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ENTENTE DE COOPÉRATION SUR LE DÉVELOPPEMENT FORESTIER

FOREST RESEARCH REPORT

No. 49: March, 1994

YIELDS OF SELECTED OLDER NOVA SCOTIA PRECOMMERCIAL THINNINGS

INTRODUCTION

Precommercial thinning (PCT) is a spacing operation intended to increase the proportion of preferred species and shorten the time to operability of dense naturally regenerated stands. This is accomplished by cutting the less desirable trees, thereby promoting the growth of quality crop trees (NSDNR, 1992). Other benefits of this treatment may include; the development of a windfirm stand due to larger root systems, an increase in site quality and a decrease in harvesting costs (Piene and Anderson, 1987).

In Nova Scotia, landowners began precommercially thinning young stands as far back as 1964. Since then, over 80,000 hectares (200,000 acres) (Figure 1) have been treated. At the time of treatment, most of these stands would have been at least 60% stocked with a minimum of 4,000 trees/ha and an average height between 1.5 and 9.0 metres (NSDLF, 1988).

The purpose of this report is to document, using Nova Scotia Forest Research **P**ermanent **S**ample **P**lot (PSP) data and photographs, the growth of some of the older precommercial thinnings in the Province. It is important to note that the PSP's were purposely located in well stocked portions of the PCT's. The PSP growth figures, therefore, may be somewhat higher than the average yield because most stands contain one or more understocked portions.

METHODS

Sixteen older precommercial thinnings involving 30 PSP's were selected to include a range of conditions from across the province (Figure 2). Photographs were taken of each PSP during the fall of 1993. To help the viewer gain a perspective of tree size, many of the photographs include a vertical range pole with 30 cm calibrations and a horizontal scale in centimetres. At the St. Margarets Bay location, plots were thinned to different densities and include controls.

Canada

Nova Scotia

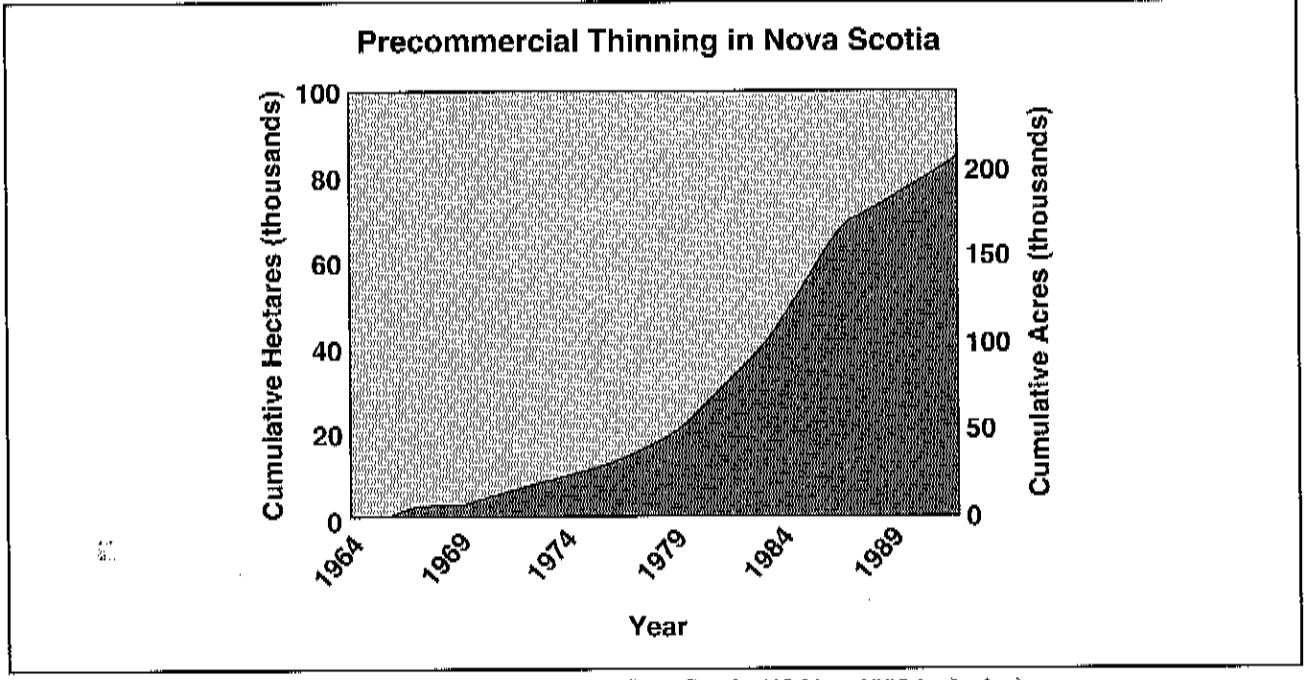

Figure 1. Area of stands precommercially thinned in Nova Scotia (1964 to 1992 inclusive).

A circular PSP was located in a fully stocked portion of each stand. Buffer zones around each plot were of similar stocking and of a width equal to or greater than the average tree height. Each plot contained a minimum of 35 trees exceeding 1 cm at breast height. All trees were measured for diameter at breast height. Fifteen of these trees representing the range of diameters, but weighted towards the larger diameters, were also measured for height. Volumes were calculated using Honer's (1967) Standard Volume Tables. An estimate of growth potential (Land Capability) was obtained by measuring the height and breast age of the 5 tallest trees. Site evaluation included a description of the lesser vegetation, soil characteristics, relief, topography, slope, aspect and history. Appendix I defines stand attributes used in this report.

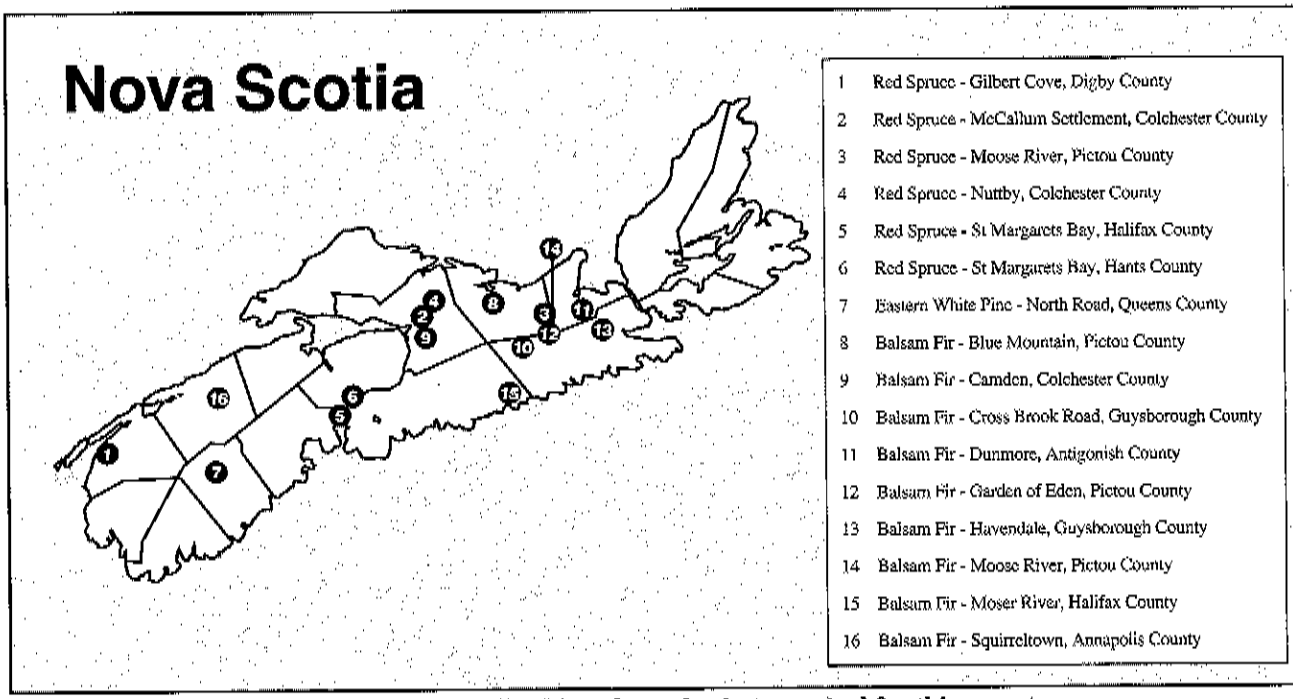

Figure 2. Location of older pre-commercially thinned stands photographed for this report.

DISCUSSION

Table 1 presents a summary of the major stand parameters for the 30 PSPs comprised of 18 red spruce (*Picea rubens Sarg.*), 2 eastern white pine (*Pinus Strobus L.*), and 10 balsam fir (*Abies Balsamea (L.) Mill.*) stands. All PCTs originated from densely regenerated softwood cutovers. Soils ranged from sandy loam to clay loam on imperfectly to well drained sites. Average stump ages ranged from 28 to 61 years old with stands treated 15 to 27 years ago at ages ranging from 11 to 40 years. Initial spacing in treated stands ranged from 1.2 X 1.2 to 3.0 X 3.0 m. Mean Annual Increments (MAI) varied from a low of 2.5 to a high of 6.3 $m^3 \cdot ha^{-1} \cdot yr^{-1}$ of merchantable volume. Estimates based on Nova Scotia's Softwood

Table 1. Permanent Sample Plot data for precommercially thinned and control stands by location.

Plot	Location	Treatment[1]	Spacing		Stump Age (years)			Merchantable				Land Capability
								Diam.	Volume		MAI[7]	
			Initial[2] (m)	Present[3] (m)	Time of PCT[4]	Since PCT[5]	Total[6]	(cm)	(m^3/ha)	(cords/ acre)	(m^3/ha/ yr)	(m^3/ha/ yr)
Red Spruce[8]					**Red Spruce[8]**							
#1	Gilbert Cove, Digby Co.	T	1.6	1.6	27	21	48	14.0	235	43.1	4.9	4.6
#2	McCallum Settlement, Colch. Co.	T	2.4	2.4	28	22	50	17.1	211	38.7	4.2	4.6
#3	Moose River, Pictou Co.	T	2.0	2.0	35	25	60	16.8	301	55.2	5.0	5.1
#4	Nuttby, Colchester Co.	T	2.4	2.3	40	21	61	18.4	295	54.1	4.8	3.7
#5-1	St Margarets Bay, Halifax Co.	C	NA	1.0	NA	NA	38	11.9	132	24.1	3.5	5.1
#5-2	St Margarets Bay, Halifax Co.	T	1.2	1.6	14	25	39	13.7	187	34.2	4.8	5.2
#5-3	St Margarets Bay, HalifaxCo.	T	1.4	1.6	14	25	39	13.6	174	31.9	4.5	5.2
#5-4	St Margarets Bay, Halifax Co.	T	1.8	1.9	11	25	36	15.5	203	37.1	5.6	5.8
#5-5	St Margarets Bay, Halifax Co.	T	1.8	1.8	12	25	37	13.6	159	29.0	4.3	5.2
#5-6	St Margarets Bay, Halifax Co.	T	2.4	2.3	13	25	38	16.1	176	32.2	4.6	6.1
#6-1	St Margarets Bay, Hants Co.	C	NA	1.0	NA	NA	41	12.2	148	27.1	3.6	4.2
#6-2	St Margarets Bay, Hants Co.	T	1.8	2.2	19	25	44	15.7	176	32.2	4.0	5.2
#6-3	St Margarets Bay, Hants Co.	T	1.8	2.4	28	25	53	16.8	198	36.4	3.7	4.9
#6-4	St Margarets Bay, Hants Co.	T	2.4	2.9	14	25	39	19.9	186	34.1	4.8	6.2
#6-5	St Margarets Bay, Hants Co.	C	NA	1.1	NA	NA	41	12.3	134	24.6	3.3	4.3
#6-6	St Margarets Bay, Hants Co.	T	2.4	2.9	16	25	41	19.6	187	34.2	4.6	5.2
#6-7	St Margarets Bay, Hants Co.	T	3.0	3.1	17	25	42	20.1	157	28.7	3.7	5.3
#6-8	St Margarets Bay, Hants Co.	T	3.0	3.1	13	25	38	19.7	164	30.0	4.3	6.5
Eastern White Pine					**White Pine**							
#7-1	North Road, Queens Co.	T	2.4	2.6	29	25	54	18.8	287	52.6	5.3	7.9
#7-2	North Road, Queens Co.	T	2.4	2.7	29	25	54	20.1	324	59.3	6.0	8.3
Balsam Fir					**Balsam Fir**							
#8	Blue Mountain, Pictou Co.	T	1.4	1.5	18	27	45	12.6	168	30.7	3.7	3.9
#9	Camden, Colchester Co.	T	1.6	1.8	18	21	39	13.2	135	24.7	3.5	5.1
#10	Cross Brook Road, Guys. Co.	T	2.1	2.1	23	22	45	15.1	183	33.6	4.1	6.4
#11	Dunmore, Antigonish Co.	T	1.8	2.5	16	23	39	19.5	248	45.3	6.3	7.0
#12	Garden of Eden, Pictou Co.	T	1.4	1.5	17	23	42	12.3	103	18.9	2.5	3.9
#13	Havendale, Guysborough Co.	T	1.5	1.4	13	15	28	12.1	76	13.9	2.7	5.7
#14	Moose River, Pictou Co.	T	1.8	2.0	27	25	52	15.1	220	40.3	4.2	4.7
#15-1	Moser River, Hfx. Co.	T	1.8	1.7	25	18	43	13.1	123	22.5	2.9	4.1
#15-2	Moser River, Hfx. Co.	T	1.8	1.8	18	18	36	13.2	135	24.8	3.8	6.5
#16	Squirreltown, Annapolis Co.	T	1.8	2.2	27	17	44	15.2	153	27.9	3.5	4.8

[1]Treatment — T = Precommercial thinning, C = Control (Unthinned).
[2]Initial — Estimated spacing following initial treatment.
[3]Present — Average spacing at time of most recent measurement.
[4]Time of PCT — Average age of stand when thinned.
[5]Since PCT — Years between stand treatment and most recent measurement.
[6]Total — Average age at time of most recent measurement.
[7]MAI — Mean Annual Merchantable Increment.
[8]Red Spruce — Primary species in plot.

Growth and Yield Model (NSDNR, 1993) show that rotation age can be reduced by 20 years and merchantable mean annual increment (MAI) increased by 35% by pre-commercially thinning at a young age. For example, a fully stocked red spruce PCT growing on an average site will achieve a peak mean annual increment of 6.1 $m^3 \cdot ha^{-1} \cdot yr^{-1}$ at 40 years (rotation age) when spaced to 1.8 x 1.8m at 10 years of age. In comparison, an unmanaged fully stocked stand of the same age and located on the same site will yield only 4.5 $m^3 \cdot ha^{-1} \cdot yr^{-1}$. In a survey of operational PCTs (NSDNR, 1992), stocking at rotation was estimated at 67%. This means that red spruce PCTs on average sites, at roatation, could be expected to yield 163 m^3/ha (i.e. 0.67 x 6.1 x 40).

For a variety of reasons, the PCTs summarized in this report have not yet reached peak mean annual increment (PMAI).

1) Most of these PCTs were thinned at an older than optimum age. This increases the age when PMAI is achieved. Nineteen out of the 27 PCTs were thinned at ages in excess of 15 years.

2) Eleven of the PSPs were thinned wider than 1.8 m. The wider the spacing the longer the rotation, although the average diameter and the PMAI attained will be larger than at narrower spacings.

3) Three of the PCTs are located on sites with Land Capabilities (LC) below 4.0. The poorer the site, the longer the rotation. This is well below the average for the province (LC=5.6).

4) Insufficient time has elapsed since spacing. On average sites, it takes 30 years from thinning until PMAI is reached. If spacing is greater than 1.8m and stand height exceeds 3m, time to reach PMAI will increase beyond 30 years. None of the PCTs have been thinned for 30 years.

It is interesting to note in the photographs, (Appendix II) the close spacing and small diameters of trees in the controls versus the thinned stands at St Margarets Bay (#6-1). In addition, in the younger stands, such as Moser River (#15-2) it is often possible to see the stumps of trees which were cut during the thinning. This gives the viewer an indication of the size and density at the time of thinning.

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APPENDIX I
Glossary

1) *Total Height* = the average height in metres of all trees weighted by basal area.

2) *Merchantable Height* = the average height, in metres, of all trees ≥ 9.1 cm DBHob (diameter outside bark at 1.35 m above the ground), weighted by basal area.

3) *Stump Age* = the average age of the 5 tallest trees measured at a height of 0.3 m above the ground.

4) *Breast Height Age* = the average age of the 5 tallest trees measured at 1.35 m above the ground.

5) *Site Index @ 50 years (BH)* = the projected average top height of the 5 tallest trees at a breast height age of 50 years.

6) *Total Frequency* = the number of trees per hectare ≥ 1.5 cm DBHob.

7) *Merchantable Frequency* = the number of trees per hectare ≥ 9.1 cm DBHob.

8) *Total Basal Area* = the cross-section area, measured at 1.35 m above ground level of all trees 1.5 cm DBHob and greater, expressed in $m^2 \cdot ha^{-1}$.

9) *Merchantable Basal Area* = the cross-section area, measured at 1.35 m above ground level, of all trees 9.1 cm DBHob and greater, expressed in $m^2 \cdot ha^{-1}$.

10) *Total Diameter* = $\sqrt{\frac{TBA}{TF \times 0.00007854}}$

11) *Merchantable Diameter* = $\sqrt{\frac{MBA}{MF \times 0.00007854}}$

12) *Total Volume* = the volume inside bark of all tree boles, including the stump and top, ≥ 1.5 cm DBHob based on volume equations derived by Honer (1967), expressed in solid $m^3 \cdot ha^{-1}$.

13) *Merchantable Volume* = the volume inside bark of all tree boles, ≥ 9.1 cm (DBHob) based on Honer's volume equations expressed in solid $m^3 \cdot ha^{-1}$. The merchantable bole excludes the stump (15 cm height) and top (≤ 7.6 cm inside bark diameter).

14) *Total Mean Annual Increment* = the total volume divided by the stump age and expressed as solid $m^3 \cdot ha^{-1} \cdot yr^{-1}$.

15) *Merchantable Mean Annual Increment* = the merchantable volume divided by the stump age

and expressed as solid $m^3 \cdot ha^{-1} \cdot yr^{-1}$.

16) *Land Capability* = productivity expressed in terms of solid $m^3 \cdot ha^{-1} \cdot yr^{-1}$ at rotation age: defined as peak mean annual increment in merchantable volume for fully stocked unmanaged softwood stands.

APPENDIX II

Permanent Sample Plot data and photographs.

Growth and Yield Statistics

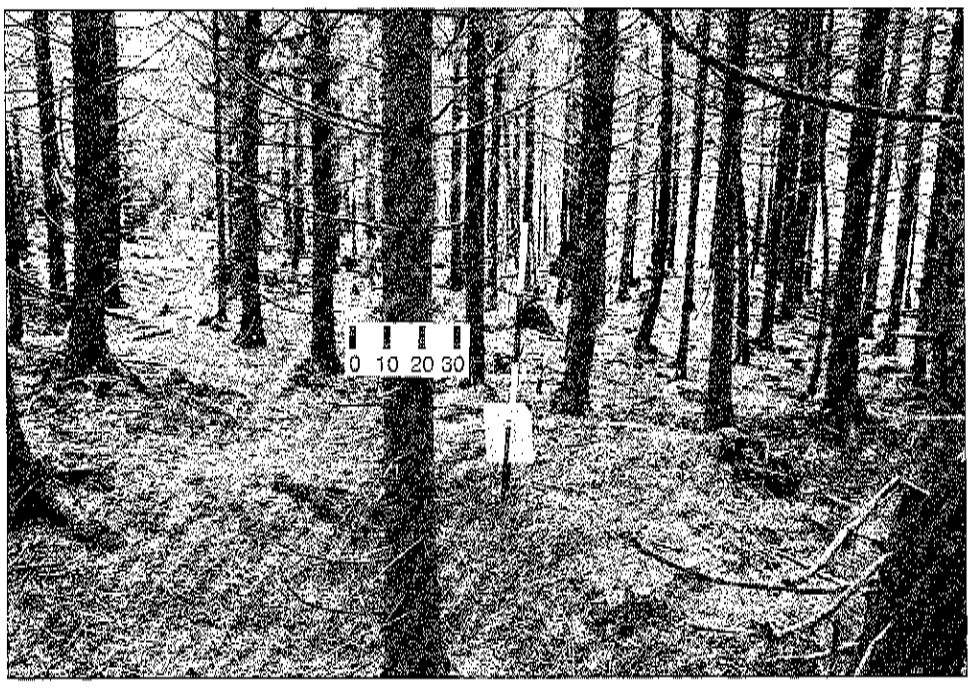
	Total	Merchantable
Frequency (trees/ha)	3840	3060
Diameter (cm)	13.0	14.0
Basal Area (m^2/ha)	51	47
Height (m)	11.7	11.9
Volume (m^3/ha)	298	235
Volume (cords/acre)		43.1
Mean Annual Increment (m^3/ha/yr)	6.2	4.9

Site Description

Soil Series	Halifax
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.6
Site Index @ 50 years (BH) (m)	14.7

Stand Description

Plot number	7833	
Treatment	Precommercial Thinning	
Years since treatment	21	
Year Treated	1972	
Year Remeasured	1993	
Stump age	48	
Breast Height Age	44	
Initial Spacing (m)	1.6	
Present Spacing (m)	1.6	
Primary Species (%)	Red Spruce	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	1800	1710
Diameter (cm)	16.8	17.1
Basal Area (m^2/ha)	40	39
Height (m)	12.1	12.1
Volume (m^3/ha)	238	211
Volume (cords/acre)		38.7
Mean Annual Increment (m^3/ha/yr)	4.8	4.2

Site Description

Soil Series	Millbrook
Soil Texture	Sandy Clay Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.6
Site Index @ 50 years (BH) (m)	14.7

Stand Description

Plot number	8801	
Treatment	Precommercial Thinning	
Years since treatment	22	
Year Treated	1971	
Year Remeasured	1993	
Stump age	50	
Breast Height Age	44	
Initial Spacing (m)	2.4	
Present Spacing (m)	2.4	
Primary Species (%)	Red Spruce	78
Secondary Species (%)	Balsam Fir	22
Tertiary Species (%)	0	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2400	2250
Diameter (cm)	16.4	16.8
Basal Area (m^2/ha)	51	50
Height (m)	13.7	13.8
Volume (m^3/ha)	342	301
Volume (cords/acre)		55.2
Mean Annual Increment (m^3/ha/yr)	5.7	5.0

Site Description

Soil Series	Cobequid
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.1
Site Index @ 50 years (BH) (m)	15.6

Stand Description

Plot number	8208	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1967	
Year Remeasured	1992	
Stump age	60	
Breast Height Age	50	
Initial Spacing (m)	2.0	
Present Spacing (m)	2.0	
Primary Species (%)	Red Spruce	98
Secondary Species (%)	Balsam Fir	2
Tertiary Species (%)	0	0

Growth and Yield Statistics

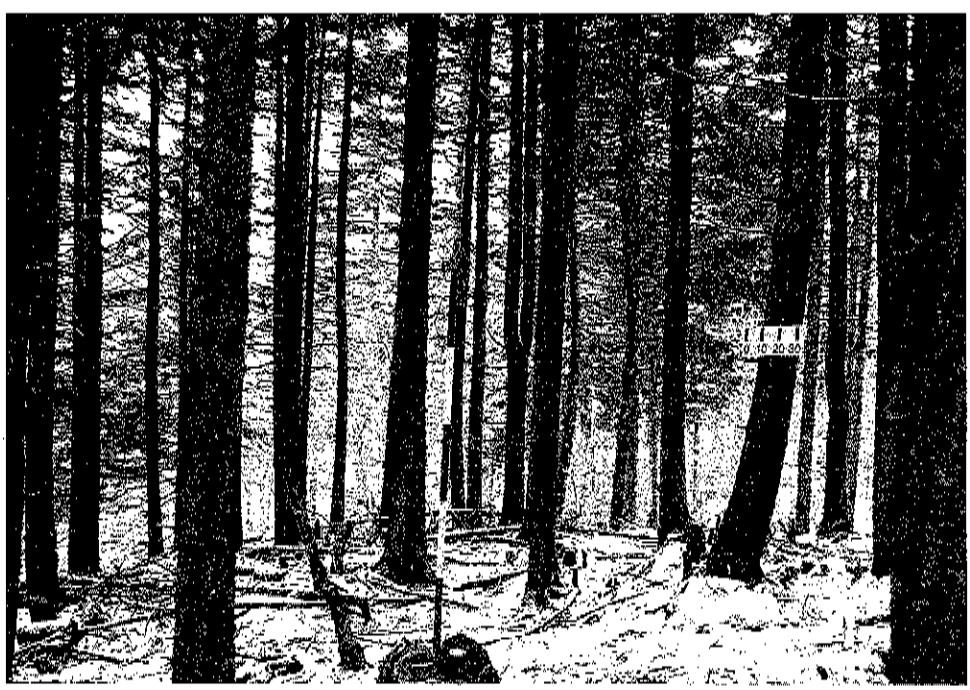
	Total	Merchantable
Frequency (trees/ha)	1920	1880
Diameter (cm)	18.3	18.4
Basal Area (m^2/ha)	50	50
Height (m)	13.1	13.1
Volume (m^3/ha)	327	295
Volume (cords/acre)		54.1
Mean Annual Increment (m^3/ha/yr)	5.4	4.8

Site Description

Soil Series	Cobequid
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	3.7
Site Index @ 50 years (BH) (m)	13

Stand Description

Plot number	7828	
Treatment	Precommercial Thinning	
Years since treatment	21	
Year Treated	1972	
Year Remeasured	1993	
Stump age	61	
Breast Height Age	56	
Initial Spacing (m)	2.4	
Present Spacing (m)	2.3	
Primary Species (%)	Red Spruce	96
Secondary Species (%)	Balsam Fir	4
Tertiary Species (%)	0	0



Growth and Yield Statistics

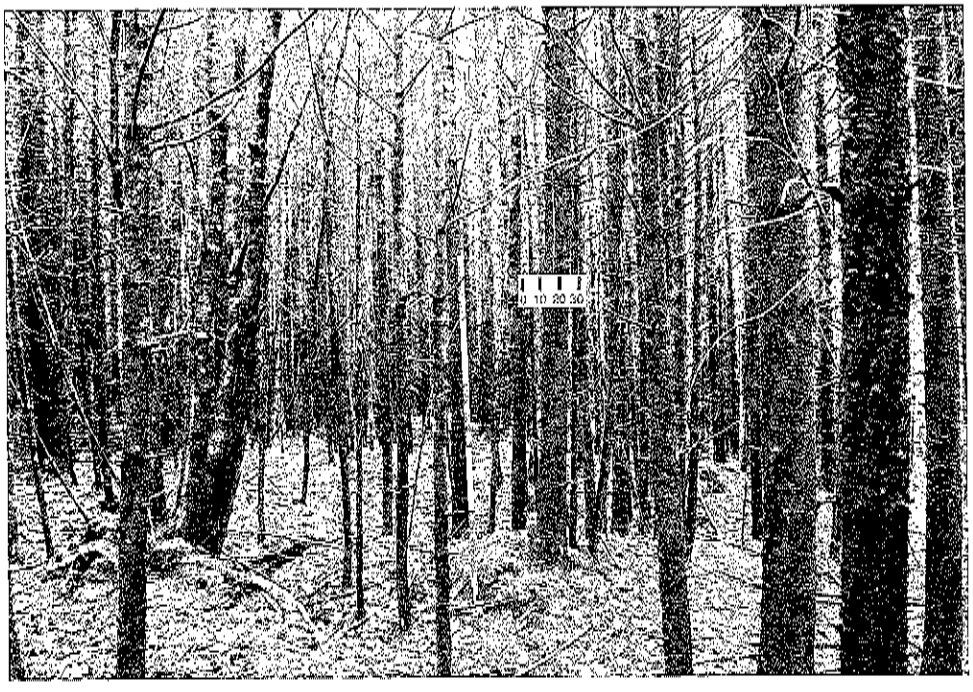
	Total	Merchantable
Frequency (trees/ha)	10774	2965
Diameter (cm)	8.0	11.9
Basal Area (m^2/ha)	55	33
Height (m)	9.5	10.7
Volume (m^3/ha)	265	132
Volume (cords/acre)		24.1
Mean Annual Increment (m^3/ha/yr)	7.0	3.5

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.1
Site Index @ 50 years (BH) (m)	15.5

Stand Description

Plot number	8348	
Treatment	Control	
Years since treatment	NA	
Year Treated	NA	
Year Remeasured	1993	
Stump age	38	
Breast Height Age	34	
Initial Spacing (m)	NA	
Present Spacing (m)	1.0	
Primary Species (%)	Red Spruce	74
Secondary Species (%)	Balsam Fir	22
Tertiary Species (%)	Red Maple	4



Growth and Yield Statistics

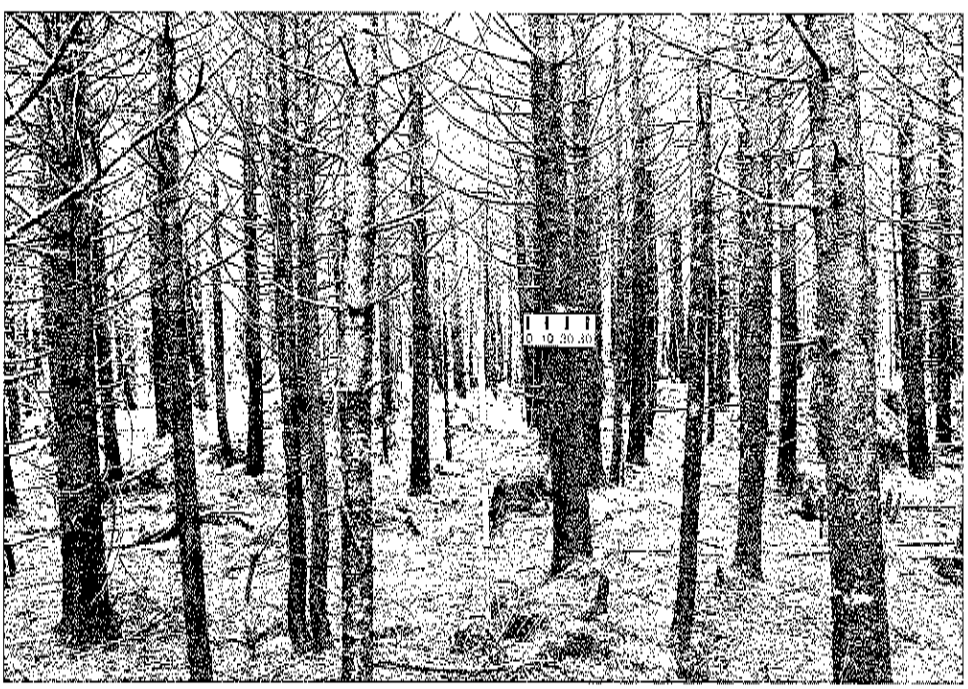
	Total	Merchantable
Frequency (trees/ha)	3929	2891
Diameter (cm)	12.3	13.7
Basal Area (m^2/ha)	47	42
Height (m)	10.2	10.5
Volume (m^3/ha)	242	187
Volume (cords/acre)		34.2
Mean Annual Increment (m^3/ha/yr)	6.2	4.8

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.2
Site Index @ 50 years (BH) (m)	15.8

Stand Description

Plot number	8349	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	39	
Breast Height Age	35	
Initial Spacing (m)	1.2	
Present Spacing (m)	1.6	
Primary Species (%)	Red Spruce	88
Secondary Species (%)	Balsam Fir	12
Tertiary Species (%)	0	0



Growth and Yield Statistics

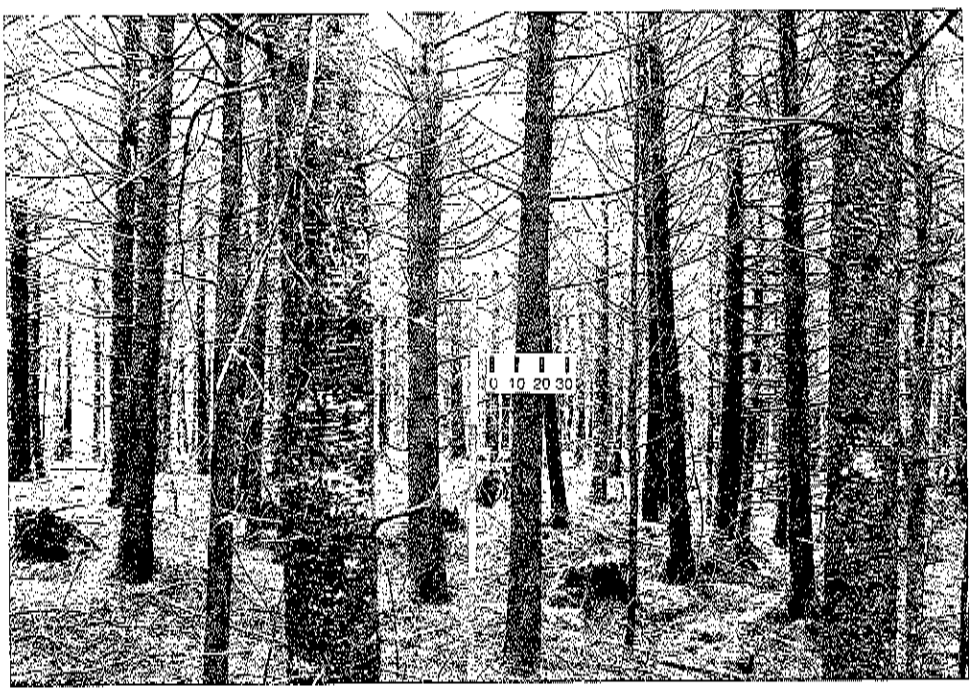
	Total	Merchantable
Frequency (trees/ha)	4102	2718
Diameter (cm)	11.7	13.6
Basal Area (m^2/ha)	44	39
Height (m)	10.3	10.6
Volume (m^3/ha)	231	174
Volume (cords/acre)		31.9
Mean Annual Increment (m^3/ha/yr)	5.9	4.5

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.2
Site Index @ 50 years (BH) (m)	15.8

Stand Description

Plot number	8350	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	39	
Breast Height Age	34	
Initial Spacing (m)	1.4	
Present Spacing (m)	1.6	
Primary Species (%)	Red Spruce	90
Secondary Species (%)	Balsam Fir	10
Tertiary Species (%)	0	0



Growth and Yield Statistics

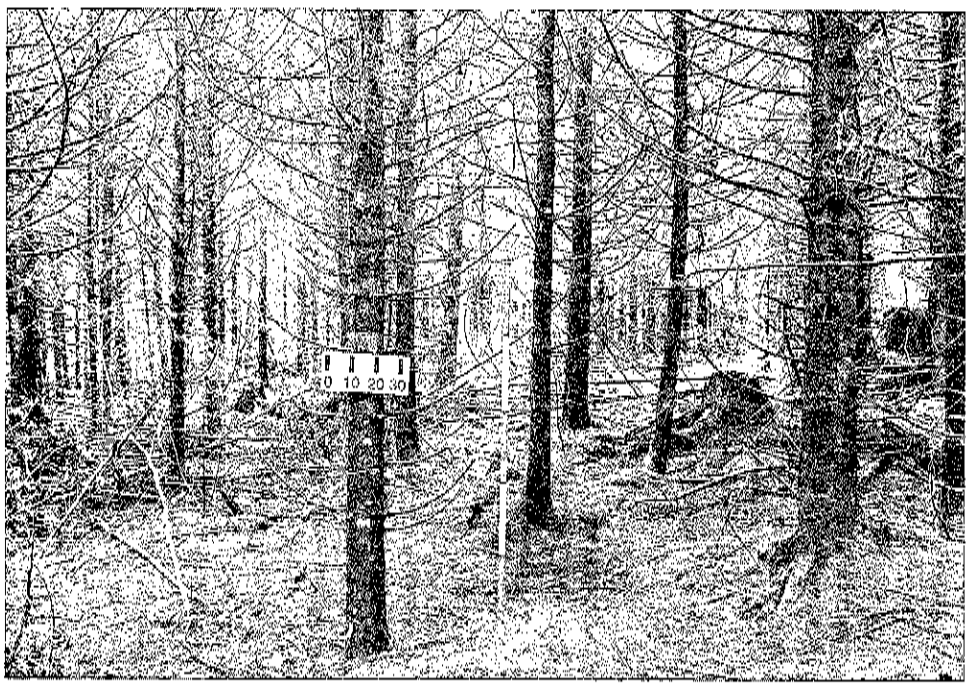
	Total	Merchantable
Frequency (trees/ha)	2644	2224
Diameter (cm)	14.6	15.5
Basal Area (m^2/ha)	44	42
Height (m)	10.8	10.9
Volume (m^3/ha)	240	203
Volume (cords/acre)		37.1
Mean Annual Increment (m^3/ha/yr)	6.7	5.6

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.8
Site Index @ 50 years (BH) (m)	16.8

Stand Description

Plot number	8351	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	36	
Breast Height Age	32	
Initial Spacing (m)	1.8	
Present Spacing (m)	1.9	
Primary Species (%)	Red Spruce	90
Secondary Species (%)	Balsam Fir	10
Tertiary Species (%)	0	0



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2940	2545
Diameter (cm)	13.0	13.6
Basal Area (m^2/ha)	39	37
Height (m)	10.0	10.1
Volume (m^3/ha)	200	159
Volume (cords/acre)		29.0
Mean Annual Increment (m^3/ha/yr)	5.4	4.3

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.2
Site Index @ 50 years (BH) (m)	15.7

Stand Description

Plot number	8352	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	37	
Breast Height Age	33	
Initial Spacing (m)	1.8	
Present Spacing (m)	1.8	
Primary Species (%)	Red Spruce	99
Secondary Species (%)	Balsam Fir	1
Tertiary Species (%)	0	0

Growth and Yield Statistics

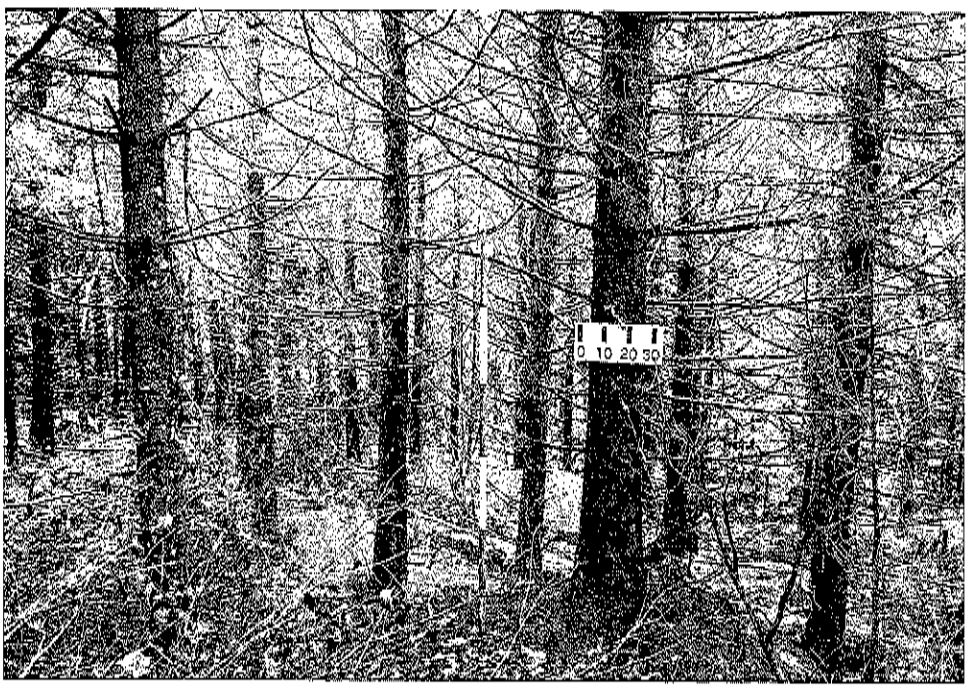
	Total	Merchantable
Frequency (trees/ha)	1878	1779
Diameter (cm)	15.8	16.1
Basal Area (m^2/ha)	37	36
Height (m)	10.8	10.9
Volume (m^3/ha)	203	176
Volume (cords/acre)		32.2
Mean Annual Increment (m^3/ha/yr)	5.3	4.6

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	6.1
Site Index @ 50 years (BH) (m)	17.1

Stand Description

Plot number	8353	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	38	
Breast Height Age	33	
Initial Spacing (m)	2.4	
Present Spacing (m)	2.3	
Primary Species (%)	Red Spruce	91
Secondary Species (%)	Balsam Fir	9
Tertiary Species (%)	Red Maple	1



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	10576	3262
Diameter (cm)	8.5	12.2
Basal Area (m^2/ha)	60	38
Height (m)	8.8	10.0
Volume (m^3/ha)	274	148
Volume (cords/acre)		27.1
Mean Annual Increment (m^3/ha/yr)	6.7	3.6

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.2
Site Index @ 50 years (BH) (m)	13.9

Stand Description

Plot number	8379	
Treatment	Control	
Years since treatment	NA	
Year Treated	NA	
Year Remeasured	1993	
Stump age	41	
Breast Height Age	35	
Initial Spacing (m)	NA	
Present Spacing (m)	1.0	
Primary Species (%)	Red Spruce	81
Secondary Species (%)	Balsam Fir	19
Tertiary Species (%)	Red Maple	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2150	1903
Diameter (cm)	15.0	15.7
Basal Area (m^2/ha)	38	37
Height (m)	10.7	10.8
Volume (m^3/ha)	206	176
Volume (cords/acre)		32.2
Mean Annual Increment (m^3/ha/yr)	4.7	4.0

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.2
Site Index @ 50 years (BH) (m)	15.7

Stand Description

Plot number	8380	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	44	
Breast Height Age	38	
Initial Spacing (m)	1.8	
Present Spacing (m)	2.2	
Primary Species (%)	Red Spruce	84
Secondary Species (%)	Balsam Fir	16
Tertiary Species (%)	0	0

Growth and Yield Statistics

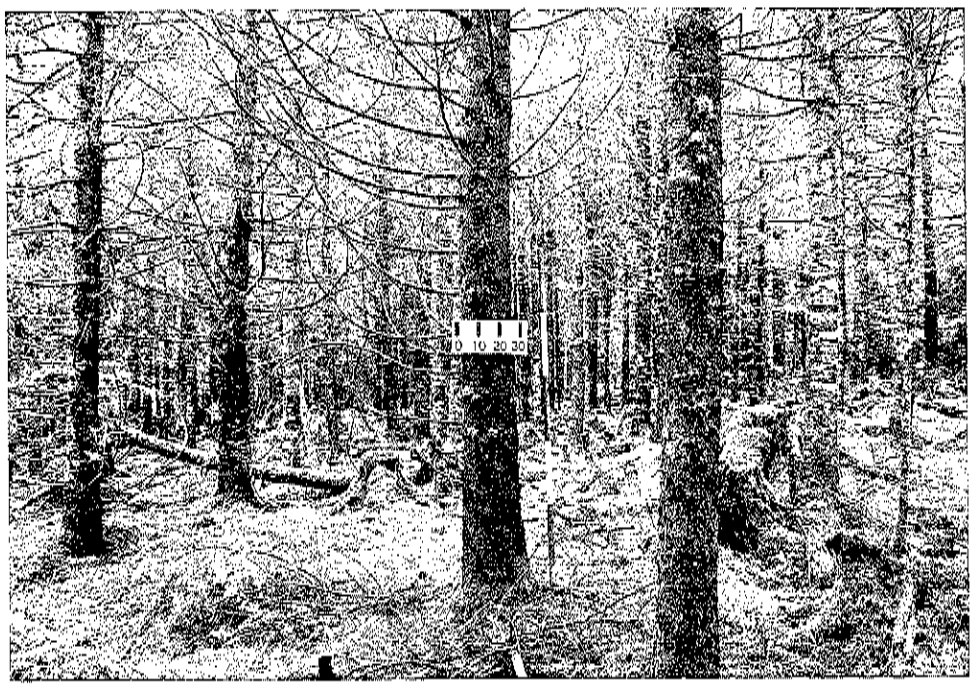
	Total	Merchantable
Frequency (trees/ha)	1804	1581
Diameter (cm)	15.9	16.8
Basal Area (m^2/ha)	36	35
Height (m)	12.8	13.0
Volume (m^3/ha)	226	198
Volume (cords/acre)		36.4
Mean Annual Increment (m^3/ha/yr)	4.3	3.7

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.9
Site Index @ 50 years (BH) (m)	15.1

Stand Description

Plot number	8381	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	53	
Breast Height Age	45	
Initial Spacing (m)	1.8	
Present Spacing (m)	2.4	
Primary Species (%)	Red Spruce	75
Secondary Species (%)	Balsam Fir	25
Tertiary Species (%)	0	0



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	8599	2669
Diameter (cm)	8.4	12.3
Basal Area (m^2/ha)	48	32
Height (m)	9.4	10.7
Volume (m^3/ha)	232	134
Volume (cords/acre)		24.6
Mean Annual Increment (m^3/ha/yr)	5.7	3.3

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.3
Site Index @ 50 years (BH) (m)	14.1

Stand Description

Plot number	8378	
Treatment	Control	
Years since treatment	NA	
Year Treated	NA	
Year Remeasured	1993	
Stump age	41	
Breast Height Age	37	
Initial Spacing (m)	NA	
Present Spacing (m)	1.1	
Primary Species (%)	Red Spruce	83
Secondary Species (%)	Balsam Fir	17
Tertiary Species (%)	0	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	1161	1161
Diameter (cm)	19.6	19.6
Basal Area (m^2/ha)	35	35
Height (m)	11.4	11.4
Volume (m^3/ha)	204	187
Volume (cords/acre)		34.2
Mean Annual Increment (m^3/ha/yr)	5.0	4.6

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.2
Site Index @ 50 years (BH) (m)	15.8

Stand Description

Plot number	8383	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	41	
Breast Height Age	37	
Initial Spacing (m)	2.4	
Present Spacing (m)	2.9	
Primary Species (%)	Red Spruce	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	1063	964
Diameter (cm)	19.3	20.1
Basal Area (m^2/ha)	31	31
Height (m)	10.9	11.0
Volume (m^3/ha)	172	157
Volume (cords/acre)		28.7
Mean Annual Increment (m^3/ha/yr)	4.1	3.7

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.3
Site Index @ 50 years (BH) (m)	16

Stand Description

Plot number	8384	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	42	
Breast Height Age	36	
Initial Spacing (m)	3.0	
Present Spacing (m)	3.1	
Primary Species (%)	Red Spruce	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0

Growth and Yield Statistics

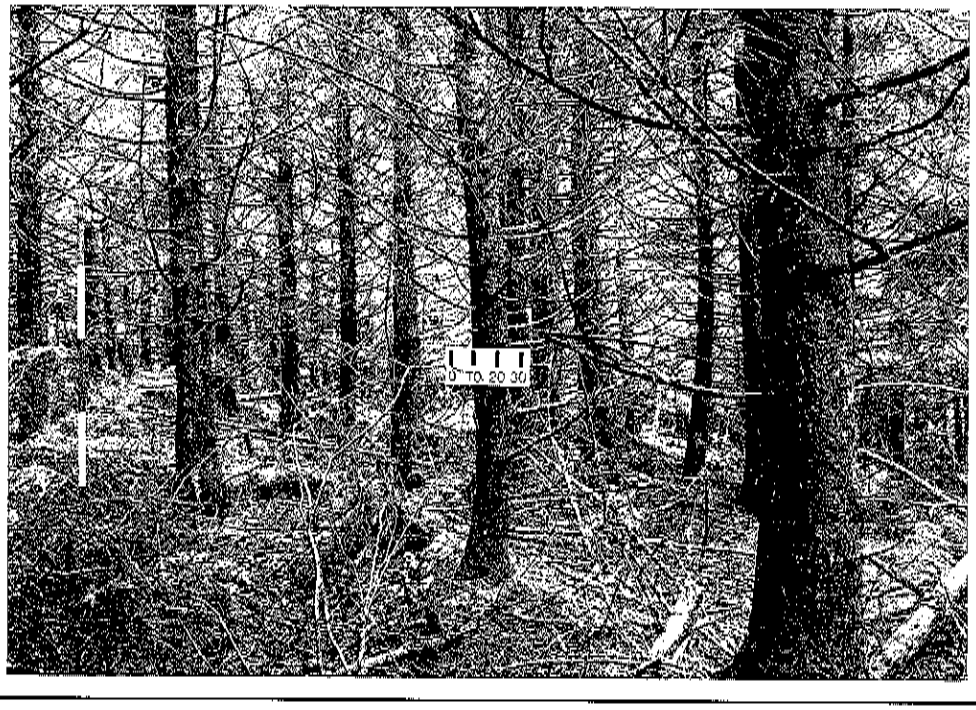
	Total	Merchantable
Frequency (trees/ha)	1063	1013
Diameter (cm)	19.3	19.7
Basal Area (m^2/ha)	31	31
Height (m)	11.4	11.5
Volume (m^3/ha)	180	164
Volume (cords/acre)		30.0
Mean Annual Increment (m^3/ha/yr)	4.7	4.3

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	6.5
Site Index @ 50 years (BH) (m)	17.9

Stand Description

Plot number	8385	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	38	
Breast Height Age	33	
Initial Spacing (m)	3.0	
Present Spacing (m)	3.1	
Primary Species (%)	Red Spruce	95
Secondary Species (%)	Balsam Fir	5
Tertiary Species (%)	0	0



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	1483	1458
Diameter (cm)	18.6	18.8
Basal Area (m^2/ha)	41	40
Height (m)	17.2	17.3
Volume (m^3/ha)	317	287
Volume (cords/acre)		52.6
Mean Annual Increment (m^3/ha/yr)	5.9	5.3

Site Description

Soil Series	Bridgewater
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Fire & Softwood Cut
Land Capability (m^3/ha/yr)	7.9
Site Index @ 50 years (BH) (m)	20.3

Stand Description

Plot number	8377	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	54	
Breast Height Age	48	
Initial Spacing (m)	2.4	
Present Spacing (m)	2.6	
Primary Species (%)	Eastern White Pine	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	1334	1310
Diameter (cm)	19.9	20.1
Basal Area (m^2/ha)	42	42
Height (m)	18.8	18.8
Volume (m^3/ha)	354	324
Volume (cords/acre)		59.3
Mean Annual Increment (m^3/ha/yr)	6.6	6.0

Site Description

Soil Series	Bridgewater
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Fire & Softwood Cut
Land Capability (m^3/ha/yr)	8.3
Site Index @ 50 years (BH) (m)	20.9

Stand Description

Plot number	8376	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	54	
Breast Height Age	48	
Initial Spacing (m)	2.4	
Present Spacing (m)	2.7	
Primary Species (%)	Eastern White Pine	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0

Growth and Yield Statistics

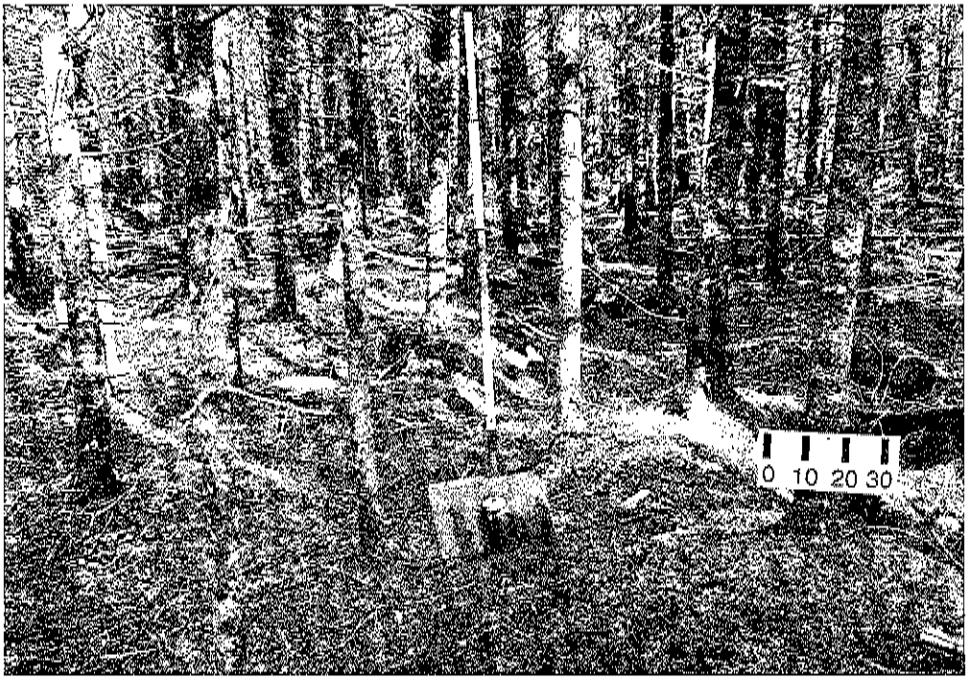
	Total	Merchantable
Frequency (trees/ha)	4260	3480
Diameter (cm)	11.8	12.6
Basal Area (m^2/ha)	46	43
Height (m)	9.8	10.0
Volume (m^3/ha)	226	168
Volume (cords/acre)		30.7
Mean Annual Increment (m^3/ha/yr)	5.0	3.7

Site Description

Soil Series	Wyvern
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Old Cut
Land Capability (m^3/ha/yr)	3.9
Site Index @ 50 years (BH) (m)	13.3

Stand Description

Plot number	7814	
Treatment	Precommercial Thinning	
Years since treatment	27	
Year Treated	1966	
Year Remeasured	1993	
Stump age	45	
Breast Height Age	39	
Initial Spacing (m)	1.4	
Present Spacing (m)	1.5	
Primary Species (%)	Balsam Fir	91
Secondary Species (%)	Red Spruce	9
Tertiary Species (%)	0	0



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2960	2240
Diameter (cm)	12.0	13.2
Basal Area (m^2/ha)	34	31
Height (m)	10.7	11.0
Volume (m^3/ha)	178	135
Volume (cords/acre)		24.7
Mean Annual Increment (m^3/ha/yr)	4.6	3.5

Site Description

Soil Series	Herbert
Soil Texture	Gravely Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.1
Site Index @ 50 years (BH) (m)	15.6

Stand Description

Plot number	7829	
Treatment	Precommercial Thinning	
Years since treatment	21	
Year Treated	1972	
Year Remeasured	1993	
Stump age	39	
Breast Height Age	34	
Initial Spacing (m)	1.6	
Present Spacing (m)	1.8	
Primary Species (%)	Balsam Fir	65
Secondary Species (%)	Red Spruce	32
Tertiary Species (%)	Eastern White Pine	2

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2280	2000
Diameter (cm)	14.3	15.1
Basal Area (m^2/ha)	37	36
Height (m)	12.7	12.8
Volume (m^3/ha)	217	183
Volume (cords/acre)		33.6
Mean Annual Increment (m^3/ha/yr)	4.8	4.1

Site Description

Soil Series	Halifax
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	6.4
Site Index @ 50 years (BH) (m)	17.7

Stand Description

Plot number	8919	
Treatment	Precommercial Thinning	
Years since treatment	22	
Year Treated	1967	
Year Remeasured	1989	
Stump age	45	
Breast Height Age	38	
Initial Spacing (m)	2.1	
Present Spacing (m)	2.1	
Primary Species (%)	Balsam Fir	76
Secondary Species (%)	White Spruce	12
Tertiary Species (%)	Red Spruce	11

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	1560	1440
Diameter (cm)	18.8	19.5
Basal Area (m^2/ha)	44	43
Height (m)	13.5	13.6
Volume (m^3/ha)	272	248
Volume (cords/acre)		45.3
Mean Annual Increment (m^3/ha/yr)	7.0	6.3

Site Description

Soil Series	Millbrook
Soil Texture	Sandy Clay Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	7
Site Index @ 50 years (BH) (m)	18.7

Stand Description

Plot number	7806	
Treatment	Precommercial Thinning	
Years since treatment	23	
Year Treated	1970	
Year Remeasured	1993	
Stump age	39	
Breast Height Age	34	
Initial Spacing (m)	1.8	
Present Spacing (m)	2.5	
Primary Species (%)	Balsam Fir	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0

Growth and Yield Statistics

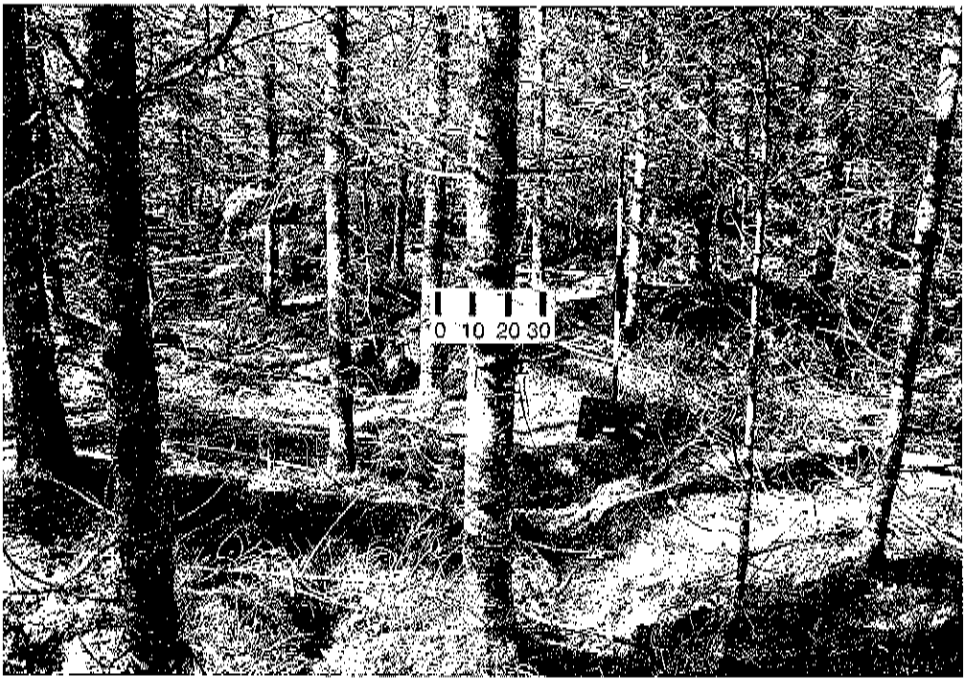
	Total	Merchantable
Frequency (trees/ha)	4320	2320
Diameter (cm)	9.6	12.3
Basal Area (m^2/ha)	31	28
Height (m)	9.3	9.8
Volume (m^3/ha)	145	103
Volume (cords/acre)		18.9
Mean Annual Increment (m^3/ha/yr)	3.5	2.5

Site Description

Soil Series	Perch Lake
Soil Texture	Sandy Loam
Soil Moisture	Imperfectly Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	3.9
Site Index @ 50 years (BH) (m)	13.4

Stand Description

Plot number	7807	
Treatment	Precommercial Thinning	
Years since treatment	23	
Year Treated	1970	
Year Remeasured	1993	
Stump age	42	
Breast Height Age	36	
Initial Spacing (m)	1.4	
Present Spacing (m)	1.5	
Primary Species (%)	Balsam Fir	89
Secondary Species (%)	Red Spruce	11
Tertiary Species (%)	White Birch	1



Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	4860	2040
Diameter (cm)	8.9	12.1
Basal Area (m^2/ha)	30	23
Height (m)	7.8	8.4
Volume (m^3/ha)	121	76
Volume (cords/acre)		13.9
Mean Annual Increment (m^3/ha/yr)	4.3	2.7

Site Description

Soil Series	Thom
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	5.7
Site Index @ 50 years (BH) (m)	16.6

Stand Description

Plot number	7951	
Treatment	Precommercial Thinning	
Years since treatment	15	
Year Treated	1974	
Year Remeasured	1989	
Stump age	28	
Breast Height Age	24	
Initial Spacing (m)	1.5	
Present Spacing (m)	1.4	
Primary Species (%)	Balsam Fir	99
Secondary Species (%)	Large Tooth Aspen	1
Tertiary Species (%)	White Spruce	1

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2460	2340
Diameter (cm)	14.9	15.1
Basal Area (m^2/ha)	43	42
Height (m)	13.0	13.0
Volume (m^3/ha)	259	220
Volume (cords/acre)		40.3
Mean Annual Increment (m^3/ha/yr)	5.0	4.2

Site Description

Soil Series	Cobequid
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.7
Site Index @ 50 years (BH) (m)	14.8

Stand Description

Plot number	7821	
Treatment	Precommercial Thinning	
Years since treatment	25	
Year Treated	1968	
Year Remeasured	1993	
Stump age	52	
Breast Height Age	46	
Initial Spacing (m)	1.8	
Present Spacing (m)	2.0	
Primary Species (%)	Balsam Fir	100
Secondary Species (%)	0	0
Tertiary Species (%)	0	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	3420	2280
Diameter (cm)	11.3	13.1
Basal Area (m^2/ha)	34	31
Height (m)	9.9	10.2
Volume (m^3/ha)	167	123
Volume (cords/acre)		22.5
Mean Annual Increment (m^3/ha/yr)	3.9	2.9

Site Description

Soil Series	Wolfville
Soil Texture	Silt Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.1
Site Index @ 50 years (BH) (m)	13.8

Stand Description

Plot number	7838	
Treatment	Precommercial Thinning	
Years since treatment	18	
Year Treated	1975	
Year Remeasured	1993	
Stump age	43	
Breast Height Age	37	
Initial Spacing (m)	1.8	
Present Spacing (m)	1.7	
Primary Species (%)	Balsam Fir	91
Secondary Species (%)	Red Spruce	9
Tertiary Species (%)	0	0

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	3120	2280
Diameter (cm)	11.8	13.2
Basal Area (m^2/ha)	34	31
Height (m)	10.8	11.0
Volume (m^3/ha)	177	135
Volume (cords/acre)		24.8
Mean Annual Increment (m^3/ha/yr)	4.9	3.8

Site Description

Soil Series	Halifax
Soil Texture	Sandy Loam
Soil Moisture	Well Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	6.5
Site Index @ 50 years (BH) (m)	17.9

Stand Description

Plot number	7839	
Treatment	Precommercial Thinning	
Years since treatment	18	
Year Treated	1975	
Year Remeasured	1993	
Stump age	36	
Breast Height Age	31	
Initial Spacing (m)	1.8	
Present Spacing (m)	1.8	
Primary Species (%)	Balsam Fir	91
Secondary Species (%)	Red Spruce	8
Tertiary Species (%)	Grey Birch	1

Growth and Yield Statistics

	Total	Merchantable
Frequency (trees/ha)	2120	1880
Diameter (cm)	14.4	15.2
Basal Area (m^2/ha)	35	34
Height (m)	10.6	10.7
Volume (m^3/ha)	178	153
Volume (cords/acre)		27.9
Mean Annual Increment (m^3/ha/yr)	4.1	3.5

Site Description

Soil Series	Gibralter
Soil Texture	Sandy Loam
Soil Moisture	Well To Imperfectly Drained
Site History	Softwood Cut
Land Capability (m^3/ha/yr)	4.8
Site Index @ 50 years (BH) (m)	14.9

Stand Description

Plot number	7840	
Treatment	Precommercial Thinning	
Years since treatment	17	
Year Treated	1976	
Year Remeasured	1993	
Stump age	44	
Breast Height Age	38	
Initial Spacing (m)	1.8	
Present Spacing (m)	2.2	
Primary Species (%)	Balsam Fir	99
Secondary Species (%)	Red Spruce	1
Tertiary Species (%)	0	0

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