

Larch Virtual Experiment Station Res. Note No. 4

Revised version June 1, 2016

Larch stand at Williamsburg Maine – Piscataquis County Demonstration Forest

Lloyd C. Irland, Brian Roth, and Gordon Moore

Key Points:

This small patch, age 51 when measured in early 2016, grew at 630 bd ft/acre/yr as measured from plots. We were able to measure it just before it was cut in winter 2016.

Based on log scale, growth was much higher. We continue to explore reasons for the difference.

Log Quality was rated very high by the sawmill, but band saw wear and handling issues were concerns. They recommend sawing larch only in winter. Products were air dried decking and bridge timbers, sold green. (see photos)

Log prices were at hemlock rates, much lower than is usual in other areas. High volume growth rates offset low stumpage rates.

Introduction

In 1964, a patch of larch was planted at this location by US Forest Service personnel. The larch was mixed with several other species which were not measured on this visit. As the wood was scheduled for harvest, we decided to measure it to determine its performance over its 51 year life. This was done by LCI and BR on Jan. 16, 2016, accompanied by Gordon Moore. The patch occupies roughly 1.3 acres. The latitude and longitude of the stand is: 45.373,-69.086). This note reports measurements taken prior to harvest of the stand in Feb. 2016 as well as log scale data and manufacturing experience.

The Demonstration Forest in Williamsburg Twp., Maine was purchased from the Larson and Decker families by the US Government during the Great Depression as part of the New Deal Resettlement Act. The properties were managed by the White Mountain National Forest, USDA until 1980. Ownership was then transferred to the Piscataquis County Soil and Water Conservation District. Management under the WMNF was limited to plantings on this property and another property in Williamsburg Twp. around the early 1960's; no harvesting or tending operations were conducted. From discussions with former staff of the WMNF it was estimated that the larch plantings on these lots were initiated about 1962. These were "end of the bucket" plantations associated with the plantings on the Massabesic Forest in Alfred including Japanese Larch, Red Pine, White Pine, Scotch Pine, Norway Spruce and White Spruce.

The PCSWCD thinned the Larch plantation at some time between 1986 and 1988. A number of harvests were conducted on the site during that time however few records remain of the harvesting or tending which was conducted. Harvesting at that time was associated with International Paper Co's. Landowner Assistance Program and the thinnings may have been sold for pulpwood at that time.



Management was re-instituted on the site in 2000 and an inventory was conducted on these sites. The plantations were not segregated but sampled as a five acre stand with three sample plots being measured with a 10 BAF. Estimates at that time indicated that the stand contained 10 cords per acre of pulpwood Larch and 3626 BF of saw-logs per acre. This would be roughly 17.2 cords per acre. The entire stand which included all of the species mentioned above as well as volunteer hardwoods contained 34 cords/ acre and 10398 BF or saw-log with a Basal Area of 150 sq. ft./ ac. Thinning was conducted on the Red Pine in the plantation at that time with another thinning of merchantable Red Pine being conducted in 2014.

A group harvest was completed in the Larch planting in February 2016.

Measurement:

An english 10- factor prism was used on two plots with random starts. Measurements were taken with a d-tape (one of the trees exceeded the 23" maximum on the tape). Several of the trees were so large that the technician's arms would not reach fully around the tree with the d-tape. A hypsometer was used to measure total height and height to live crown. Volumes were calculated by Dave Maass and Ken Laustsen.

The plots had BA of 170 and 150. Average BA of both plots was 160.

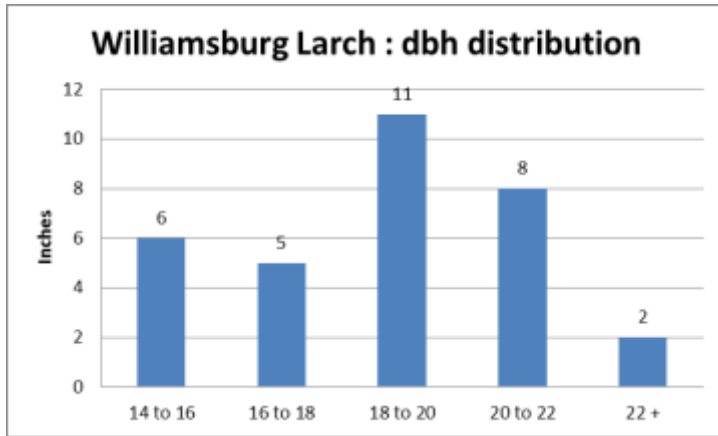
The corresponding QMD's were 16.4 and 17.7 inches.

Descriptive Stats:		diam	Ht	Ht to live crown	LCR
Max		23.3	122	62	67%
Min		12.5	88	34	43%
mean		14.1	98.5	52	47%
std dev		2.54	7.02	6.80	0.06
Averages 51 yr		0.28	1.93		
based on means					

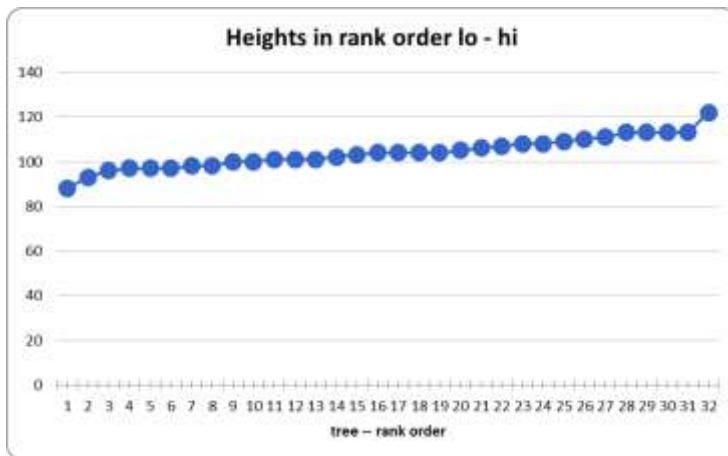
Measurements were taken on a sample of log diameters for taper estimation. The data sheet is attached.

Tree Data

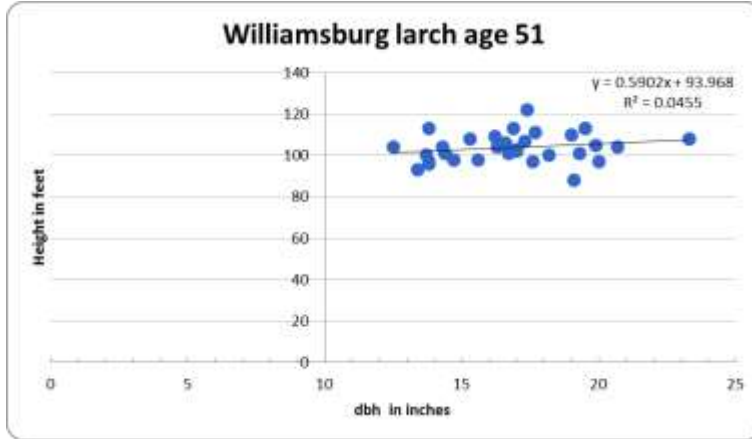
Average tree diameter was 14.1, QMD of the full sample was 17.0. One third of the sample trees fell in the range 18 to 20". Trees per acre averaged across both plots was 110. The tree data sheet is attached to this note.



Twenty of the trees had live crown ratios of 50% or higher, presumably due to their rapid height growth keeping them well ahead of competition, plus possible effects of the thinning. It appears that the height growth has been slowing for a while given the rounded tops (may be reaching their maximum for this site). This would explain why the ht:dbh relationship is so flat, with 18 of the 32 sample trees between 98 and 108 feet in total height. This could also reflect an effect of the previous light thinning.



Height growth averaged 1.92 ft/yr, ranging from 1.7 to 2.4 at the extremes; 23 out of 32 measured trees grew at 2 feet per year or more.



Annual Growth

Annual growth over the life of this patch was 1.7 cords/A. In sawtimber size wood above 9", to a 5" top, growth was 630 bd ft/A. These rates compare very favorably with other conifer species that are widely planted in the region. The grade in these trees was fairly good, compared to other unmanaged larch stands we have seen, since smaller and lower quality trees had been removed in an earlier thinning.

For tonnage, the MAI was 3.4 green tons per acre, or the equivalent of 3.4 tonnes of Carbon dioxide annually.

These results do not indicate potential under active management, as yields from the thinning are not included and the stand has clearly been held past its economic rotation, perhaps by several decades.

Volumes at age 51 and MAI's

AVERAGE of 2 Points		MAI's
BA/ac (ft ²)=	160	
Tree/Ac =	110	
Total Vol/Ac (Green Tons)=	172.7	3.4
Merch Vol/AC (CF)=	7320	143.5
Merch Vol/Ac (cords)=	86.1	1.7
Merch Vol/AC (MBF)=	32.1	0.630

The logs harvested were sold to a sawmill, Parker Lumber in nearby Bradford, as noted above, and paid for at hemlock log prices. We know that in New York state, stumpage prices comparable to white pine are regularly paid for exotic larches. This shows that the high growth rates can overcome low stumpage prices. And this MAI estimate omits whatever income was realized in the late 80's commercial harvest.

Utilization:

Sawlog scale slips showed a total scale volumes as follows
(International rule) :

Scaled as Logs (net)	53,680 bd ft
Not yet sold, studwood	5,000 "
Total	58,680
Log scale per acre /yr	885 bd ft for est. 1.3 acres
Standing Volume	
from our plot estimate	32,146 bd ft
(this would be gross scale)	

We are uncertain if this suggests an underestimate in our volume equations; slightly different assumptions were used in calculations from the plot data. The per acre estimate could be rough because of uncertain area of this patch, which did not have clean boundaries where it intergraded into mixes with other species.

Log quality was high. Loggers praised the ease of cutting it; many stems essentially delimbed themselves as they fell. Butt swell was nominal. Deductions on stick scaling were only 2%.

The logs were sawn at Parker Lumber Co. in Bradford, Maine. Normal overrun in this mill as about 30%; expected to be higher for this material as log size was large. A portion was sawn into decking, and the bulk went to bridge timbers, mostly 4 X 8 “, all sold green. A quantity of decking is being set to one side to air dry for sale later this year.

Observations by mill owner Brian Parker:

1) We had to stop and change bands several times while sawing the 50,000 + BF. Not really sure why. 1x was metal and the rest may have been due to so much sap? It just didn't saw well.

2) Some of the wood was very light, especially compared to hemlock.

3) Handling the lumber required gloves, it was like handling fiberglass insulation.

... having to stop and change bands repeatedly is unacceptable. Sometimes that means there are problems that need to be worked through and eventually we will get it right. I will say we always have problems sawing native tamarack in the summer when it is dry---it cooks our gang saws. Also, when it's dry, it makes long stringy chips and cards that plug the chipper. That's why it was a must to saw this when it was frozen and fresh out of the woods.

The quality is absolutely fantastic. The drawback is only certain markets will accept tamarack or larch and it's a bit tricky working the side stock in with our hemlock markets as well. All in all, yes, I would probably be willing to saw some more, in the winter and it would have to be a small batch similar to this one unless more markets open up for the species.

*We need fast growing, high quality species in the northeast if we're going to compete with other regions that have an edge on us in those categories. Otherwise there must be something unique to what grows here in order to make the wheels turn. With that said, it's hard to go and tell somebody to plant a bunch of this Larch not knowing what the market will look like in 50 years!

Photos in attachments tell the story on log quality.

Revenues

This patch, somewhat more than 1.3 acres, produced a net stumpage value of \$6,978.00. This does not count pulpwood harvested in the 1980s or as part of the 2016 operation, nor the remaining 5 M of studwood not yet sold. So this patch produced more than \$137.00 per year. Based on our measured standing volumes, which may be conservative, a stand yielding these MAI's would produce the following dollar returns per year, if marketed at pulp or logs at the prices shown. Since we do not have measures of stand volumes at a wide range of ages, we will forego a full financial analysis.

Range of Annual Value Growth per Year				
based on Measured MAI's				
	Unit values	Value Growth/yr	Unit values pine	Value grth/yr
	Hemlock			
Pulpwood	6	\$10.13	5	\$8.44
Sawlogs	130	\$81.94	172	\$108.42
	Stumpage values from MFS 2014 report.			
	Hemlock logs from actual sale.			

ATTACHMENTS

1. Photos – self-explanatory



Link to Brian Roth's photos:

<https://drive.google.com/folderview?id=0BwPhIAQ1EungbFpHeWZ4RnFaUW8&usp=sharing>



These photos by Brian Parker, Parker Lumber.





These three photos, also by Brian Parker, show the decking that was air dried over the winter. It went to 12%, with little drying degrade. It was so hard that inserting the moisture meter probe was difficult.





Attachment 2. Tree Measurement List

Williamsburg Larch Measurements, age 51.							2.54	0.3048
English				Metric				
	Tally	diam (in)	ht (ft)			diam (cm)	Ht (m)	
			Total	To live crown	LCR		Total	
Plot 1	1	14.4	101		49	51%	36.6	30.8
	2	13.8	96		55	43%	35.1	29.3
	3	13.7	100		51	49%	34.8	30.5
	4	13.4	93		48	48%	34.0	28.3
	5	16.7	101		41	59%	42.4	30.8
	6	17	102		40	61%	43.2	31.1
	7	20.7	104		34	67%	52.6	31.7
	8	20	97		35	64%	50.8	29.6
	9	17.3	107		48	55%	43.9	32.6
	10	17.4	122		57	53%	44.2	37.2
	11	13.8	113		51	55%	35.1	34.4
	12	15.3	108		55	49%	38.9	32.9
	13	16.9	113		57	50%	42.9	34.4
	14	12.5	104		58	44%	31.8	31.7
	15	19.5	113		62	45%	49.5	34.4
Plot 2	16	16.6	106		47	56%	42.2	32.3
	17	23.3	108		45	58%	59.2	32.9
	18	19.9	105		55	48%	50.5	32.0
	19	19.3	101		47	53%	49.0	30.8
	20	17.6	97		51	47%	44.7	29.6
	21	17	103		52	50%	43.2	31.4
	22	15.6	98		52	47%	39.6	29.9
	23	19.1	88		50	43%	48.5	26.8
	24	13.8	97		48	51%	35.1	29.6
	25	18.2	100		42	58%	46.2	30.5
	26	14.3	104		53	49%	36.3	31.7
	27	19.5	113		62	45%	49.5	34.4
	28	17.7	111		50	55%	45.0	33.8
	29	14.7	98		40	59%	37.3	29.9
	30	19	110		50	55%	48.3	33.5
	31	16.2	109		53	51%	41.1	33.2
	32	16.3	104		48	54%	41.4	31.7

Attachment 3. Williamsburg larch log measurements for taper estimation.

Measured by Gordon Moore.

	#1	#2	#3	#4	#5	#6	#7	Total ht	1-Feb-16
Butt Log								above ground	Low snow conditions, 8"-10" on ground at harvest.
Bottom OB, dia	19.2	24.4	22.6	20.5	23.3	18.3	15.2		Chopper cut very low to the ground, into but swell, but very little but swell observed.
IB, dia	18.7	23.8	22.2	20.1	21.5	17.8	14.7		Logger reports the wood cuts like White Pine, very soft and easy to limb.
DBH	14.7	19.5	15.7	15.3	18.8	14.6	13.3		Wood yarded with a Clark 664 D, slight uphill pull, logger able to haul 4 to 5 stems at a time.
Top OB, dia	13.7	17.7	14.8	14.2	17.8	13.1	13	16.5	Mill spec's 16'5" including trim X 10" top.
IB, dia	12.8	17	14.1	13.8	17	12.7	12.6		
2nd Log									
Bottom OB, dia	13.7	17.7	14.8	14.2	17.8	13.1	13		
IB, dia	12.8	17	14.1	13.8	17	12.7	12.6		Data from Gordon Moore, rcvd by Ici Feb 3
Top OB, dia	12.1	16.3	12.2	12.9	14.5	11.5	11	33	
IB, dia	11.7	15.8	11.7	12.2	13.8	10.8	10.6		
3rd Log									
Bottom OB, dia	12.1	16.3	12.2	12.9	14.5	11.5	11		
IB, dia	11.7	15.8	11.7	12.2	13.8	10.8	10.6		
Top OB, dia	10.8	13.3	10.3	11.7	12.2	9.3	10.5	49.5	
IB, dia	10.2	12.7	9.8	11.3	11.7	9	10		
4th Log									
Bottom OB, dia	NA	13.3	NA	11.7	12.2	NA	NA		
IB, dia		12.7		11.3	11.7				
Top OB, Dia		10		9.3	10.8			66	
IB, dia		9.7		8.7	10.3				
Merchantable Lgth	73	82	85	88	82	61	79		
									hmmm added col does not match merch hts
									bucking for defect?