

APPENDIX VII

Forest Insects and Disease

March 2001

Forest – Insects and Disease

This appendix adds to section 6.3.2 in the Management Plan. It includes further description of the insect pests in TFL 39 and summarizes the main disease concerns. It also includes guidelines for establishment of Sitka spruce and *Abies* species and summarizes the procedure for making allowances for the impacts of forest pests in strategic timber supply analyses.

Operational strategies for reducing the impacts of disease, insects and wind, when managing with variable retention, are described in “Guidelines for Designing Variable retention – Layout and Silviculture Prescriptions”, August 1999, revised October 2000 (“SPs for VR”). A current version is included in the text CD attached to this report.

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1.0 Insect Pests

1.1 Conifer Sawfly - *Neodiprion* spp

Sawflies are common on most conifers in British Columbia and populations are generally controlled by numerous predators and pests. Under favourable conditions short intense epidemics can arise. The nature of these conditions is not known. However, epidemic populations are usually short lived (1-2 years) and are generally terminated by parasites and a nucleopolyhedrosis virus.

A number of infestations have occurred in TFL 39 during the last 40 years, particularly in Blocks 2 and 6. Only three of the earlier infestations had a significant impact on forest values. Sawflies feed on the old foliage - mortality is not likely to occur unless the sawfly infestation is combined with a defoliator that feed on the new foliage (e.g. the blackheaded budworm) or bark beetles.

- In the late 1970's severe defoliation of amabilis fir and hemlock was recorded on 7,000 ha and 600ha respectively in the Keta Lake and Bigtree Creek drainages in Block 2 of TFL 39. Estimates of tree mortality in defoliated stands were 15% in Bigtree Creek and 4% in the Keta Lake area. The mortality was attributed to attacks on defoliated trees by the fir root bark beetle (*Pseudohylesinus granulatus*) and the Pacific silver fir beetle (*Pseudohylesinus sericeus*). By 1983, 90% of the defoliated stands had been salvage harvested.
- Between 1985 and 1988, populations of the blackheaded budworm (*Acleris gloverana*) and conifer sawflies (*Neodiprion* spp) defoliated up to 44, 300 ha of western hemlock in the Queen Charlotte Islands. By 1987, successive years of defoliation by the two species had resulted in the mortality of 25% of the second-growth hemlock over an area of 3,100 ha.
- For the three years (1995 to 1997), infestations of the conifer sawfly (*Neodiprion* spp.) caused significant and highly visible defoliation of amabilis fir and hemlock in Blocks 2 and 5 of TFL 39.

Defoliation was first detected in Block 5 in 1995. This outbreak expanded to over 10,000 ha by 1996. By the fall of 1997 most of the outbreak had declined and the infestation has now collapsed. Harvest operations included recovery of timber from stands impacted by this infestation.

In 1996, sawfly infestations were detected in the Kunnum Creek, Adam River, White River, Bigtree Creek and Memekay River drainages within Block 2 of TFL 39, and within Schoen Lake Provincial Park. The total area of defoliation increased to approximately 5,100 ha in 1997. The infestations have now collapsed in high-risk areas. There was some salvage harvesting in high-risk stands in the Kunnum Drainage.

The strategy for minimizing losses from such sawfly infestations includes:

- Involve specialists in the development of management tactics. The MoF regional specialist and a consulting entomologist were involved in determining management activities for the recent infestations.
- Monitor defoliation and populations of sawfly and of associated pests (bark beetles and the blackheaded budworm) and conditions that contribute to a high risk of mortality. Identify high risk stands.
- Plan salvage harvest in high risk areas. Implement such plans to recover mortality. Salvage plans were made for the recent infestations and salvage harvesting occurred in some stands in Block 5 and in the Kunnum Drainage of Block 2.

1.2 Blackheaded Budworm - *Acieris gloverana*

Since 1940, epidemics have caused mortality and growth loss in parts of Blocks 2, 4 and 6 of TFL 39. Attempts were made to control the budworm only when it seemed probable that large-scale mortality would occur.

Populations have recently increased in the Queen Charlotte Islands (Block 6 of TFL 39). The Canadian Forestry Service is monitoring these populations. This latest cycle started south of TFL 39 and has been slowly moving north. The Blackheaded budworm typically feeds in the upper crowns of trees, leaving the lower branches for later feeding. This creates a red-brown appearance in the foliage and allows for easy detection of advanced insect damage.

Populations of the budworm will continue to be monitored. Salvage plans will be implemented if timber is threatened. Infested stands will be excluded from the juvenile spacing program.

1.3 Sitka Spruce Weevil - *Pissodes strobi*

Blocks 1, 2, 3, 4 and 5 are in the hazard zones for the Sitka spruce weevil. Rules for planting Sitka spruce are followed to reduce damage by the weevil. Refer to section 3. Weyerhaeuser is involved in trials with seedlings from weevil resistant provenances.

In some high hazard zone stands the presence of Sitka spruce has been reduced by spacing. In older stands there is generally sufficient hemlock to ensure the viability of the stand.

Management Plan #7 reported damage in 3,000 ha of second growth Sitka spruce stands in Block 4. The infected area has not increased significantly and the weevil population remains moderate. Portions of the effected area have been underplanted with cedar, even though significant mortality is not expected.

1.4 Balsam Woolly Adelgid - *Adelges piceae*

Although the Balsam Woolly Adelgid is currently not present in TFL 39, it has been observed nearby; at Menzies Bay, near Block 2 and in patches up the mainland coast to West Thurlow Island - in the vicinity of Block 1.

Weyerhaeuser has issued revised and more stringent guidelines to reduce the risk of future losses from the aldehyd. Refer to section 4.

1.5 Ambrosia Beetles

Weyerhaeuser has had an active damage prevention program for over 30 years to minimize the significant financial loss that these beetles can cause. After early trials and operational spraying with a number of insecticides, damage is now controlled by careful management of inventories of susceptible logs and the use of pheromones and trap logs around log sort and storage areas.

2.0 Summary of Disease Concerns

Wood volume losses to disease in old-growth forest have been estimated as significant by the Canadian Forest Service. The assumption that growth is balancing mortality has been affirmed by measurements of a limited number of Weyerhaeuser permanent sample plots for nearly 30 years.

In the new forests a number of parasitic fungi and plants can kill trees or degrade log quality and value. Most significant of these are hemlock mistletoe, laminated root rot, Annosus root rot and Armillaria root disease. Active preventative measures at present are limited to mistletoe and laminated root rot - these are described in sections 6.3.2.3 and in the "SPs for VR" referenced at the beginning of this appendix.

3.0 Planting and Natural Regeneration Guidelines for Sitka Spruce

A. Planting Sitka Spruce (*Picea sitchensis*)

The guidelines to minimize losses to the weevil are:

- No Hazard Zone (Queen Charlotte Islands)

Sitka spruce planting is unrestricted.

- Low Hazard Zone (Very Wet Hypermaritime [CWHvh] subzone on midcoast mainland and northern tip of Vancouver Island, see map.)

Plant Sitka spruce within the low weevil hazard zone in accordance with the guidelines in: "Site Diagnosis, Tree Species Selection and Slashburning Guidelines for the Vancouver Forest Region, Land Management Handbook No. 8" (Green *et al.* 1984).

- Medium Hazard Zone (Very Wet Hypermaritime (CWHvh) subzone, south of Brooks Peninsula, see map.)

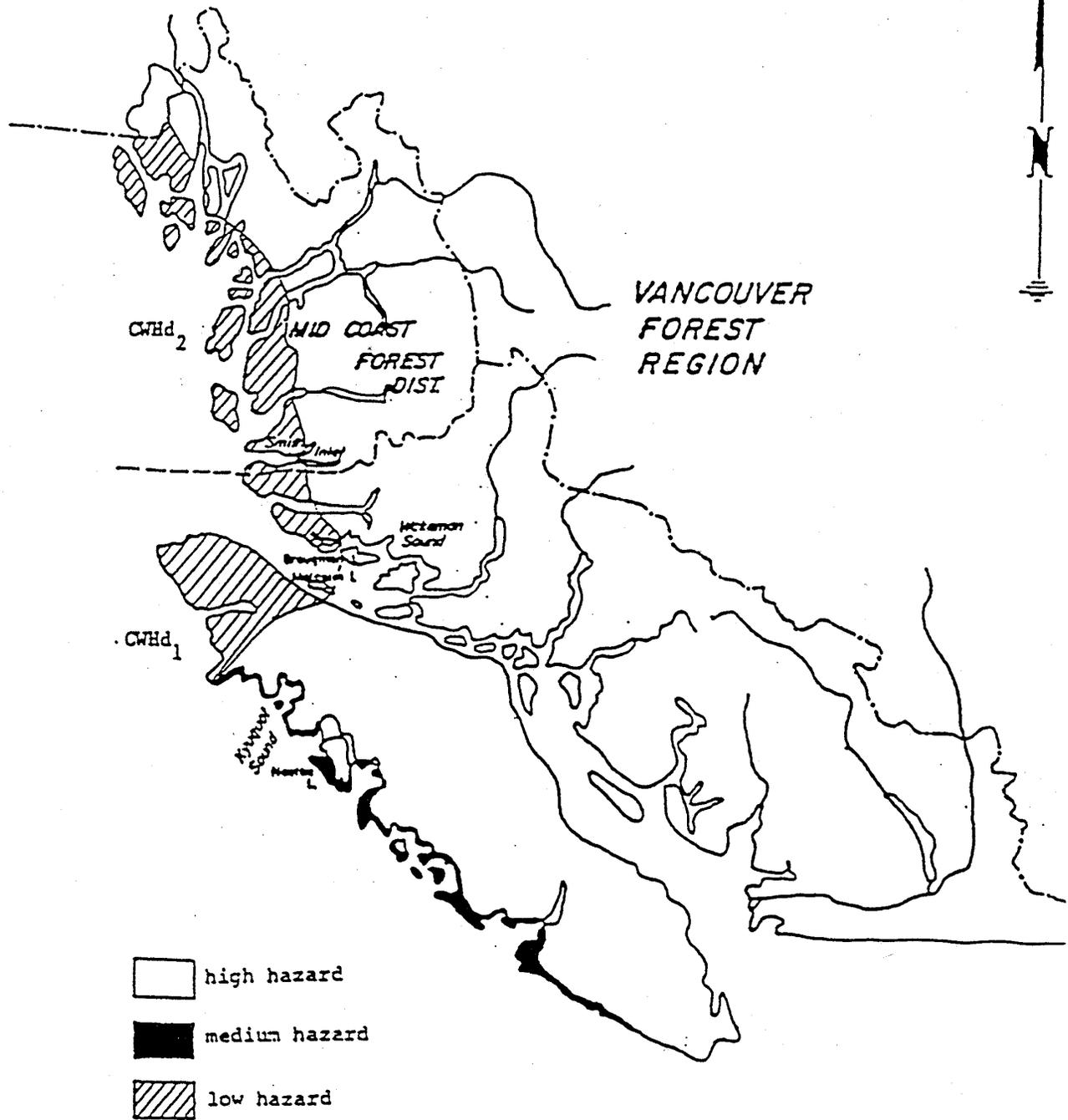
Up to 20 percent of the stand composition may be Sitka spruce, provided that acceptable alternative species exceed 600 stems per hectare.

- High Hazard Zone (all remaining biogeoclimatic units in the Vancouver Forest Region, see map).

Plant no Sitka spruce.

For site-specific situations, hazard may be determined from the number of annual degree days by calculation. (Reference: McMullen, L.H. 1976. Spruce weevil damage: ecological basis and hazard rating for Vancouver Island. Can. For. Serv., Info. Rept. BC-X-141, 7 p.)

Hazard zones for Sitka spruce weevil In the Vancouver Forest Region



Original Date:

Revised:

4.0 Guideline for *Abies* Species

Purpose of Guideline

The purpose of this guideline is:

1. To recognize the recent rapid extension of the Balsam Woolly Adelgid and the mortality occurring in infested stands on Weyerhaeuser forest lands.
2. To minimize future losses and avoid difficult reforestation problems if stands become infested in the next 10 to 20 years.
3. To correct areas stocked with off-site *Abies* spp.

The guideline:

- Revises the planting guideline for *Abies* species.
- States a guideline for the acceptance of *Abies* as natural regeneration.
- Requires the assessment of all stands that have significant balsam stocking on a periodic basis.
- To ensure adequate stocking with other species in stands of off-site *Abies* spp.

Guideline

1.0 Zones

The quarantine zone is defined as the area declared by the Provincial Government Regulation.

The transition zone is the area outside the quarantine zone to the boundaries of the area considered infested by Weyerhaeuser.

The area, considered infested by Weyerhaeuser on Vancouver Island, is south and south-east of the height of land between the Adam River and the White River and south of a line extending westerly to the head of Tahsis Inlet. On the Mainland, it is the quarantine zone which is south of an east-west line north of Vancouver Island, extending eastwards to the height of land of the Cascade Mountains.

2.0 Reforestation with *Abies* spp

All stands will have at least the minimum number of stems/ha stated in the Silviculture Prescription or Weyerhaeuser standards, as applicable, of a genus other than *Abies*. The minimum number of stems is generally 600 per hectare at the expiry of the regeneration delay and free growing periods. Exceptions require the approval in writing of a TFL Forester. See Section 5 of this guideline.

3.0 Planting of *Abies* species

- 3.1** No trees of *Abies* shall be planted outside the area considered to be infested unless they have been grown in a nursery that is at least 80 km from a known balsam adelgid infestation **or** the stock has been treated.

It is illegal under the Balsam Woolly Adelgid Regulations (1992) to move a living *Abies* spp tree from within the quarantine zone to an area in B.C. outside the quarantine zone.

- 3.2** *Abies amabilis* should not be planted in the Quarantine Zone and the Transition Zone, except with a TFL Forester's or Forest Practices written permission.
- 3.3** *Abies procera* may be planted in mixture with other species in the quarantine zone and the transition zone where it is suited because of its reported resistance to the Adelgid. There should be a minimum of 600 sph of conifers other than *Abies* spp on the area. All plantations with *Abies procera* should be monitored every five years for a 25-year period and the monitoring schedule entered into the forward planning schedule at the time of planting.
- 3.4** *Abies grandis*, because it is susceptible to adelgid attack, will only be planted in the quarantine and transition zones on the most favourable sites and where other conifer species will not grow well. There should be a minimum of 600 sph of conifers other than *Abies* spp on the area. All plantations with *Abies grandis* should be monitored every five years for a 25-year period and the monitoring schedule entered into the forward planning schedule at the time of planting.

4.0 Natural Regeneration of *Abies* species

- 4.1** *Abies lasiocarpa* is not acceptable as regeneration on Weyerhaeuser lands.
- 4.2** Off-site *Abies amabilis* in Stands at the Reforestation Stage.

All areas which are stocked with *Abies amabilis* which is off-site and where there are insufficient stems/ha of other species to meet compliance (post 1987 harvesting) must be brought to standard immediately with ecologically acceptable species other than *Abies* to meet the minimum requirements of regeneration delay or free growing as applicable.

Older regeneration (pre 1987) which is off-site and where there are less than 600 stems/ha of other ecologically acceptable conifer species shall be assessed on a priority basis and shall be brought to the minimum standard where practicable on a timely basis.

- 4.3** On Site *Abies amabilis* and *grandis* (per the Red Book)
- 4.31** Outside the Area Considered Infested

Accept natural regeneration but encourage mixed stands with the objective of having 600 stems/ha of other ecologically acceptable conifers.

4.32 In the Transition Zone

Assess stocked stands and add other species where practicable.

Manage AAR areas for other species to achieve at least the minimum stems /ha required under the SP/Weyerhaeuser Standards by the regeneration delay and free growing deadlines as applicable. Exceptions require the approval of a TFL Forester in writing.

4.33 In the Quarantine Zone

Abies amabilis is unacceptable on any current openings or areas which are still AAR at the date of this guideline.

Abies grandis is only acceptable on sites where it is clearly the best species and where other species are off-site or marginal, e.g. areas with high water tables.

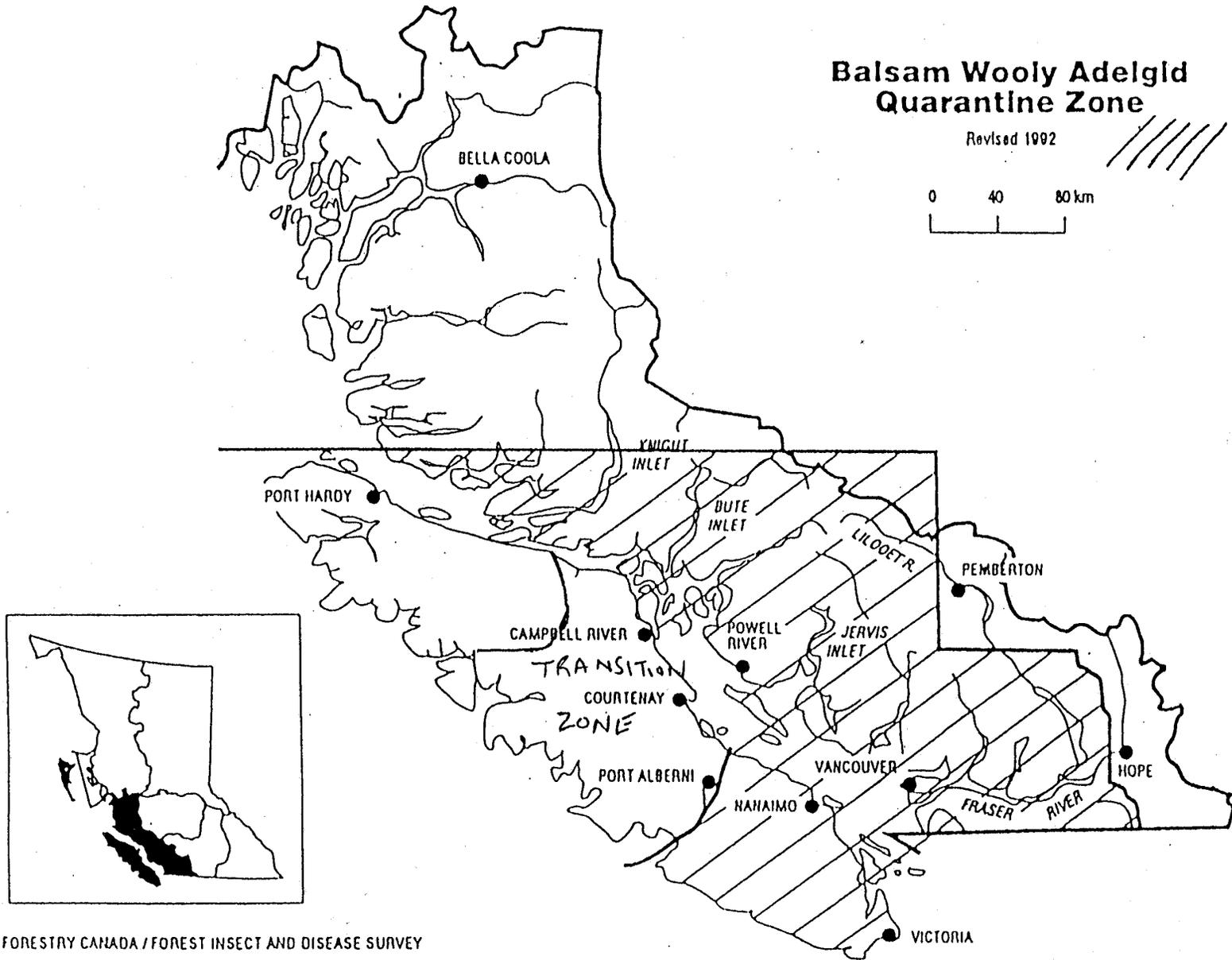
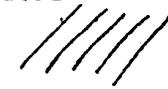
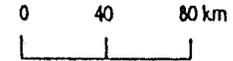
5.0. Exceptions

Exceptions to this guideline shall be approved in writing and may be granted by a TFL Forester but are only permitted under the following circumstances:

- There have been several unsuccessful attempts to reforest the area with ecologically acceptable species other than *Abies* **and**
- The area that is not stocked with the minimum number of sph of other ecologically acceptable species is a small area which is normally less than two hectares and in general is less than one hectare.

Balsam Woolly Adelgid Quarantine Zone

Revised 1992



FORESTRY CANADA / FOREST INSECT AND DISEASE SURVEY

5.0 Allowances for the Impacts of Forest Pests in Strategic Analyses

Losses caused by insects or disease are accounted for in strategic analysis (e.g. the Timber Supply Analysis). Current procedures include:

- The permanent sample plots (PSPs) used to develop and calibrate the yield model, Y-XENO have been measured for periods averaging at least 20 years and up to 60 years. Sampling in the late 1960s and early 1970s showed that *Heterobasidion annosa* was widespread among hemlock PSPs. More recently *Phellinus weirri* was found in 35% of 212 plots surveyed.
- The operational adjustment factor applied to second-growth yields includes an allowance of 2% for pest losses over and above those experienced within the PSPs (and hence considered expressed in the yield tables).
- Volume estimates are reduced for decay, waste and breakage.
- Harvest levels are reduced to account for unsalvaged losses due to fire, pests and windthrow. This factor is currently 1.0%.