



# High Yield Forestry– A New Look at Exotic and Hybrid Larch

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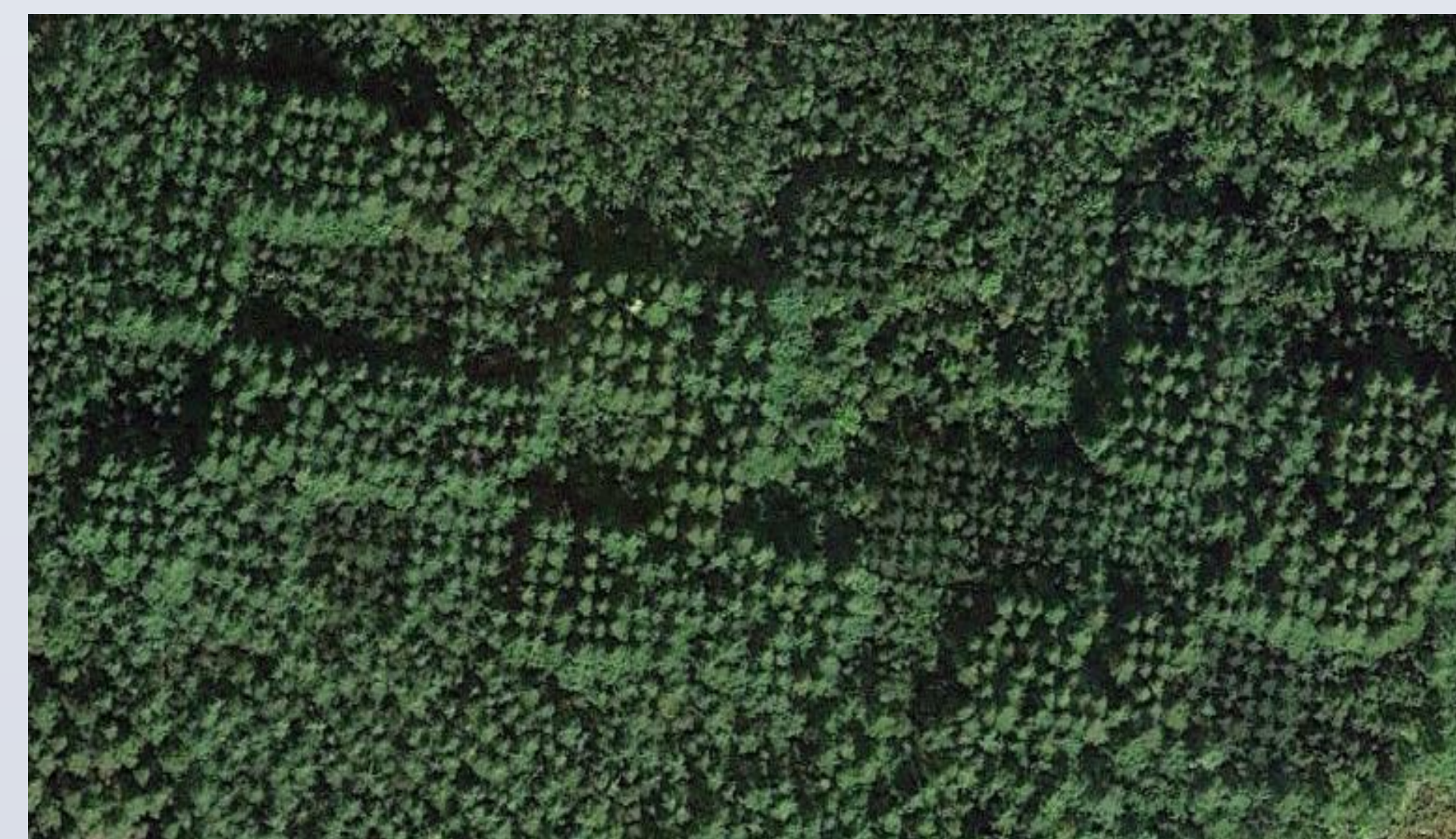
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## ABSTRACT

Around the Northeast over the years, exotic and hybrid larches (*Larix eurolepis* Henry) have been planted by a variety of agencies and landowners. This poster is based on rough yield estimates, still being refined, with data from regional field experiments. Early growth results for Maine plantings have been previously reported, with growth rates of one cord/a/yr and more. Additional examples, usually confined to individuals, small patches, or limited provenance trials have displayed similar height growth. Average diameters as much as 10" were measured at Chase Stream, ME, yielding sawlog size trees at age 27yr. A full statistical analysis comparing a large suite of hybrids and seed sources is in progress. Economic analysis shows financial returns at least as favorable as other species being planted regionally. Analyses suited to a range of investor situations are presented in a separate working paper. More complete yield models, and comparisons with commonly planted red pine and white spruce are in preparation. Concerns for damaging agents and invasiveness are discussed. The widely held perception that "there is no market for larch" is incorrect.

## OBJECTIVES

To use re-measurements of existing stands and provenance trials in ME to examine the economics of growing larches under current conditions. It has long been observed that larches, both exotic and hybrid, perform extraordinarily well in height and diameter growth. Yet little formal documentation on the performance of planted larches in ME exists. This poster reports summary of 27 year-old data from a species comparison trial conducted at Chase Stream, ME.



Google Earth 2013 aerial imagery of Chase Stream species comparison trial. While planting in Maine is not extensive, a cumulative area of 85,000 acres was planted between 2000 & 2012.



Comparison between black spruce plot on left and hybrid larch plot on right at age 27 at Chase Stream, ME.

## MATERIALS and METHODS

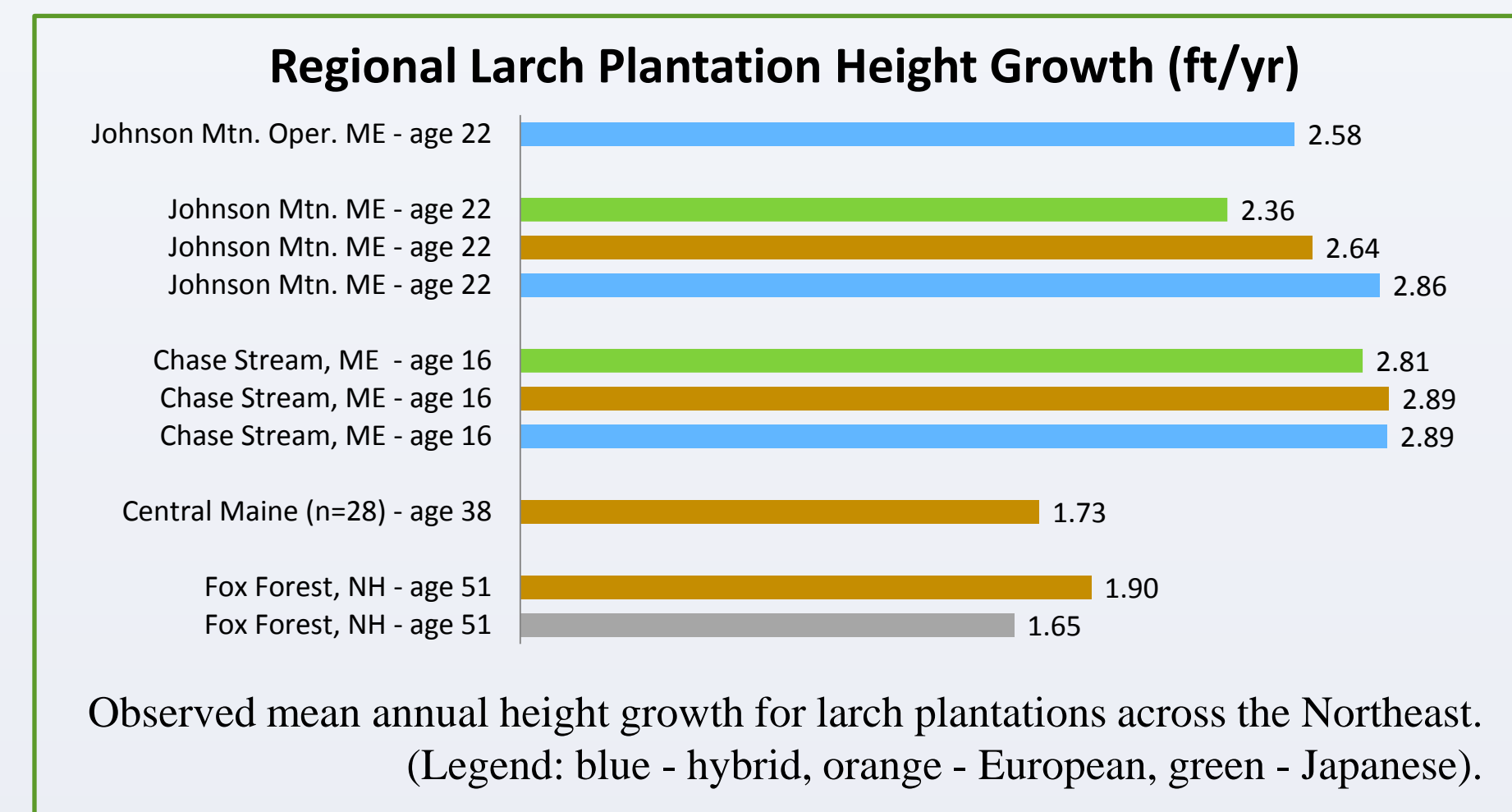
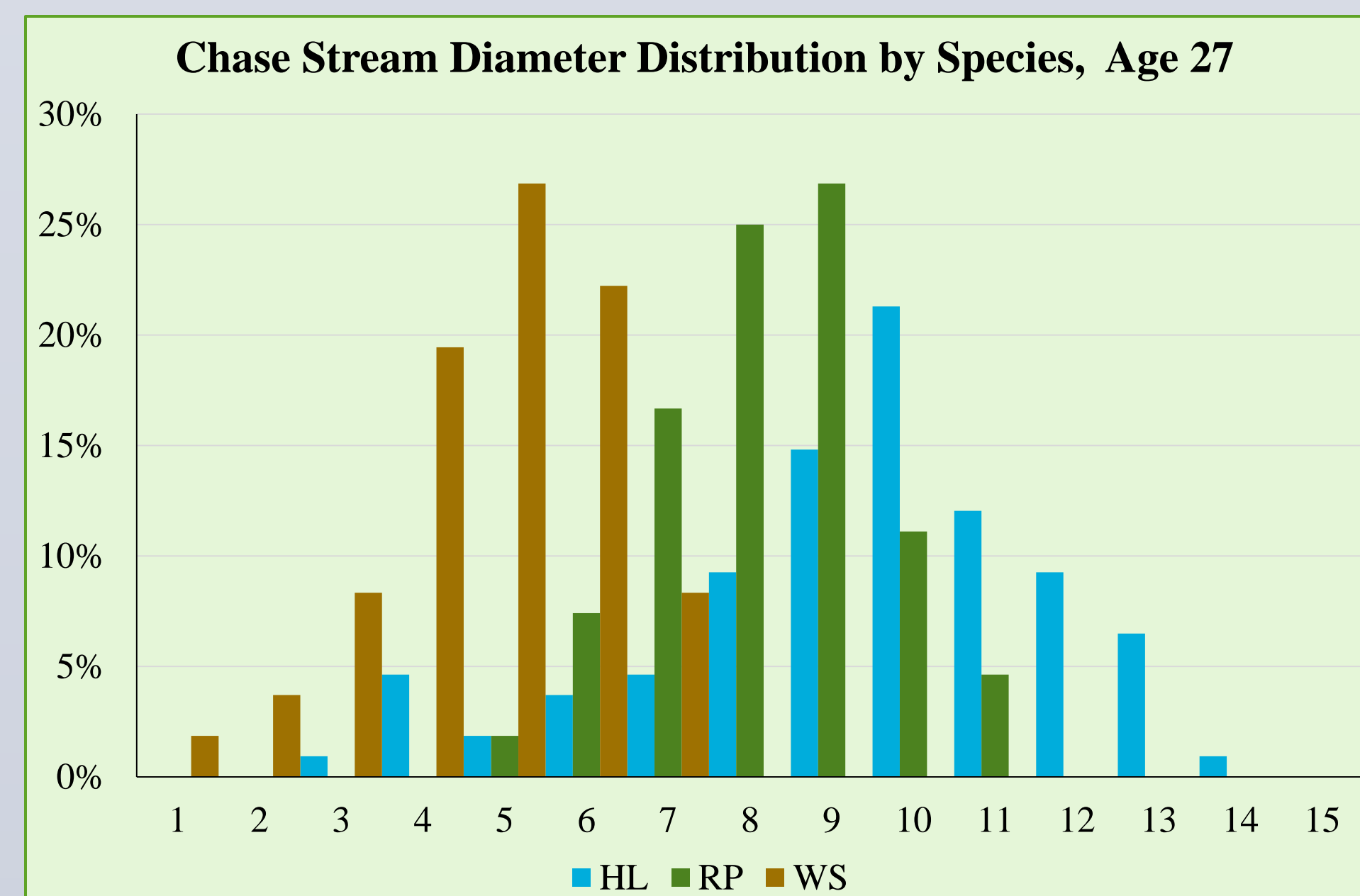
The data was derived from a single trial as part of a larger study designed to evaluate yields of various planted species on different soil types. The trial was established in 1988 by Carl Haag on Scott Paper Company land in central Maine. The Chase Stream data was selected for analysis because the trial was established on a typical moderate to well-drained forest soil in central Maine, with age 27 year data. The trial consists of 3 replicates of 16 tree plots planted on an 9' by 9' spacing, surrounded by a single tree buffer row. There were four European, two Japanese, and two native eastern larch provenances as well as a single source of hybrid larch (JxE) from an open-pollinated seed orchard in Germany. Red and Jack pine, black and white spruce came from nursery run stock of known sources.

Diameter (dbh) and total height data was collected at age 5, 10,16 and 27 years after establishment. Individual gross tree volumes were calculated at age 10, 16 and 27 using taper equations published by Li *et al.* (2012). Total volume was calculated without any limiting top diameter. Merchantable volumes were calculated based on diameters and heights at age 16. Total merchantable volume was calculated to a 3" (7.6 cm) top diameter and total sawlog merchantable volume was calculated to 8" (20.3 cm) top diameter.

Economic analysis was performed using conservative yield assumptions and price assumptions. Three different owner scenarios were analyzed: (a) small forest owner who plans to own the land anyway but is interested in planting (simple timber-only NPV); (b) investor seeking returns from buying land, planting trees, and selling out at the rotation age (Klemperer); (c) a timber growing company interested in the long-term (NPV and SEV). Conservative price assumptions were employed, with no escalation in real values.



Drs. Robert Weir and Michael Greenwood in a 27 year-old hybrid larch plantation near Fairfield, ME.



## RESULTS and ECONOMIC ANALYSIS

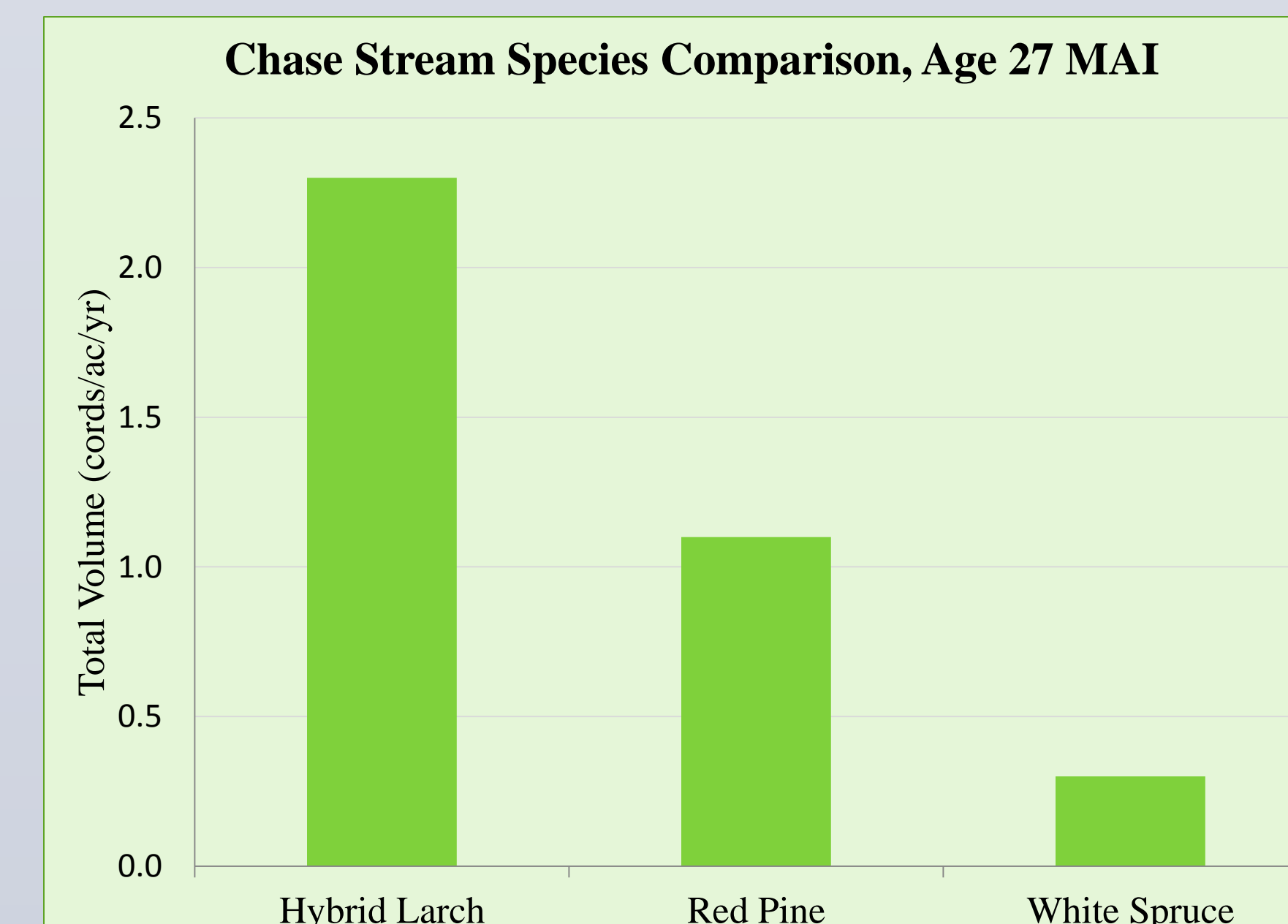
Re-measurement data show that larch growth performance is very strong. Since we cannot foresee markets and prices, we adopt the following utilization/price assumptions, using them with no future escalation. We assume establishment costs of \$255/acre, and a release spray at age 6 for \$185/A. Larches offer a high merchantable yield at age 27 and an economic analysis was completed for that age.

### \*Price assumptions:

- Maine stumpage values averages 2008-2013. (MFS)
- Larch logs will sell at same price as white pine (higher than spruce)
- Larch pulp will sell at same price as white pine also (lower than spruce)
- High weighted price for larch due to high log percent.

A companion working paper supplies details of the assumptions and analysis. For a timber growing landowner, who is already planting, the only question is whether to plant larch or some other species. We do not believe a comparison at age 27 is sound, as the red pine and white spruce plots have major growth still ahead of them. Simulations are planned. But the yield differences reported here would be compelling to most landowners.

For a long-term timberland owner who is already planting, or a small landowner who plans to continue to own the land regardless, annual expenses and taxes can be ignored. Here we present timber only NPV's for a single rotation. Analysis on this basis shows positive NPV's at 3% and 5% discount rates. The Soil Expectation Value analysis produces the same result. We assume that recently cut land suited to planting could be purchased at \$200/acre. If so, an investor would only make this purchase and planting investment if using a 3% discount rate, or 5% for European and hybrids. This reflects the fact that forest land cannot be purchased in Maine at prices reflecting its productivity for timber.



## Soil Expectation Values for Larches at Chase Stream, ME\* (Faustmann - USD)

Discount Rate	Japanese	European	Hybrid (JxE)
3.0 %	\$703	\$963	\$1,208
5.0 %	\$77	\$193	\$303
7.0 %	\$(154)	\$(93)	\$(35)

\*Assume annual management costs plus taxes at \$6.50/a/yr.

## CONCLUSIONS

- Data on re-measured stands shows that larch growth rates are very high.
- Statistical analysis of the Johnson mt. test shows that hybrid means for ht. are significantly greater than J or E parental means.
- Hybrid larch height growth is consistently and statistically greater than that of either of their Japanese and European parents.
- Volume yields are high, with large proportions of wood meeting minimum sawlog sizes at age 16.
- Return on investment on an incremental basis is attractive.
- Timber growing landowners as well as woodlot owners would find returns attractive.

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