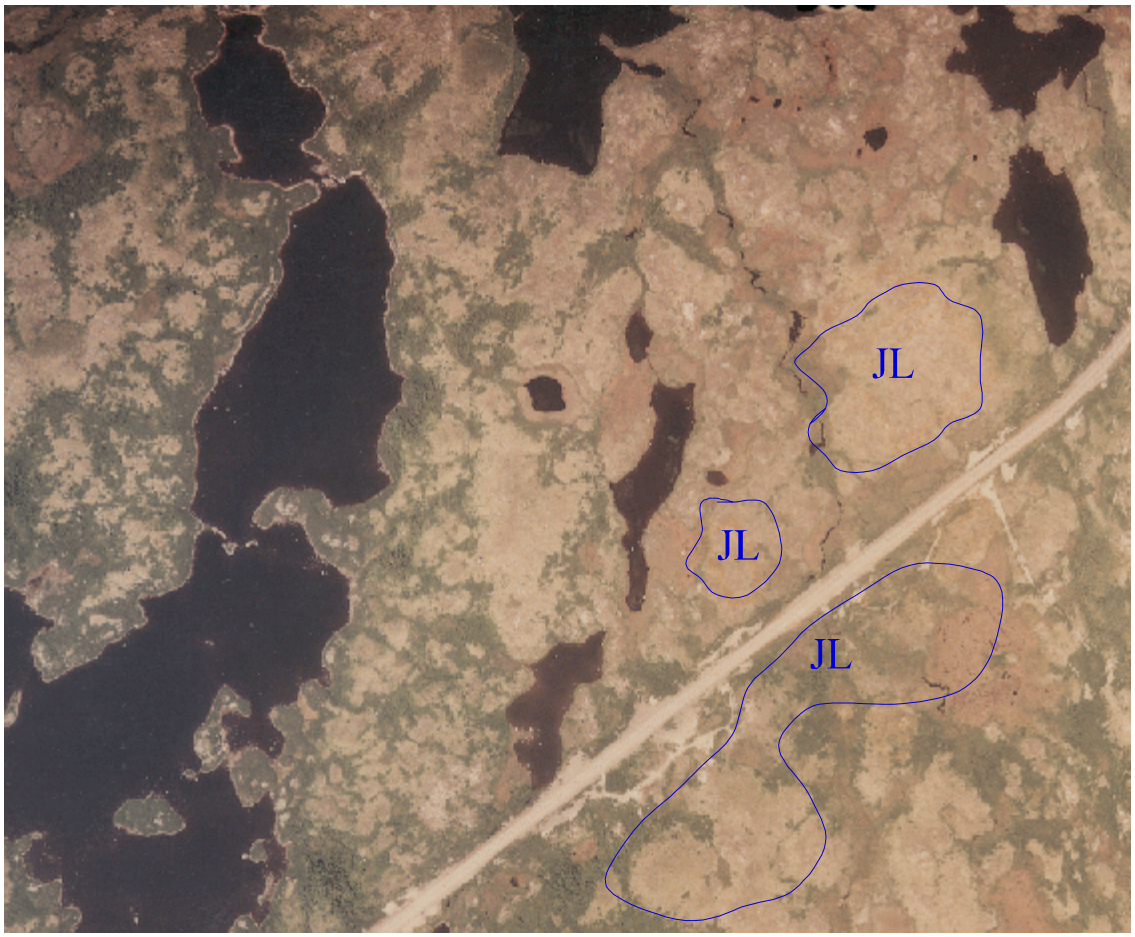
FIVE MILE POND

This Japanese larch plantation is on both sides of the Trans-Canada Highway about a kilometre east of the Witless Bay line intersection. It is an exceptionally exposed site. And, although once carried tree cover, like most of the eastern barrens, the forest would not have been very productive and has been burned off repeatedly by wild fires. The barrens are extremely valuable for recreation, notably fishing, bird hunting (notably partridges) and berry-picking.

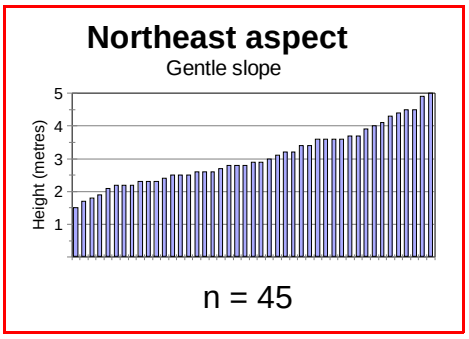


The site was scarified in the 1970's and planted in 1984 as a mixture of Japanese larch and five other species. Survival is patchy because only the Japanese larch survived. Part of the problem is that larch often flushes in April during periods of warm sunny weather only to have the young shoots killed by frost and freezing rain. However, it appears that most of the mortality is due to frost-heaving as a result of the surface being exposed by strong, persistent wind in very cold weather and by mild, rainy weather in midwinter, both of which remove the protective snow cover.

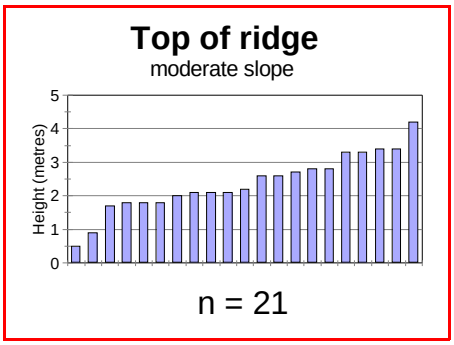
Part of a 15 year-old Japanese larch plantation beside the Trans-Canada Highway, near the Witless Bay Line intersection. The average height is 2.8 m and top height over 5 m. Crown deformation clearly indicates a persistent southwest wind during the growing season.

The harshness of this particular part of the Holyrood barrens is evident in this westward view from the Japanese larch plantation (foreground). The rills on the hillocks (top left) is scarification done in the 1970's - which are still treeless. The only natural forest regeneration is on the relatively more sheltered east-facing slopes and in the valley (top right).

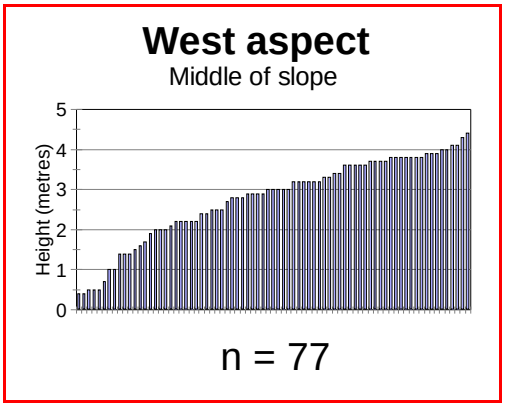
The heights of Japanese larch were measured along seven transects through the plantation with the same orientation as the axes of ridges. The following charts summarize the results of these measurements for each transect.



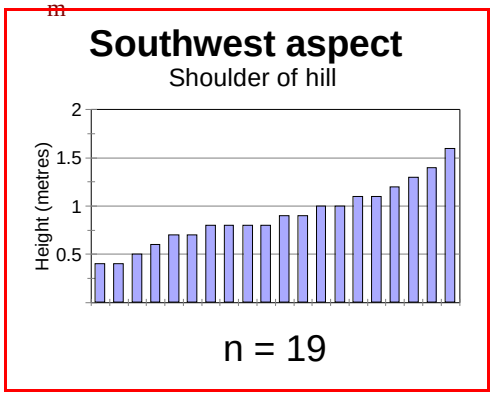
1. Av. ht 3.1 m; range 1.5 - 5 m, Std 0.9 m



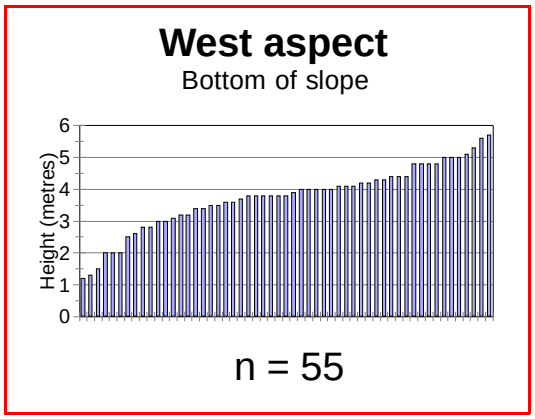
2. Av. ht. 2.3 m; range 0.5 - 4.2 m; Std .0.8 m



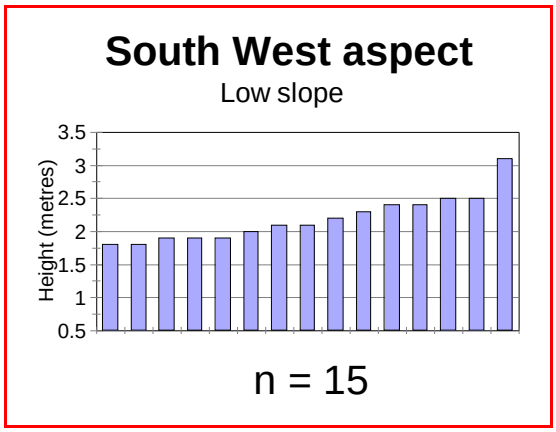
3. Av. ht. 2.8 m; range 0.4 - 4.4 m; Std 1 m.



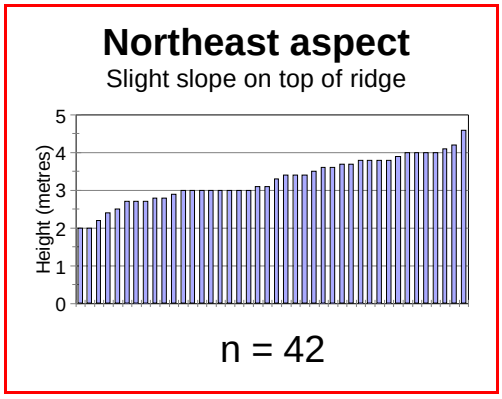
4. Av. ht. 0.9 m; range 0.4 - 1.6 m; Std 0.3 m



5. Av. ht. 3.7 m; range 1.2 - 5.7 m; Std 1.0 m



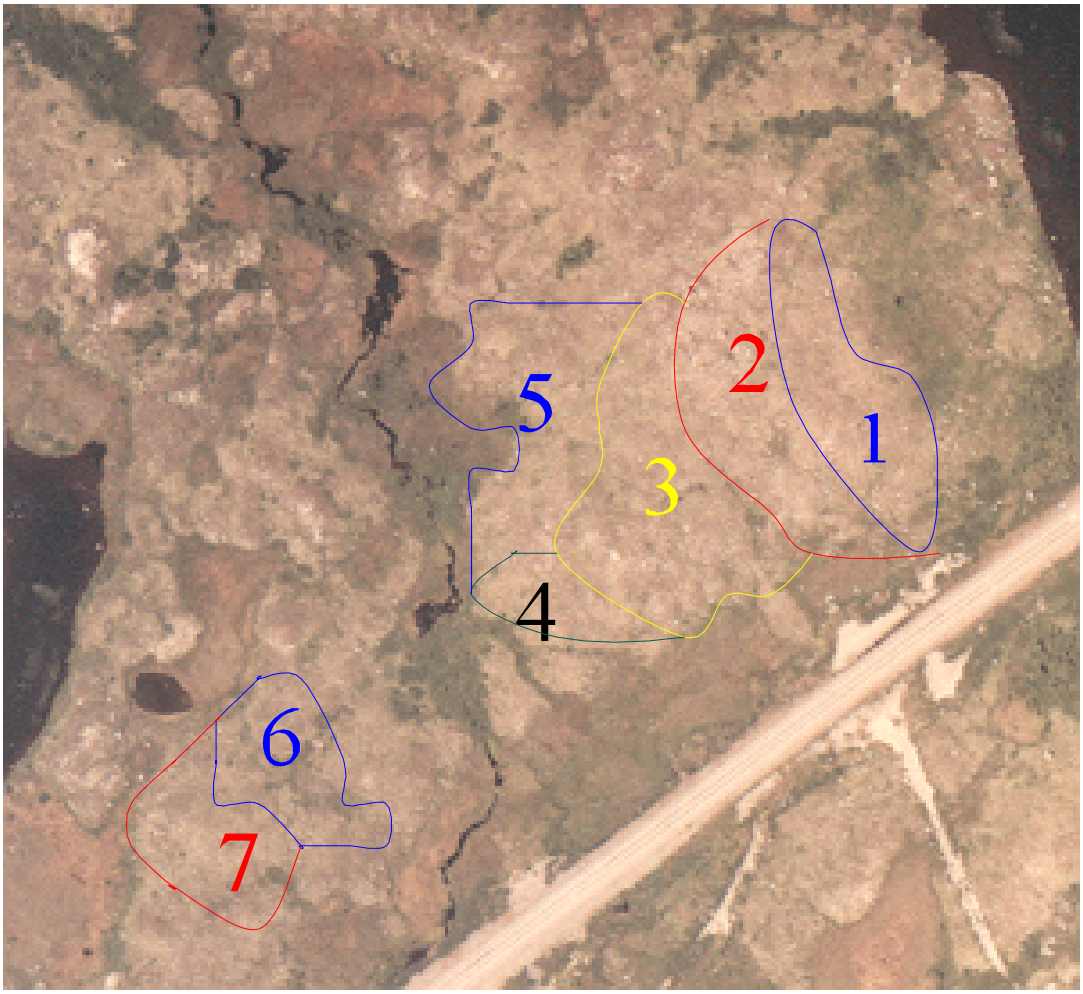
6. Av. ht. 2.2 m; range 1.8 - 3.1 m; Std 0.3 m



7. Av. ht. 3.3 m; range 2.0 - 4.6 m; Std 0.6 m.

Heights of Japanese larch east of Five Mile Pond near the Witless Bay Line intersection on the Trans-Canada Highway. Approximately 60% sample along seven transects, measured in August 1999 (see aerial photo for locations of transects).

Because of the topography, not all transects were the same length - tops of ridges are much shorter than the broad, curving slopes. But there were some obvious differences in the heights of the larch with respect to aspect and position on slopes. For example, the tallest trees are found in zones 1 & 6; i.e., on a slope with a northeast aspects and in zone 3 at the bottom of a slope with a west aspect. These zones also have the best survival.



Growth and survival in zone 3 on mid-slope with a west aspect is almost as good as zones 1 & 6. And a little less again in zones 2 & 7, near the crest of ridges also with a west aspect.

The poorest growth and lowest survival is zone 4 and to some extent in zone 7, both of which are on a shoulder with a southwest aspect.

The crowns of trees on upper slopes with a west aspect are a little more windswept than elsewhere. This tends to support the theory of up-slope wind converging with lateral wind at a higher level; i.e., airflow is compressed towards the ridge. The consequence of this phenomenon in summer is a drying effect resulting from a combination of warmer, stronger winds and higher solar radiation on west-facing slopes. Of course, this does not necessarily mean the site is prone to drought conditions (an extremely rare event on these barrens). Rather, it is a case of too much wind shutting down the stomata, despite the abundance of solar radiation. It has the

same effect as too much wind during cool, cloudy days.

In winter, again because of the stronger wind and higher solar radiation receipts, west slopes have a longer asper (snow-free) season than more sheltered sites. Of course, without snow cover in winter, this means that there is much a higher risk of soil erosion by runoff and soil frost - hence lower survival rates. It is a surprise to many that the barrens on the Avalon in general, have a milder climate than central Newfoundland (which has a semi-continental climate). The problem with the milder winter climate on exposed barrens is the cycle of freeze-thaw of the soil which causes considerable mortality in the fine-root mass of young trees.

Another problem on slopes with a west aspect is the high percentage of scarified patches which are completely devoid of vegetation and which have enlarged. Presumably this is due to the combination of wind, water and frost heaving. Often one finds a Japanese larch surviving on the edge of the patches. Some of them are only 20-70 cm tall but healthy-looking. At first sight these could easily be mistaken for naturally regenerated seedlings. What keeps them alive is that they produced long straggly, tap roots, instead of a normal symmetrical root plate with a mass of fine roots.

Given the average height of 2.83 m for the 15-year-old plantation as a whole, it is obvious that forest cover can be restored on these barrens. Of course, there are no plans for large-scale plantations on the Holyrood barrens. In any case, they should be given low priority given that there are many more potentially better sites for plantation forestry at lower elevations. Nevertheless, this plantation has provided valuable data on the variability of growth with respect to the relationship between aspect and exposure. Generally, the main axes of ridges are oriented southwest to northeast. If we could take the wind out of the equation, we would find that the weather is ideal for growing trees and they would grow wonderfully on the barrens