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Stand history of the Nicauba Research Forest

Project Q-10

by

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INTRODUCTION

The Nicauba Research Forest was created in 1964 with the aid of Consolidated-Bathurst Company in order to study long-term silvicultural treatments and ecology of black spruce (*Picea mariana* (Mill.) B.S.P.) in the boreal forest. Various studies are now being conducted by the silvicultural section of the Quebec Forest Research Laboratory. The ecological and pedological surveys, together with the forest inventory are completed and will soon be published. This paper presents parts of the silvicultural research carried out in the forest.

LOCATION

The Nicauba Research Forest, formerly named the Chibougamau Research Forest by Hatcher and Jurdant (1), is situated at Lat. $49^{\circ}27'$, Long. $74^{\circ}01'$, in the southwestern part of Forest Section B.1b (2). The mean elevation is about 1,300 feet. The forest lies on both sides of astronomic north line separating the townships of Ducharme and Mignault, about 310 miles northwest of Quebec City with the access road joining the Chibougamau highway at mile 101.

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FOREST INVENTORY

1. Sampling method

One hundred and forty-six plots 1/10 acre each, following 27 transects, were established at random and delimited by Hatcher in 1964-65. These are shown on map 1, for each plot, the plot number is above and the plot main age below. The age of the trees was taken at one foot above ground level for the softwoods in the dominant, co-dominant and intermediate strata.

2. Forest composition

a) Softwoods

The principal softwood is black spruce (Picea mariana (Mill.) B.S.P.) with balsam fir (Abies balsamea (L.) Mill.) and jack pine (Pinus banksiana Lamb.) as associated species according to the ecological type. Some scattered tamarack (Larix laricina (Du Roi) K. Koch) are also found.

b) Hardwoods

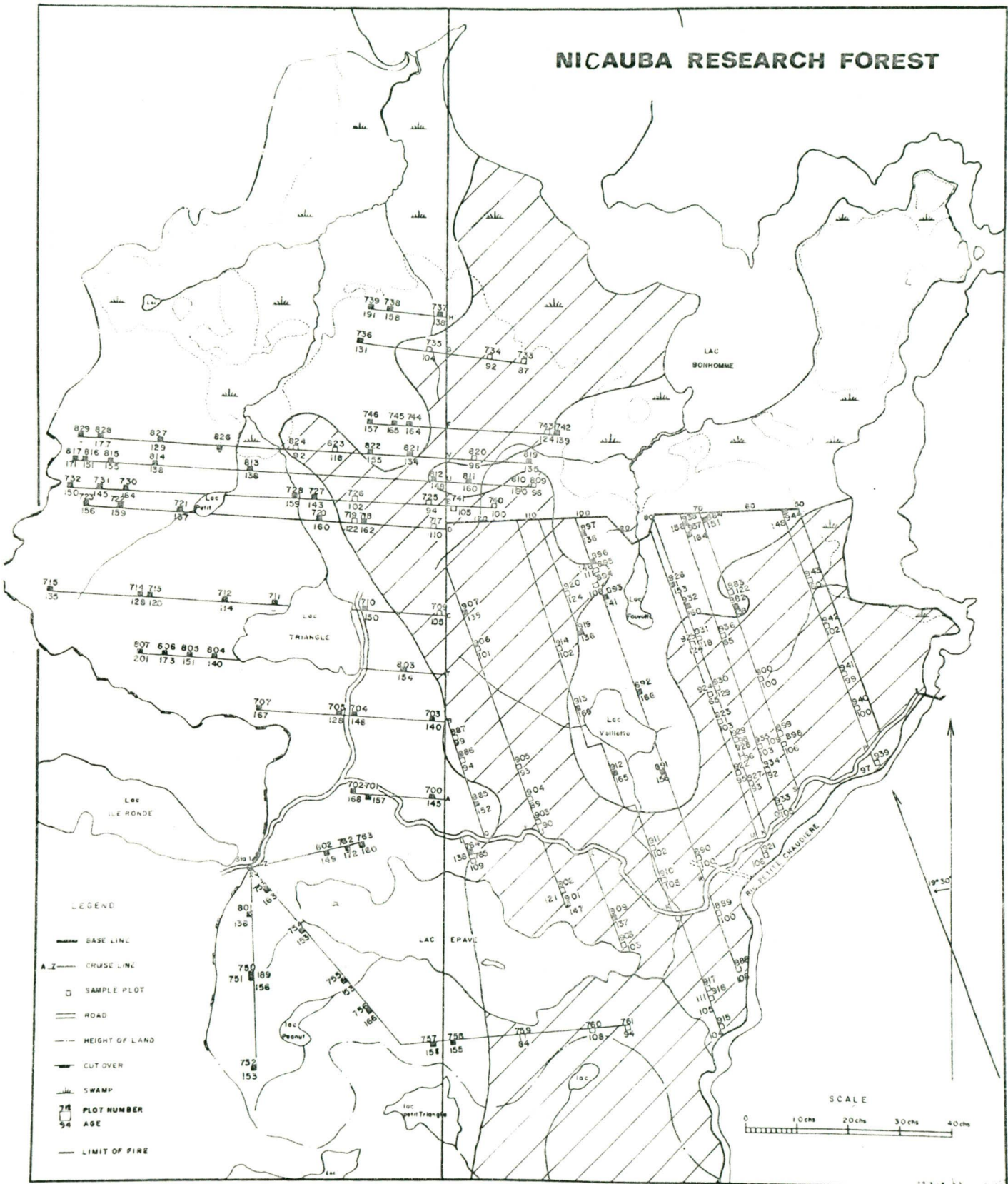
The principal hardwoods found are white birch (Betula papyrifera Marsh.) and trembling aspen (Populus tremuloides Michx.). The shrubs according to Jurdant (1) are:

- american mountain-ash (Sorbus americana Marsh.)
- serviceberries (Amelanchier sp. Medic.)
- mountain maple (Acer spicatum Lam.)
- speckled alder (Alnus rugosa (Du Roi) Spreng.)
- dwarf birch (Betula glandulosa Michx.)

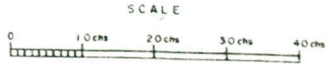
c) Age distribution

Figures 1 and 2 show the distribution, by age class, of number of trees for all the plots, for the principal softwoods. The age curves for black spruce and especially jack pine (Fig. 1) show two peaks near

NICAUBA RESEARCH FOREST



- LEGEND
- BASE LINE
 - A-Z CRUISE LINE
 - SAMPLE PLOT
 - ROAD
 - HEIGHT OF LAND
 - CUT OVER
 - SWAMP
 - 74 54 PLOT NUMBER AGE
 - LIMIT OF FIRE



9° 30'

100 and 160 years. Normal age distribution for balsam fir (Fig. 2) shows the characteristic decline in numbers after 90 years. These phenomena are discussed below.

STAND HISTORY

The history or present origins of the Nicauba Research Forest can clearly be derived from the age class distributions (Fig. 1). The two distinct peaks appear to indicate two consecutive fires, confirmed by the fact that charcoal is present in the A_f horizon.

In addition, the respective age peaks for jack pine and black spruce are also indicative of fire. In both instances, the two age peaks of jack pine occur approximately 10 years before those of black spruce. Jack pine, a pioneer species, regenerates immediately after fire, and black spruce regeneration usually follows later, depending on the seed source and the occurrence of a good seed year. Such large jumps in regeneration for the two species are clearly indicated in Figure 1.

Thus, the recent history of the Nicauba Research Forest indicates that two extensive fires created the present forest stands. A fire around 1805 destroyed all of the forest and a second one around 1865 destroyed only part of the forest (shaded black on map 1).

CONCLUSIONS

The western section of the forest represents the oldest part, with a mean age of 160 years. The eastern section is younger, about 100 years old. Thus, it is reasonable to conclude that two fires passed through the Nicauba Research Forest, one in 1805 which destroyed the entire forest, and the other in 1865 which destroyed only the eastern section.

Table 1. Age distribution, by year, for all the plots combined.

Age	bS	bF	jP	Age	bS	bF	jP
0-30	0	0	0	60	2	-	-
31	-	-	-	61	-	-	-
32	-	-	-	62	2	-	-
33	1	-	-	63	2	1	-
34	-	-	-	64	-	-	-
35	-	-	-	65	1	-	-
36	-	-	-	66	-	-	-
37	-	-	-	67	-	-	-
38	1	-	-	68	-	-	-
39	-	-	-	69	-	-	-
Total	2	0	0	Total	7	1	0
40	2	-	-	70	1	2	-
41	-	-	-	71	-	-	-
42	-	-	-	72	-	-	-
43	-	-	-	73	-	1	-
44	-	-	-	74	-	-	-
45	1	-	-	75	3	1	-
46	-	-	-	76	2	-	-
47	1	-	-	77	2	-	-
48	-	-	-	78	3	3	-
49	1	-	-	79	1	-	-
Total	5	0	0	Total	12	7	0
50	-	-	-	80	6	3	-
51	-	-	-	81	-	-	-
52	1	-	-	82	-	1	-
53	-	-	-	83	1	-	-
54	1	-	-	84	1	-	-
55	2	1	-	85	4	-	-
56	-	-	-	86	2	-	-
57	1	-	-	87	2	-	-
58	2	-	-	88	5	-	-
59	-	-	-	89	5	2	-
Total	7	1	0	Total	26	6	0

(cont'd)

Age	bP	bF	JP
92	8	3	-
93	3	-	-
94	6	1	-
95	12	-	-
96	10	-	-
97	15	1	-
98	6	-	-
99	5	1	-
100	10	1	1
101	3	1	1

Total	78	8	2
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100	12	1	-
101	9	-	-
102	13	1	1
103	13	1	-
104	15	-	2
105	13	-	1
106	11	-	2
107	7	-	1
108	14	-	1
109	8	-	-

Total	115	3	8
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110	9	1	-
111	3	-	2
112	5	-	3
113	3	-	2
114	2	1	1
115	8	-	3
116	3	-	-
117	4	1	1
118	6	-	-
119	3	-	-

Total	46	3	12
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Age	bS	bF	JP
120	8	-	1
121	1	-	-
122	7	-	1
123	4	-	-
124	4	-	1
125	6	-	-
126	3	1	-
127	2	-	-
128	1	-	1
129	1	-	-

Total	37	1	4
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130	7	1	-
131	-	-	-
132	6	-	-
133	2	-	-
134	4	-	-
135	10	-	-
136	3	-	-
137	1	-	-
138	2	-	-
139	1	-	-

Total	36	1	0
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140	12	-	-
141	2	-	-
142	3	-	-
143	6	-	-
144	4	-	-
145	6	-	-
146	1	-	-
147	2	-	-
148	3	-	-
149	4	-	-

Total	43	0	0
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Table 1. (cont'd)

Age	bS	bF	jF	Age	bS	bF	jF
150	11	-	1	180	5	-	-
151	3	-	1	181	-	-	1
152	6	-	1	182	1	-	1
153	2	-	-	183	-	-	-
154	1	-	-	184	-	-	-
155	10	-	-	185	1	-	-
156	6	-	-	186	2	-	-
157	5	-	1	187	-	-	-
158	10	-	-	188	-	-	-
159	5	-	-	189	-	-	-
Total	59	0	4	Total	9	0	2
160	20	-	1	190	1	-	-
161	7	-	-	191	-	-	-
162	11	-	-	192	1	-	-
163	13	-	-	193	-	-	-
164	11	-	-	194	-	-	-
165	11	-	-	195	2	-	-
166	13	-	-	196	-	-	-
167	7	-	1	197	-	-	-
168	10	-	-	198	-	-	-
169	4	-	-	199	-	-	-
Total	107	0	2	Total	4	0	0
170	16	-	2	200	-	-	-
171	4	-	-	201	-	-	-
172	3	-	1	202	-	-	-
173	2	-	-	203	-	-	-
174	2	-	-	204	-	-	-
175	3	-	-	205	1	-	-
176	2	-	1	206	1	-	-
177	-	-	-	207	-	-	-
178	2	-	1	208	-	-	-
179	1	-	-	209	-	-	-
Total	35	0	5	Total	2	0	0

Table 1. (cont'd)

Age	bS	bF	JP	Age	bS	bF	JP
210	1	-	-	240	2	-	-
211	-	-	-	241	-	-	-
212	-	-	-	242	1	-	-
213	-	-	-	243	-	-	-
214	-	-	-	244	-	-	-
215	1	-	-	245	-	-	-
216	-	-	-	246	1	-	-
217	-	-	-	247	1	-	-
218	-	-	-	248	-	-	-
219	-	-	-	249	1	-	-
Total	2	0	0	Total	6	0	0
220	-	-	-	250	1	-	-
221	-	-	-	251	-	-	-
222	-	-	-	252	-	-	-
223	-	-	-	253	2	-	-
224	-	-	-	254	-	-	-
225	1	-	-	255	-	-	-
226	1	-	-	256	-	-	-
227	-	-	-	257	-	-	-
228	-	-	-	258	1	-	-
229	-	-	-	259	-	-	-
Total	2	0	0	Total	4	0	0
230	1	-	-	260	2	-	-
231	-	-	-	261	1	-	-
232	-	-	-	262	1	-	-
233	-	-	-	263	-	-	-
234	-	-	-	264	-	-	-
235	1	-	-	265	-	-	-
236	2	-	-	266	-	-	-
237	-	-	-	267	-	-	-
238	-	-	-	268	1	-	-
239	-	-	-	269	-	-	-
Total	4	0	0	Total	5	0	0

Table 1. (cont'd)

Age	bS	bF	jP
270	-	-	-
271	-	-	-
272	1	-	-
273	1	-	-
274	-	-	-
275	1	-	-
276	-	-	-
277	-	-	-
278	-	-	-
279	-	-	-
Total	3	0	0
292	1	-	-
Total	1	0	0
320	1	-	-
Total	1	0	0

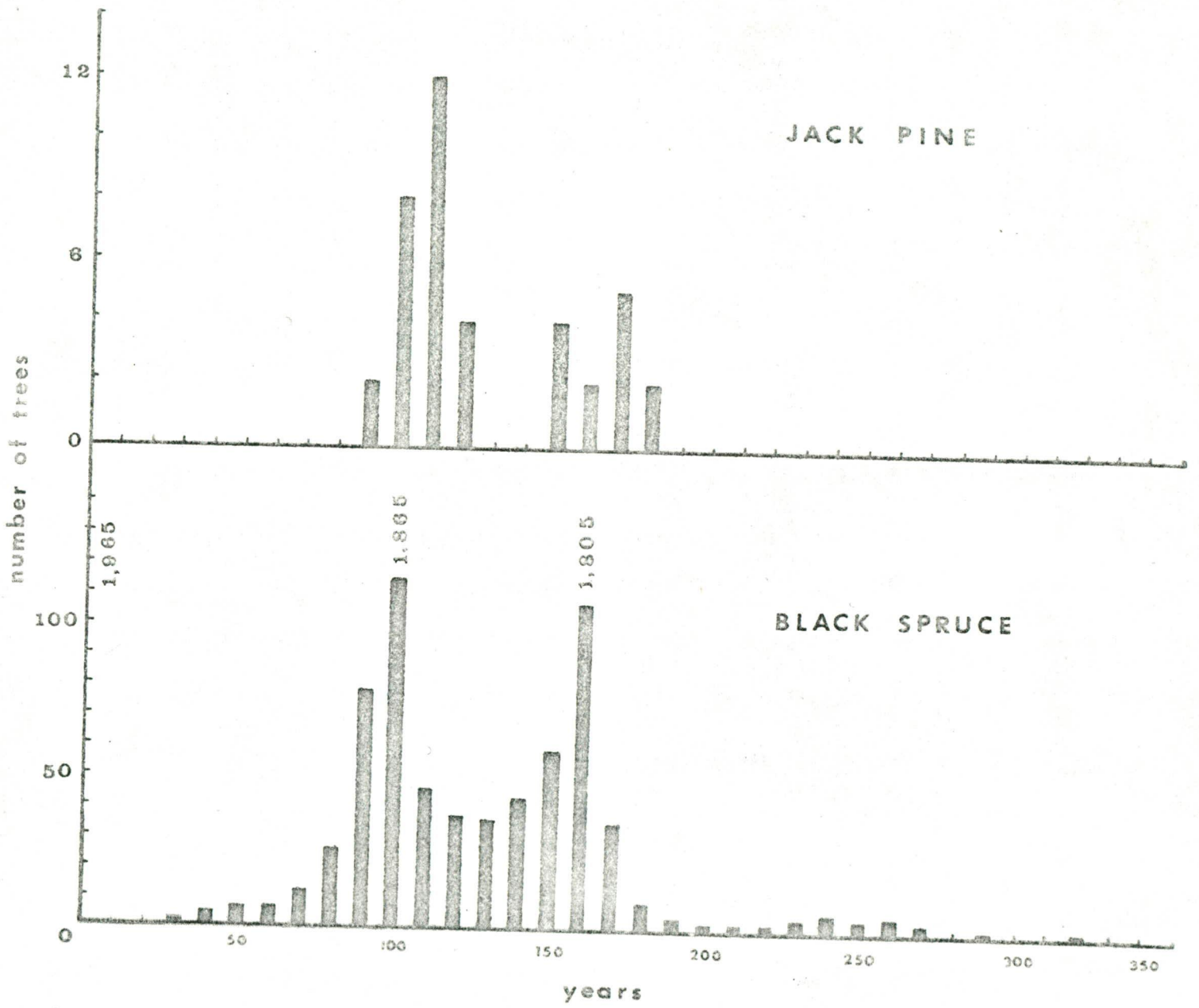


FIG. 1

AGE DISTRIBUTION

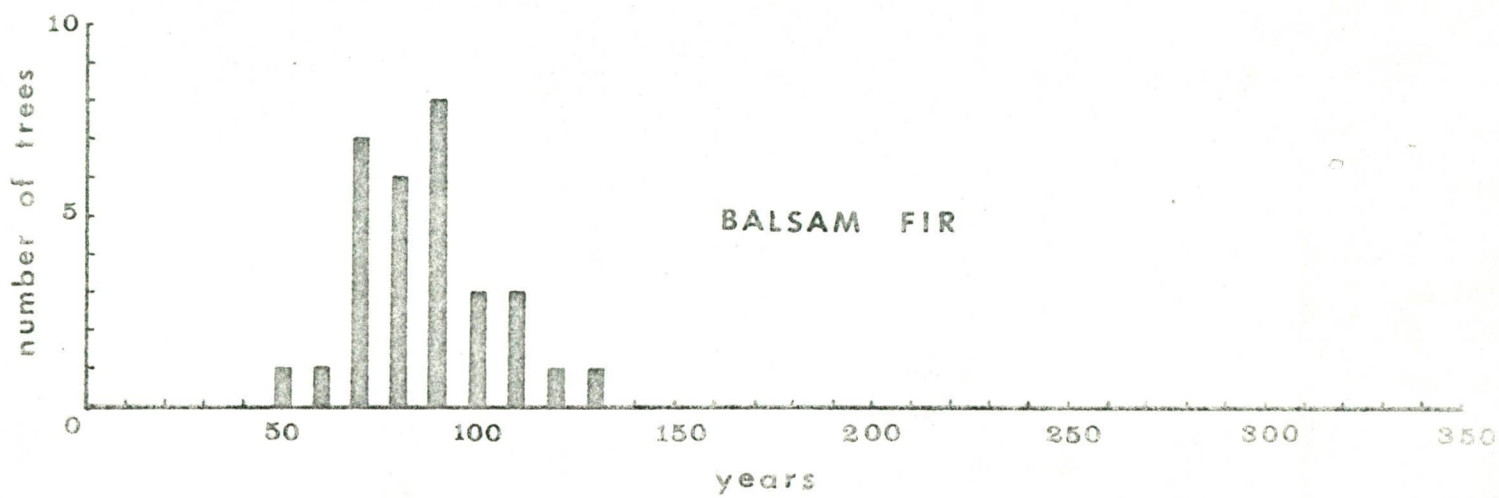


FIG. 2

AGE DISTRIBUTION

As a result, the younger part of the forest (100 years old) requires silvicultural treatment to obtain greater reproduction, whereas the older part (160 years old and more) is overmature and should be cut as soon as possible.

REFERENCES

1. Hatcher, R.J. and Jurdant, M.L.G., 1965. Chibougamau Research Forest, Quebec, (Project Q-120). Department of Forestry and Rural Development, Internal Report 65-Q-5, Quebec district, 14 p.
2. Rowe, J.S., 1959. Forest regions of Canada. Canada Dept. N. Affairs and Nat. Res. Ottawa, For. Br. Bull. 123, 71 p.