



# Mountain Pine Beetle Seed Planning

TREE IMPROVEMENT BRANCH

BULLETIN 01  
NOVEMBER 2006

## Interior Lodgepole Pine Seed Inventory Analysis

An understanding of the interior lodgepole pine seed inventory (gaps and surpluses), its transferability, and flexibility are critical components of the provincial Mountain Pine Beetle strategy. This bulletin will focus on the current seed inventory and the seedling demand of natural stand interior lodgepole pine (Pli) as of August 10, 2006.<sup>1</sup>

### Key Messages

The current inventory of natural stand Pli seed represents approximately a 17-year supply. Two seed planning zones (TOA and CT) currently have under a 10-year supply and are the highest priorities to balance the sustainability of the Pli seed inventory. Future demand for Pli is uncertain, and a 20% and 40% increase by seed planning zone was simulated resulting in a reduction of the provincial supply to 14 and 12 years respectively. This provincial picture provides some broad guidelines on where gaps and surpluses exist, but it is critical that licensees, BCTS and others with reforestation obligations analyze their own seed inventories and needs.

### Analysis Assumptions

This bulletin focuses on the natural stand (B) seed inventory. The seed orchard component, its advantages and future production estimates, will be covered in a subsequent bulletin. This analysis used the interior natural stand seed planning zones (SPZ) to subdivide the inventory. Each seedlot may be used in one or more SPZ or "Areas of Use." The seedling inventory of seedlots with multiple SPZ (i.e., B+ seedlots) was divided equally among their applicable SPZ.

The current seed inventory is presented as potential seedlings, as this is more operationally relevant to most forestry professionals. The number of potential seedlings is based on the germination capacity (GC) of an individual seedlot,

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<sup>1</sup> Includes all Pi seed registered for interior seed planning zones (SM seed for Pli omitted) and any seedlots currently being processed or tested.





the number of seeds per gram, and the total seedlot weight. Additional information on this calculation can be found in the Tree Improvement Branch Update Extension Note, Vol. 5 #2, *2001 BCMoF Sowing Guidelines* (<http://www.for.gov.bc.ca/hti/publications/notes/notes.htm>). The current analysis does not incorporate the new 2007 Pli Sowing Guidelines that were introduced in late August, 2006. More information can be found at [http://www.for.gov.bc.ca/hti/spar/2007\\_sowing\\_guidelines.htm](http://www.for.gov.bc.ca/hti/spar/2007_sowing_guidelines.htm).

Seedlots that are currently in germination testing or processing<sup>2</sup> had their potential seedling totals estimated by multiplying kilograms of seed by 155, or hectolitres of cones by 41.9 to obtain thousands of potential seedlings.

Total seedling demand (orchard and natural stand) for Pli reached a total of 134 million seedlings in 2006 and has been increasing at a rate of 11 million seedlings over the past three years (2004–2006). The three-year average of natural stand planting was 110 million seedlings and represents the total demand used in this analysis. The current natural stand inventory was divided by the average natural stand demand to arrive at provincial and SPZ estimates of years supply of Pli seed. This constitutes a provincial average. To look at how sensitive the inventory is to an uncertain demand, a 20% and 40% increase in demand was forecast for each SPZ. The years supply of seed for the three scenarios is presented in Table 1 and Figure 1.

### **Analysis Results**

The current Pli seed inventory is equivalent to 1.85 billion seedlings. It is composed of 98.5% (88.9% B and 9.6% B+) natural stand seed and 1.5% seed orchard seed.

The inventory is highly dynamic with large volumes of Pli being contributed recently. Since January 1, 2006 a total of 332 million potential seedlings have been added to the Pli inventory increasing the total by 18%. A provincial summary is important at a higher strategic level, but seed owners are encouraged to perform a specific analysis on their own inventory to identify gaps and possibly surpluses in their inventories.

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<sup>2</sup> Thank you to Linda and Peter Hellenius (Silva Enterprises Ltd.) for contributing their current processing volumes to this analysis.

**Table 1.** The natural stand seedling demand and inventory (millions of potential seedlings) and years supply of lodgepole pine seed.

SPZ <sup>a</sup>	B – Inventory	2004–2006 B – Demand	Years Supply	+20% Demand Years Supply	+40% Demand Years Supply
BB	57.665	4.400	13.1	10.9	9.4
BLK	149.309	8.745	19.6	16.3	14.0
BSH	7.755	0.252	30.7	25.6	22.0
CHL	115.898	9.418	13.0	10.9	9.3
CP	144.177	8.578	16.8	14.0	12.0
CT	69.505	7.670	9.6	8.0	6.8
DK	19.389	0.015	1321.9	1101.6	944.2
EK	61.605	4.386	14.0	11.7	10.0
FIN	72.340	5.104	14.2	11.8	10.1
FN	14.947	0.010	1446.5	1205.4	1033.2
HH	65.309	5.144	12.7	10.6	9.1
MGR	90.882	4.488	21.7	18.1	15.5
MIC	5.167	0.008	674.0	561.6	481.4
MRB	37.664	0.151	276.2	230.2	197.3
NCH	445.694	22.746	21.7	18.0	15.5
NST	57.678	0.056	1035.5	862.9	739.7
QL	52.711	0.811	70.1	58.4	50.1
SA	57.462	3.581	16.0	13.4	11.5
TOA	73.132	15.020	4.9	4.1	3.5
TOD	83.320	6.430	13.0	10.8	9.3
WK	72.258	2.587	27.9	23.3	20.0
<b>TOTAL</b>	<b>1848.494</b>	<b>109.6</b>	<b>16.9</b>	<b>14.1</b>	<b>12.0</b>

a BB = Big Bar; BLK = Bulkley; BSH = Bush; CHL = Chilcotin; CP = Central Plateau; CT = Cariboo Transition; DK = Dease Klappan; EK = East Kootenay; FIN = Finlay; FN = Fort Nelson; HH = Hudson Hope; MGR = McGregor; MIC = Mica; MRB = Mt. Robson; NCH = Nechako; NST = Nass Skeena Transition; QL = Quesnel; SA = Shuswap Adams; TOA = Thompson Okanagan Arid; TOD = Thompson Okanagan Dry; WK = West Kootenay.

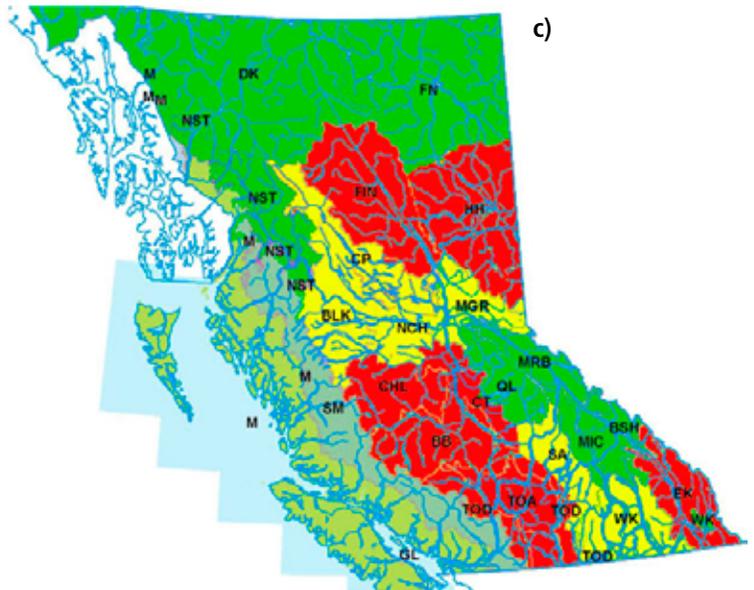
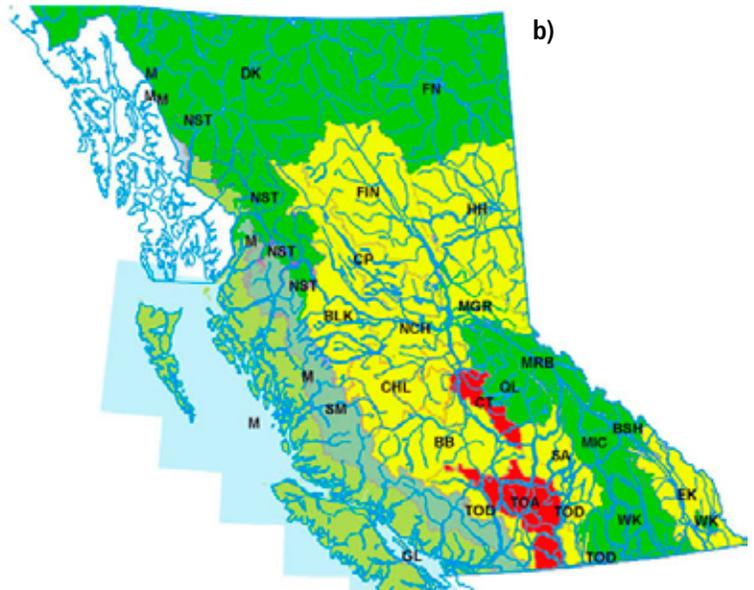
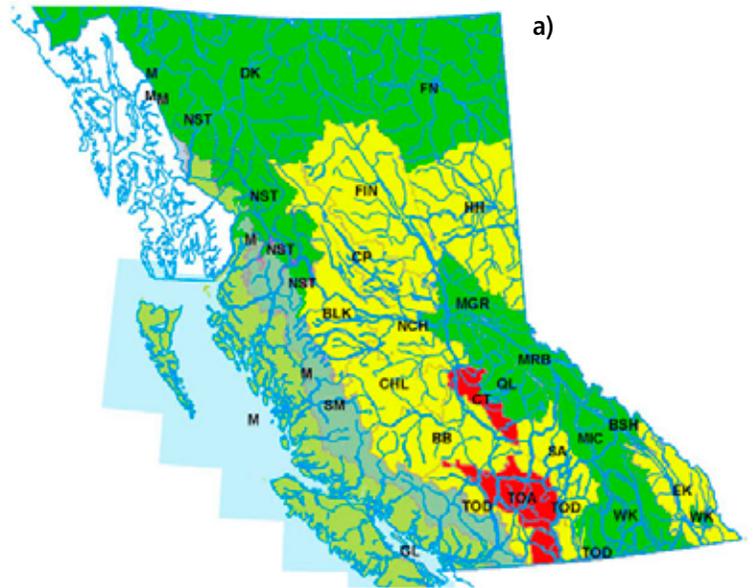




**Figure 1.** The sensitivity of years of lodgepole pine seed supply by natural stand seed planning zone presented based on:

- a) average seedlings requested 2004–2006,
- b) a 20% increase on average seedlings requested 2004–2006, and
- c) a 40% increase of average seedlings requested 2004–2006.

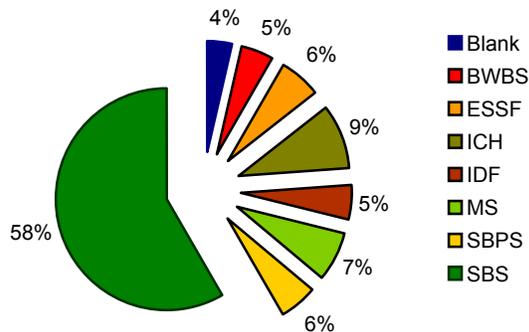
Green indicates >20-year supply; yellow indicates between a 10- and 20-year supply; and red indicates less than a 10-year supply.



## Discussion

On a provincial scale, the current inventory of natural stand Pli seed represents approximately a 17-year supply in relation to natural stand reforestation between 2004 and 2006. Two seed planning zones (TOA and CT) currently have under a 10- year supply and are considered the highest priorities to improve the balance and sustainability of the Pli inventory. For TOA, a total of 21 million seedlings has been added to the inventory in 2006, bringing the years supply up to 4.9 from 3.5. The 2006 CT inventory has increased only through large superior provenance collections, primarily from the Oie Lake source.

For some SPZ, there is a large excess of seed (i.e., DK, FN, MIC, MRB, and NST) based on current planting trends. Opportunities exist to use this seed in other seed planning zones **IF** the seedlot meets the basic elevation, latitude and longitude transfer limits **AND** if the seed is used within the same biogeoclimatic zone as its origin. The distribution of seed across the biogeoclimatic zones is not uniform and the breakdown is illustrated in Figure 2. The majority of seed is from the Sub-Boreal Spruce zone (58%) and the remaining zones have between 5 and 9% of the inventory. Choosing seed from SPZ or biogeoclimatic zones with excess seed on the seedlot selection screen in SPAR<sup>3</sup> will allow seed from scarcer SPZ to be extended further where there is greater demand. Seed planning should involve an assessment of gaps, but also surpluses in order to improve overall seed-use efficiency.



**Figure 2.** The breakdown of the natural stand lodgepole pine seed inventory by biogeoclimatic zone. Blank = no zone designated; BWBS = Boreal White and Black Spruce; ESSF = Engelmann Spruce–Subalpine Fir; ICH = Interior Cedar–Hemlock; IDF = Interior Douglas-fir; MS = Montane Spruce; SBPS = Sub Boreal Pine–Spruce; SBS = Sub-Boreal Spruce.

<sup>3</sup> Seed Planning and Registry Information System.



Table 1 and Figure 1 illustrate the sensitivity of our Pli inventory to a growing, but uncertain demand. Factors such as the increased use of natural regeneration, selection of alternate species, stocking levels, wildfires, climate change, and further AAC increases make predicting seedling demand difficult. With a 20% increase in demand there are fewer years supply of seed available (14 years vs. 17 years), but no additional SPZ had less than a 10-year supply. Increasing the demand by 40% reduces the provincial supply to 12 years, but also brings the BB, CHL, EK, FIN, HH, and TOD to below a 10-year supply of Pli seed. A 20% increase in demand appears to have little impact on the inventory, but at a 40% increase in demand a large proportion of the SPZ have less than a 10-year supply of seed.

The analysis is based solely on natural stand seed planning zones and natural stand seedlings requested. This accounts for about 90% of the Pli seedlings requested between 2004 and 2006 and will decrease as seed orchard production increases. Due to the relatively minor current annual contribution of orchard seed and the small amount in inventory an analysis based solely on natural stand seed provides a good general overview of Pli gaps and surpluses for the province. Incorporation of orchard seed is complicated because different SPZ and overlap SPZ exist for interior orchard seed. The further breakdown by SPZ and elevation band (Seed Planning Unit) results in even more complicated analysis. The intent here is to provide a simple, timely and accurate description of our Pli seed inventory.

An additional and significant complication in this analysis is that it does not differentiate between seed that is held 'Reserved' for the sole use of the owner and seed that is 'Surplus' and available for sale. Currently about 92% of the natural stand Pli seed is maintained as Reserved on SPAR. This indicates that there is a fairly small probability of finding seed for your planting site for sale. There is no simple solution to this at the provincial level, but as owners review their inventories, it is an important consideration, especially if you have seed reserved that you do not anticipate using.

The provincial scope provides some broad guidelines on where gaps and surpluses exist, but it is critical that companies scrutinize their own inventories. A specific analysis allows for greater precision as fewer assumptions are involved and specific demand figures can be used to generate years supply of seed. One example is the use of superior provenance seed – in this analysis the seedlings have been divided equally among all applicable SPZ, but if you know that all of the seed is intended for one SPZ, then this provides a much more realistic assessment. Seed planning can be complex and is often specific to the licensees, species, harvest levels and challenges being faced. There is no template for planning, but some of the basic considerations are outlined in a Seed Planning presentation provided for the Chief Forester's Standards for seed use training; visit [http://www.for.gov.bc.ca/code/cfstandards/InstructionalMaterials/05CFS\\_Seed\\_Planning.pdf](http://www.for.gov.bc.ca/code/cfstandards/InstructionalMaterials/05CFS_Seed_Planning.pdf).

*For more information, please contact:*

**Dave Kolotelo**

Dave.Kolotelo@gov.bc.ca  
(604) 541-1683 ext 228