blocks of this size should have enough flexibility to achieve the retention target. Blocks with "excessive" WTP retention are not an effective balancing measure as they will disrupt the even distribution desired for WTPs. In most situations an individual block should reach the target for WTP retention and where variation exists, the under achievement on one block will balance over achievement on another. This balance should be achieved within the currently approved blocks for an individual watershed area.

2) WTPs should have a maximum separation of 500m between patches or adjacent stands of mature forest, except under specified circumstances. Flexibility on distance between WTPs is more problematic than retention percentage. Ideally the flexibility on distance should come below this upper bound established by territory size and dispersal distance. That is, the **average** distance between WTPs should be considerably less than 500m, allowing topographic or other constraints to be met within 500m. In the exceptions where it is demonstrated that the distance between WTPs must exceed 500m, measures must be taken to provide cover features distributed such that maximum distance to cover is less than 250m. These cover features may include, but are not limited to:

- retaining CWD in unburned piles at least 3m in diameter and 2m in height. The pile must include medium diameter (i.e. 25cm) stems extending from the piles. The piles should be distributed throughout the block. These piles will provide hunting and resting perches for birds; denning areas for rodents and their predators; security cover, den sites and under-snow access for mustelids and other animals.
- retaining groups of stubbed trees .
- establishing machine free zones (MFZ) in gullies, swales and other topographic features that provide breaks in the landscape and may provide

security/hiding cover. The MFZ will help retain undisturbed vegetation for cover.

- retaining patches of immature conifer or deciduous trees, in excess of their representation, to provide habitat.
- configuring block design to minimize distance between WTP.
- retaining patches of tall shrubs, such as alder or willow, which are 0.25 ha or larger in size.
- establishing patches of quick growing cover in conjunction with other measures.

3) WTPs should be composed of forest vegetation representative of the harvested area, with a range of tree diameters, favouring larger diameters where possible and with densities typical of the stand. Non-forested and non-commercial forested areas may be included in WTPs only to the degree that they are represented of the pre-harvest forest stand.

4) WTPs should be a minimum of 0.25ha in size, but preferably larger.

5) WTPs should be designed to persist in the surrounding or adjacent regenerating forest for the rotation of the forest. No harvest should be planned for the WTPs. Susceptibility to wind-throw and disease or insect attack should be considered when deciding on WTP location, shape and size.

Managing forest insects within WTPs

As WTPs are designed to contain large old trees, they may be susceptible to forest insect attack. Forest insect susceptibility may increase for WTPs if the trees are stressed or are subject to blowdown.

Forest insect infestations of WTPs are largely benign and in fact, may be essential for maintenance of certain biodiversity values, (e.g. Cape May and bay breasted warblers are considered budworm specialists, and do best at infested sites). However, insects may pose a significant threat to other forest resources, notably timber. Based on this threat, it may be prudent to harvest portions of WTPs for sanitation purposes. Except in the most severe cases, harvest reduces the WTP value. At some level of extraction (e.g. 75% of the original WTP or reduced less than .25 ha), the value of the WTP as a patch is reduced to near zero and remaining trees are functioning only as dispersed wildlife trees. Dispersed wildlife trees are important stand level features, but provide different values to WTPs. A mechanism or process is needed to identify and quantify “legitimate/real” forest insect risk and recommend measures which address the risk while minimizing impact to habitat and biodiversity. A process has been developed for similar situations in riparian reserve zones. Harvest of trees effected by forest insects in a RRZ can only occur where it can be demonstrated that:

- there are susceptible stand types within 2km of the RRZ infestation;
- the forest insect hazard is being similarly managed in the surrounding landscape (i.e. adjacent stands); and
- there is brood remaining in the RRZ trees (i.e. sanitation and not salvage).

Recommended Practices:
The following guidelines are recommended for addressing forest insect infestations in WTPs.

A) WTP screening
Screen the forest insect situation in the WTP(s) against the following criteria:

- there is insect brood remaining in the WTP trees (i.e. sanitation and not salvage) at levels which pose a risk to adjacent stands (i.e. epidemic Vs endemic).
- there are moderate to highly susceptible stand types within 2km of the WTP infestation.
- the forest insect hazard is being actively managed with companion treatments to those in the WTP in the surrounding landscape (i.e. adjacent stands)

The following information should be included in any plan to harvest beetle-infested timber in a WTP.

1. a strategy for beetle intervention, including specific activities proposed;
2. a rating of host (stand) susceptibility within two kilometres of the infestation in the RRZ or WTP;
3. a description of past and current beetle management activities in the area; and,
4. ground survey information to determine the level of beetle infestation.

Note that when forest insect management plans are being developed, the need to retain WTPs must be considered. Where pheromone or trap tree baiting is proposed, these baiting locations should be installed at least 500m for spruce beetle and 100m for mountain pine beetle from existing or proposed WTPs.

B) WTP harvest
If a forest insect situation in a WTP meets the screening criteria listed above, and where less than 75% of the WTP needs to be removed, then the following measures are recommended during harvest activities used to address the situation:

1. Methods used for the harvest and removal of beetle-attacked trees from a WTP must result in the least amount of damage to non-target trees and other vegetation in the WTP.
2. Trees will normally be hand-felled. Trees may be machine-felled providing the tracks of heavy equipment do not enter the WTP.

3. Trees will either be line-skidded out of the WTP, or directionally-felled and top-skidded out, providing the tracks of heavy equipment does not enter the WTP.
4. In exceptional circumstances, harvest and remove trees using heavy equipment (e.g., feller-buncher, skidder) may be warranted. However, the proponent should exhaust all other, less-intrusive means of harvesting and removing trees before considering heavy equipment.
5. Only green, "current-attack" or red-attack trees that still harbor beetles should be harvested. Red trees that do not contain beetles should not be harvested.
6. With the exception of spruce, other trees felled within a WTP for safety reasons, or to facilitate harvest or skidding operations, should be left on the ground as coarse woody debris, providing they do not constitute a significant forest health hazard. All green spruce trees felled that measure at least 15 centimetres DBH must be removed from the RRZ or WTP and processed for forest health reasons.
7. Stumps should be processed in such a manner that any beetles remaining in the stumps will be destroyed (e.g. burning or debarking the stumps).
8. WCB regulations remain paramount, and may require that additional trees be removed for safety reasons.
9. Trees should be harvested in winter only to avoid impacts to breeding or rearing wildlife. The exception is those WTPs with demonstrated winter range value and use.

C) WTP replacement

An alternative or replacement WTP must be identified where:

- the amount of green attacked trees or red attacked trees still harbouring brood, results in more than 75% of an individual patch being removed; or
- the WTP retention target for the cutblock falls by more than 25% of that specified in the SP; or
- a key characteristic of the WTP (e.g. Douglas fir retention) is removed as a result of harvest.

Where a replacement WTP must be identified, it should be representative of the originally harvest stand and the sanitized WTP in terms of species composition and size, and location. The maximum 500m separation between mature forest canopy must also be retained.

Managing for WTPs in large scale disturbances

Even in intensively managed landscapes, large catastrophic stand renewing events will occur. There is an expectation to recover some of the potential fibre loss caused by insects or fire. In fact, fire or insect wood salvage often receives priority for harvest to reduce economic loss to decay in the dead trees. (e.g.

recent mountain pine beetle or Bowron spruce beetle out breaks.) However, these damaged or destroyed forest stands still require management for stand level biodiversity. Salvage areas provide an opportunity to capitalize on the natural process. For example, natural skips can be used as wildlife tree patches and natural fire edges used for block boundaries.

Recommended Practices:

1. Forestry operations in fire or insect killed forest stands should be consistent with the provisions of current legislation (eg Forest Practices Code Act or Forest and Range Practices Act) and related regulations as they pertain to managing for stand level biodiversity. As such, all fires or insect affected stands considered for salvage need provisions for stand level biodiversity.
2. Careful planning and appropriate safe work practices (e.g. wildlife/danger tree assessment) must be implemented when harvesting in structurally damaged stands (i.e. from fire or insects). Worker safety remains paramount, but can be accommodated in stand-level biodiversity management.
3. The location of residual stands of live trees and the edge of the affected area needs to be accurately mapped. Maintenance of stand level biodiversity and establishing windfirm block boundaries will rely on accurate mapping of these features and incorporation of them into block design and lay-out.
4. Riparian reserve and management zones should be applied on all streams, and appropriate management measures deployed.
5. WTPs should be focused on the non-damaged patches where possible. These are the areas that WTPs are supposed to mimic. It is particularly important to retain undamaged patches remote from riparian areas. This approach will help achieve stand retention representative of the original forest. Burned or insect killed stands should only be used as WTPs where there are not enough green areas to meet the minimum acceptable WTP retention levels. While stands of dead trees should not typically be used as WTPs, some individual dead trees, especially fire-killed trees, should be retained at the edge of the WTP. Fire killed trees are important habitat for black-backed woodpecker. These trees also help establish windfirm edges on WTP by feathering wind. Regardless of the final composition, WTPs should be clearly described and mapped in silviculture prescriptions.
6. WTP should be distributed to achieve a maximum 500m separation between mature forest cover. On average, mature forest cover separation is expected to be less.
7. For fire salvage, no harvest and no road zones will need to be identified on some steep-gradient streams. This includes non-fish bearing streams that are tributary to major fish bearing waters. Mass-wasting occurrence appears to increase for several years immediately after a fire, likely due to the complete removal of vegetation cover.

These occurrences result in increased sediment load in the streams. There is increased importance to minimize incremental sediment input generated by logging and road construction within the overall stream systems that are heavily impacted by the fire. No harvest zones will limit the amount of ground disturbance which in turn decreases the risk of sediment transport to streams. The size and location of no harvest zones will be dictated primarily by the terrain on the burn and the fire intensity near small streams. Because of the elevated risk of sedimentation, extra attention must be applied to harvesting on wet ground. These sites may necessitate winter or frozen ground harvesting.

8. Roads and landings should not be located in areas which did not suffer fire or insect damage. This practice will help retain the windfirmness and ecological integrity of these stands.
9. Often, fire or insect salvage will involve large blocks or the need to aggregate blocks. In these situations, consideration must be given to landscape-level biodiversity. The legal objectives for maintenance of landscape biodiversity, for example patch size or seral stage distribution, must be considered. A large block resulting from fire or insect salvage will affect patch size distribution and will influence future forest development as it relates to landscape objectives. Cut blocks greater than 60ha needed to recover damaged timber must be consistent with spatial and temporal characteristics of natural disturbances.

Managing for dispersed wildlife trees

Wildlife trees can be retained as individual trees or in patches, with patches generally the preferred method. It is usually desirable to leave some dispersed wildlife trees (DWTs) to compliment the benefits arising from WTPs. DWTs can provide a broad distribution of roost, perch and nest trees and medium to long term CWD well distributed across a cut block.

The BGB recommends a maximum distance between patches of 500 metres. It is expected that shorter distances will be the norm, but that actual distances will vary considerably, dependant upon the availability of suitable WTPs. Where the distance between patches is necessarily large, dispersed wildlife trees may ameliorate the lack of WTPs and promote stand structure diversity.

In order to better manage and conserve biodiversity, those portions of a block where distance between patches exceeds 300 metres should have dispersed wildlife trees. This 300 metre threshold is based on the area (approximately 9 hectares) that might begin to effect the dispersal and use of smaller wildlife species**.** Where this condition exists, at least 5 stems per hectare of dispersed large coniferous trees or large deciduous trees, should be retained. The

minimum size recommended for suitable wildlife trees is 25 cm in diameter for deciduous trees and 35 cm in diameter for conifers at breast height (DBH).

Where suitable large deciduous or coniferous trees are not available, approximately 10 tree stubs per hectare should be created. Tree stubs should also to be at least 25 cm DBH for deciduous trees and 35 cm for conifers, and should be at least 5 metres in height. Stubbing, of course, will be restricted to those areas being harvested with feller-bunchers. Stubs should be left where a block is planned for broadcast burning and where the distance between patches exceeds 300 metres.

The exception to these requirements is on blocks using cable harvesting systems. In these instances, every effort should be made to meet the 300 metre patch separation through WTP retention.

Appendix A discusses preferred trees for selecting dispersed wildlife trees.

While the natural distribution pattern of wildlife trees will vary the actual number of wildlife trees left on each hectare of a cut-block, DWT should be dispersed as evenly as possible across the block. Stubbing should be done in order to supplement deficiencies in numbers of suitable wildlife trees.

Requirements for DWTs are not additive to the wildlife tree retention target established by legal objective or policy. It is expected that any retention of DWTs will be suitably accounted for in calculating “eligible area” for biodiversity.

Recommended Practices:

1. Except on blocks using cable harvesting systems, some dispersed wildlife trees should be retained on all cut blocks.
2. At least 3 DWT per hectare should be left on all cut blocks.
3. On blocks with distances between WTP exceed 300m , at least 5 stems per hectare of dispersed large coniferous trees or large deciduous trees should to be retained. The minimum size of suitable wildlife trees is 25 cm in diameter for deciduous trees and 35 cm in diameter for conifers at breast height (DBH).

Appendix A - Wildlife Tree Characteristics

Wildlife trees (WTs) are important components to stand structure and are characterized by a number of factors including:

1) trees considered large size for site. Trees from the top 10% of the diameter distribution for the stand should be included as WTs. The minimum size of suitable wildlife trees is 25 cm in diameter for deciduous trees and 35 cm in diameter for conifers at breast height (DBH).
2) evidence of wildlife use (e.g. nesting cavities or dens) or tree structure suited for wildlife use (suitable for large nest, hunting perch sites, etc.).
3) species type. While wildlife tree patches (WTPs) should be representative of the harvested stand, some trees have better general qualities as WTs, especially to serve as dispersed wildlife trees. The preferred species list is:
    A) Large Douglas-fir "veterans" or large Cottonwood trees.
    B) Mature Douglas-fir, preferably with some surrounding trees left intact to help protect the root integrity and windfirmness of the Douglas-fir.
    C) Subalpine-fir, preferably with some surrounding trees left intact to help protect the root integrity and windfirmness of the subalpine-fir.
    D) Clumps of aspen containing individual aspen greater than 25 cm DBH.
    E) Windfirm individual conifers or deciduous trees.
    F) Coniferous or deciduous stubs.
4) declining or dead condition. Indicators of decay include:
    - internal decay (heartrot or natural/ excavated cavities present)
    - crevices present (loose bark or cracks suitable for bats)
    - large brooms present(mistletoe)
    - current insect infestation
5) relative scarcity of tree species. While not the primary purpose of WT retention, and sometimes at odds with the representation objectives, "rare" or uncommon trees should be retained on the block.

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