

SILVICULTURAL OPERATIONS
RIDING MOUNTAIN FOREST EXPERIMENTAL AREA

1967

by

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SILVICULTURAL OPERATIONS

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INTRODUCTION

This report outlines the progress of silvicultural operations on the Riding Mountain Forest Experimental Area during the 1967 fiscal year. The work done this year was in accordance with the original program submitted in 1960 and included regeneration surveys, remeasurement of MS-69 rate of growth plots, road and trail construction, planting, assisting on research projects and general supervision, maintenance and routine administration of the Riding Mountain Forest Experimental Area. The writer wishes to acknowledge the assistance of G.R. Hennessey on the regeneration survey and of J.M. Shoup who undertook the responsibility of supervising the day to day reexamination of project MS-69.

REMEASUREMENT OF MS-69 PLOTS

~~The~~ ^{In} 1946-1948 a grid of 1/10 acre permanent sample plots was established in the Riding Mountain Forest Experimental Area. The purpose of this project is to measure stand development, regeneration, tree growth and mortality. These plots have been remeasured every 10 years and the plots established in 1947 were remeasured in 1957 and in 1967 thus providing a 20 year record of forest development in the Experimental Area.

Three hundred and ninety-two MS-69 plots were remeasured during the 1967 field season at about the same time in the growing season as they were established in 1947. All standing trees were tallied as living or dead. Trees which had died since the last remeasurement were blazed and a cross was painted on the north side of all living trees 4 inches d.b.h. and over. Where possible the heights of five dominant trees of each species in the plot were taken and diameters measured to 1/10 of an inch. These trees were marked with a dot above the d.b.h. mark. Regeneration was tallied by species on a 3.3 foot strip along the south boundary of each plot.

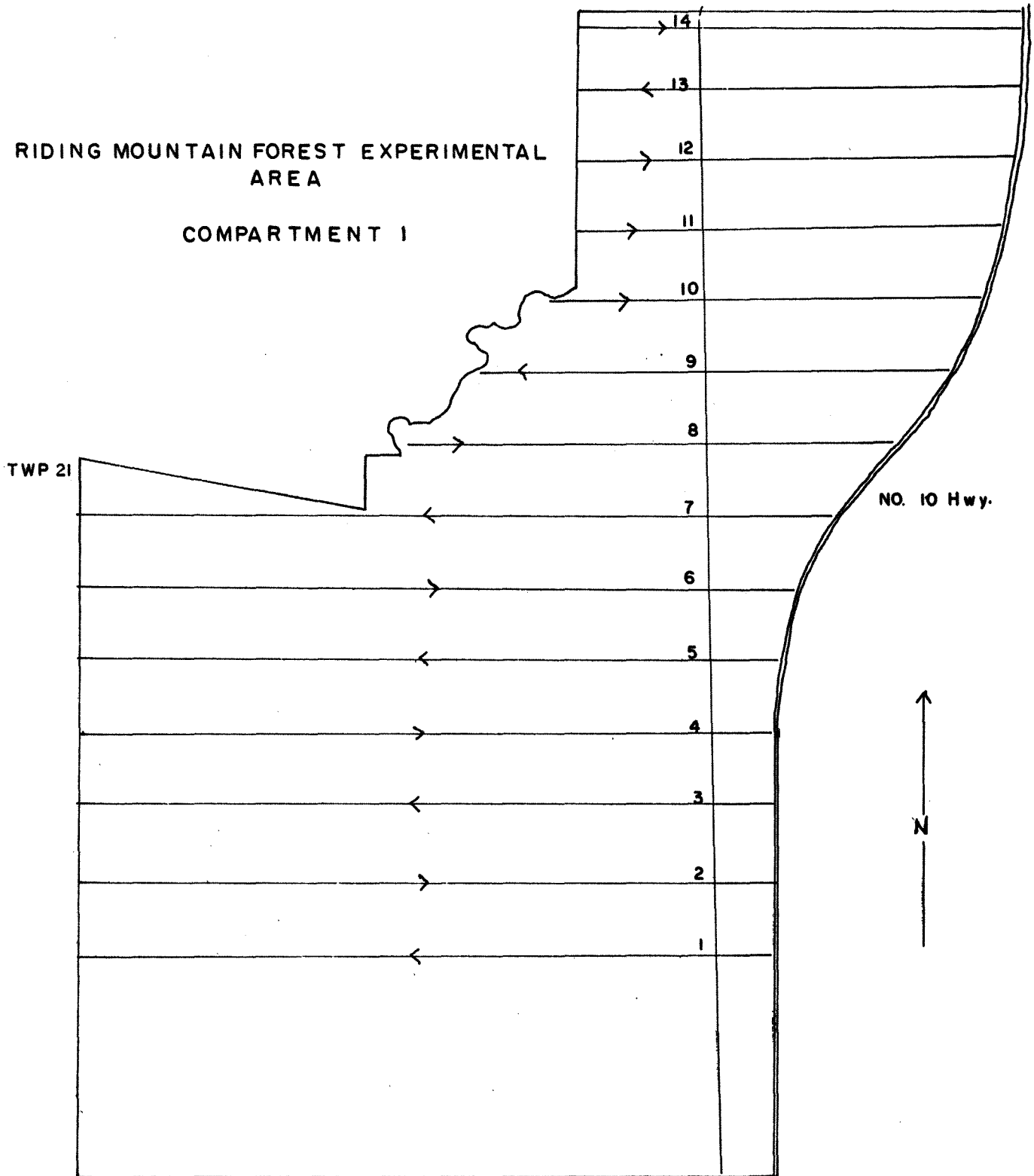
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REGENERATION SURVEY LINES MAY JUNE 1967

RIDING MOUNTAIN FOREST EXPERIMENTAL
AREA

COMPARTMENT 1



SCALE 1" = 10 CHAINS

FIG. 1

Throughout the summer forty plots or approximately 10 per cent of the total number to be remeasured were check tallied for accuracy and a continuous check was made on reproduction tally strips and trees selected for height and diameter remeasurements. During the measurement period crews were constantly reminded of the need for accuracy in all work.

This year's remeasurement began during the first week in May and was completed by the end of August.

During the winter of 1967-1968 the MS-69 data gathered in 1966 and 1967 was coded, checked and made ready for compilation at Ottawa.

REGENERATION SURVEY

One of the main objectives of the silvicultural operations program in the Riding Mountain Area is to obtain prompt and adequate regeneration on all cut-over areas.

Research has shown that white spruce regeneration can readily be obtained by eliminating the dense hazel understory and exposing mineral soil to natural white spruce seedfall. Currently the best method of doing this is by scalping with a bulldozer blade.

In May 1967 a regeneration survey was carried out in Compartment 1 on 190 acres that had been scarified in 1960 to create mineral soil seedbeds suitable for natural regeneration of white spruce and then shelterwood logged in the winters of 1961 and 1962. The purpose of this survey was to evaluate white spruce regeneration after the final cut which was made in the winter of 1966-1967.

This survey was made on continuous strips of mil-acre quadrats run completely across the area at five chain intervals (Figure 1). Each quadrat was classified by moisture regime, per cent scarified, type of seedbed and the percentage of seedbed covered with slash from the last cut of the two stage shelterwood logging operation. All mil-acre quadrats that were stocked with planted, regeneration and advance growth² white spruce were recorded and a total count of all white spruce was made on every 10th quadrat.

A total of 4,659 mil-acre quadrats were examined along the surveyed lines: 922 quadrats or 19.8% of the total number of quadrats examined showed some evidence of scarification, 496 or 53.8% of the total number of the scarified quadrats were stocked with five-year-old white spruce natural regeneration. Table 1 shows the per cent stocking of natural regeneration white spruce by moisture regime and seedbed types.

2

Advance growth, young trees less than 1" d.b.h., which became established naturally and not as a result of the scarification treatments.

Natural regeneration, young trees which resulted from the germination of natural seedfall on seedbeds prepared using a bulldozer and blade.

Table 1

Percent Stacking of Natural Regeneration White Spruce by Seed bed and Moisture Regime.

Seed bed	Moisture Regime 3		Moisture Regime 4		Moisture Regime 5		Moisture Regime 6		Moisture Regime 7		Moisture Regime 8		Moisture Regime 9		Total No of Plots Examined	
	Not Stacked	% Stacked	Not Stacked	% Stacked	Not Stacked	% Stacked	Not Stacked	% Stacked	Not Stacked	% Stacked	Not Stacked	% Stacked	Not Stacked	% Stacked		Total No. of Plots Examined
Un disturbed	0	1399	0	1295	0	401	0	317	0	157	0	7	0	161	0	3737
Humus	25	36	26	58	9	11	0	11	0	0	0	0	0	0	0	176
Mineral Soil	261	102	145	36	18	5	0	0	0	0	0	0	0	0	0	567
Mound	3	88	9	67	0	11	0	1	0	0	0	0	0	0	0	179
All Seedbeds Combined	289	1625	180	1456	27	428	0	329	0	157	0	7	0	161	0	4659

Throughout this survey the tallest seedling was measured on each stocked mil-acre quadrat. Table 2 shows the height of the average regeneration seedling by moisture regime and seedbed.

Along the survey lines 179 of the total mil-acre quadrats examined were mounds of dried out duff and humus piled up by the scarifying machinery. Only 12 of these quadrats were stocked with white spruce regeneration and seedlings occurred only on small patches of exposed mineral soil.

Little or no scarification was carried out on soils with a 6 to 8 moisture regime and white spruce regeneration was absent in these areas.

Throughout the survey, 464 total count quadrats were examined, 266 regeneration white spruce seedlings were counted for an average of 0.57 seedlings per mil-acre quadrat on the survey area. Table 3 shows the number of natural regeneration white spruce seedlings per acre, by moisture regime and seedbed types.

During this survey all advance growth white spruce up to 1 inch d.b.h. was tallied. Table 4 summarizes the per cent advance growth stocking on all quadrats and the number of advance growth white spruce by seedbed and moisture regime. Table 5 shows the average height of the advance growth by moisture regime.

The total per cent stocking, number of trees per acre and average height in inches of all regeneration and advance growth in the surveyed area is shown in Table 6.

Approximately 19% of the total area examined during the survey was covered from 1 inch to 5 inches with recent logging slash and 21% of the scarified area was covered with slash. Approximately 39% of the slash covered disturbed area was stocked with regeneration white spruce while 56% stocking occurred on treated ground which had not been disturbed by logging equipment or slash.

Observations throughout the surveyed area seemed to indicate that if the scarification treatment had been delayed until after the first salvage cut had been made, less damage would have occurred to prepared seedbeds and first year seedlings by slash and logging equipment. It was also noticed that the larger patches of scarified ground had more seedlings per mil-acre quadrat and retained receptive mineral soil seedbeds longer than the smaller areas.

PLANTING

In May 1967, 1,000 jack pine and 1,000 white spruce were planted on log yards and skid rows along the east side of Compartment 1 adjacent to Number 10 Highway.

Table 2

Average Height of Regeneration white Spruce Seedlings by Seed bed and Moisture Regime

Seedbed	Moisture Regime 3			Moisture Regime 4			Moisture Regime 5			Totals		
	Total ht. of tallest seedling in inches	No. of Seedlings	Av. Ht. of Seedlings in inches	Total ht. of tallest Seedling in inches	No. of Seedlings	Av. Ht. of Seedlings in inches	Total ht. of tallest Seedling in inches	No. of Seedlings	Av. Ht. of Seedlings in inches	Total Ht. in inches	Total Number of trees	Av. Ht. in inches
Undisturbed	—	—	—	—	—	—	—	—	—	—	—	—
Humus	138	25	5.5	172	26	6.6	78	9	8.7	388	60	6.5
Mineral Soil	1565	261	6.0	946	145	6.5	119	18	6.6	2630	424	6.2
mound	19	3	6.3	36	9	4.0	0	0	—	55	12	4.6
Total	1722	289	6.0	1154	180	6.4	197	27	7.3	3073	496	6.2

Table 3
Number of Natural White Spruce Regeneration Seedlings by Seedbed and Moisture Regime

Seedbed	Moisture Regime 3			Moisture Regime 4			Moisture Regime 5			Av. Stocking m. 3, 4, 5	Moisture Regime 6			Moisture Regime 7			Moisture Regime 8			Moisture Regime 9		
	No. of Seedlings	No. of Plots	No. of Seedlings Per Acre	No. of Seedlings	No. of Plots	No. of Seedlings Per Acre	No. of Seedlings	No. of Plots	No. of Seedlings Per Acre		No. of Seedlings	No. of Plots	No. of Seedlings Per Acre	No. of Seedlings	No. of Plots	No. of Seedlings Per Acre	No. of Seedlings	No. of Plots	No. of Seedlings Per Acre	No. of Seedlings	No. of Plots	No. of Seedlings Per Acre
Undisturbed	0	148	0	0	131	0	0	31	0		0	34	0	0	14	0	0	1	0	0	16	0
Humus	22	6	3600	2	8	200	18	4	4500	2300	0	1	0	0	0	-	0	0	-	0	0	-
Mineral Soil	95	34	2800	64	19	3400	63	3	21000	4000	0	0	-	0	0	-	0	0	-	0	0	-
Mound	0	6	0	2	8	200	0	1	0	100	0	0	-	0	0	-	0	0	-	0	0	-
Combined Seedbeds	117	194	600	68	165	400	81	39	2100	700	0	35	0	0	14	0	0	1	0	0	16	0

Table 4
Present Stocking of Advance Growth on All Quadrats, by Seed bed and Moisture Regime

Seed bed	Moisture Regime 3			Moisture Regime 4			Moisture Regime 5			Moisture Regime 6			Moisture Regime 7			Moisture Regime 8			Moisture Regime 9			Total
	Stocked	Not Stocked	% Stocked	Stocked	Not Stocked	% Stocked	Stocked	Not Stocked	% Stocked	Stocked	Not Stocked	% Stocked	Stocked	Not Stocked	% Stocked	Stocked	Not Stocked	% Stocked	Stocked	Not Stocked	% Stocked	
Undisturbed	75	1324	5.4	95	1200	7.3	40	361	10	22	295	6.9	10	147	6.4	0	7	0.0	0	161	0.0	3737
Humus	0	61	0.0	1	83	1.2	0	20	0.0	1	10	3.1	0	0	-	0	0	-	0	0	-	176
Mineral Soil	0	363	0.0	0	181	0.0	0	23	0.0	0	0	-	0	0	-	0	0	-	0	0	-	567
Mound	0	91	0.0	0	76	0.0	0	11	0.0	0	1	-	0	0	-	0	0	-	0	0	-	179
Total	75	1839	3.9	96	1540	5.9	40	1415	8.8	23	306	7.0	10	147	6.4	0	7	0.0	0	161	0.0	4659

Number of Advance Growth white Spruce by Seed bed and Moisture Regime

	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre	No. of trees	No. of Plots	No. of trees Per Acre
Undisturbed	14	148	94	24	130	200	15	31	484	20	34	588	1	14	71	0	1	0	0	16	0	76	347	219

Table 5
Average Height of Advance Growth by Moisture Regime

Seedbed	Moisture Regime																	
	3		4		5		6		7		8		9		All			
	Total Ht of Tallest Tree	No. of Trees in inches	Av. Ht. of trees in inches	Total Ht of Tallest Tree	No. of Trees	Av. Ht. of trees in inches	Total Ht of Tallest Tree	No. of Trees	Av. Ht. of trees in inches	Total Ht of Tallest Tree	No. of Trees	Av. Ht. of trees in inches	Total Ht of Tallest Tree	No. of Trees	Av. Ht. of trees in inches	Total Ht of Tallest Tree		
Undisturbed	1177	75	15.7	95	40	14.0	202	22	9.2	259	10	25.9	0	0	-	3440	242	14.2
Humus	0	0	-	1	0	-	1	1	1.0	0	0	-	0	0	-	5	2	2.5
All	1177	75	15.7	96	40	14.0	203	23	8.8	259	10	25.9	0	0	-	2445	244	14.1

Table 6

Number of Trees per Acre, Average Height of Trees in Inches and Percent Stocking are Shown by Seed bed and Moisture Regime.

Moisture Regime																								
Seed bed	3			4			5			6			7			8			9			All		
	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches	Percent Stocking	No. trees Per Acre	Av. Ht. of trees in inches
Undisturbed	5.4	94	15.7	7.3	200	13.1	10.0	484	14.0	6.9	588	9.2	6.4	71	25.9	0	0		0	0		6.5	203	14.2
Humus	40.9	3600	5.5	32.1	200	6.5	45.0	4500	8.7	9.1	0	1.0	-	-	-	-	-	-	-	-	-	35.2	2210	6.3
Mineral Soil	71.9	2800	6.0	80.1	2400	6.5	78.8	21,000	6.6	-	-	-	-	-	-	-	-	-	-	-	-	74.8	3964	6.2
Mounds	3.3	0	6.3	11.8	200	4.0	0	0	-	0	-	-	-	-	-	-	-	-	-	-	-	6.7	133	4.6
All Seedbeds	19.0	675	8.0	16.9	570	8.7	14.7	2462	11.3	7.0	571	8.8	6.0	71	25.9	0	0		0	0		15.9	737	8.8

In June, 5,585 white spruce seedlings were planted on 28 planting strips in Compartment 12, Sec. 29, Twp.20, Rge. 18, W.P.M.(Fig. 2). The planting strips cleared in 1966 are approximately 9 chains long and run east and west from the northeast corner of the section. Fourteen strips were scalped to mineral soil and not cultivated; 10 strips were scalped to mineral soil and cultivated with an Athens plow. Ten strips were scalped to humus horizon and also cultivated with a disk plow. The strips are approximately 12 feet apart. Figure 2 shows the individual strip preparation and the number of trees planted on each prepared strip.

The plantation was examined during the first week of June, 261 dead white spruce seedlings were counted.

On June 1, 900 white spruce, 123 black spruce and 96 jack pine tubelings (Ontario design) were planted on one of the bulldozed strips (No. 30) prepared in 1966. These strips had been scarified leaving a thin layer of humus, then cultivated with an Athens plow. Holes were punched in the ground with an iron bar dibble and the plants were inserted by hand. Over 1,100 two-month-old tubelings were planted in approximately 3 hours by a 4 man crew.

On August 8 the tubeling plantation was examined, 24 bS, 11 jP, and 91 wS were dead. The hot dry summer may have contributed to some of the tubeling mortality.

In October 1967 an additional eighteen planting strips were cleared on the northwest quarter of Compartment 12, Sec. 29, Twp. 20, Rge. 18 W.P.M. These strips are approximately 17 1/2 chains long and run south off the north boundary of the section (Fig. 3). A D-6-C with an hydraulically operated blade was used to scarify the strips to mineral soil. This job was completed in about 18 working hours. One half of the strips will be disced with an Athens plow during the coming summer, 17 of the strips will be planted with white spruce seedling in the autumn, and the remaining strips will be planted during the summer with white spruce, black spruce and jack pine tubelings.

ROADS

The Riding Mountain Forest Experimental Area road building program was continued in 1967 (Fig. 4). This year over 2 1/2 miles of new road was completed and gravelled and an additional 1 1/2 miles of right-of-way cleared and graded. A total of 18 miles of access roads have now been developed and most of the experimental area is now accessible within half a mile by road.

PLANTING STRIPS BULLDOZED
1966
PLANTED 1967

COMPARTMENT 12
N.W. Cr. 29-20-18. WPM

LEGEND

- H---- Humus
- M---- Mineral Soil
- O---- Cultivated

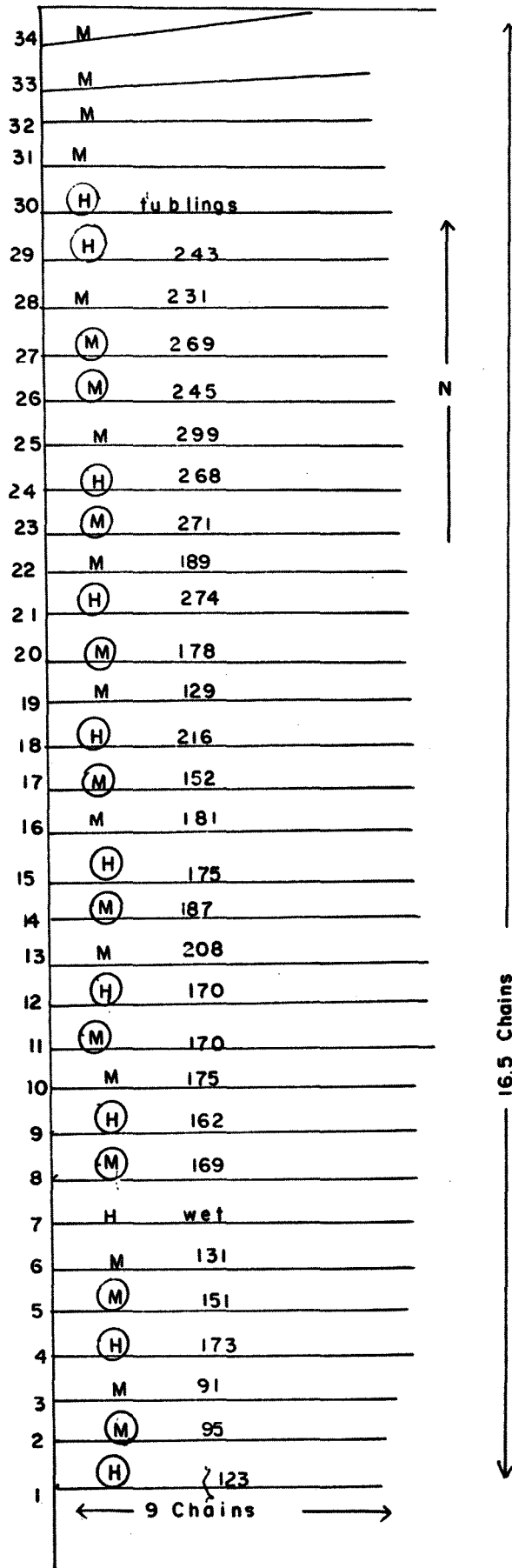
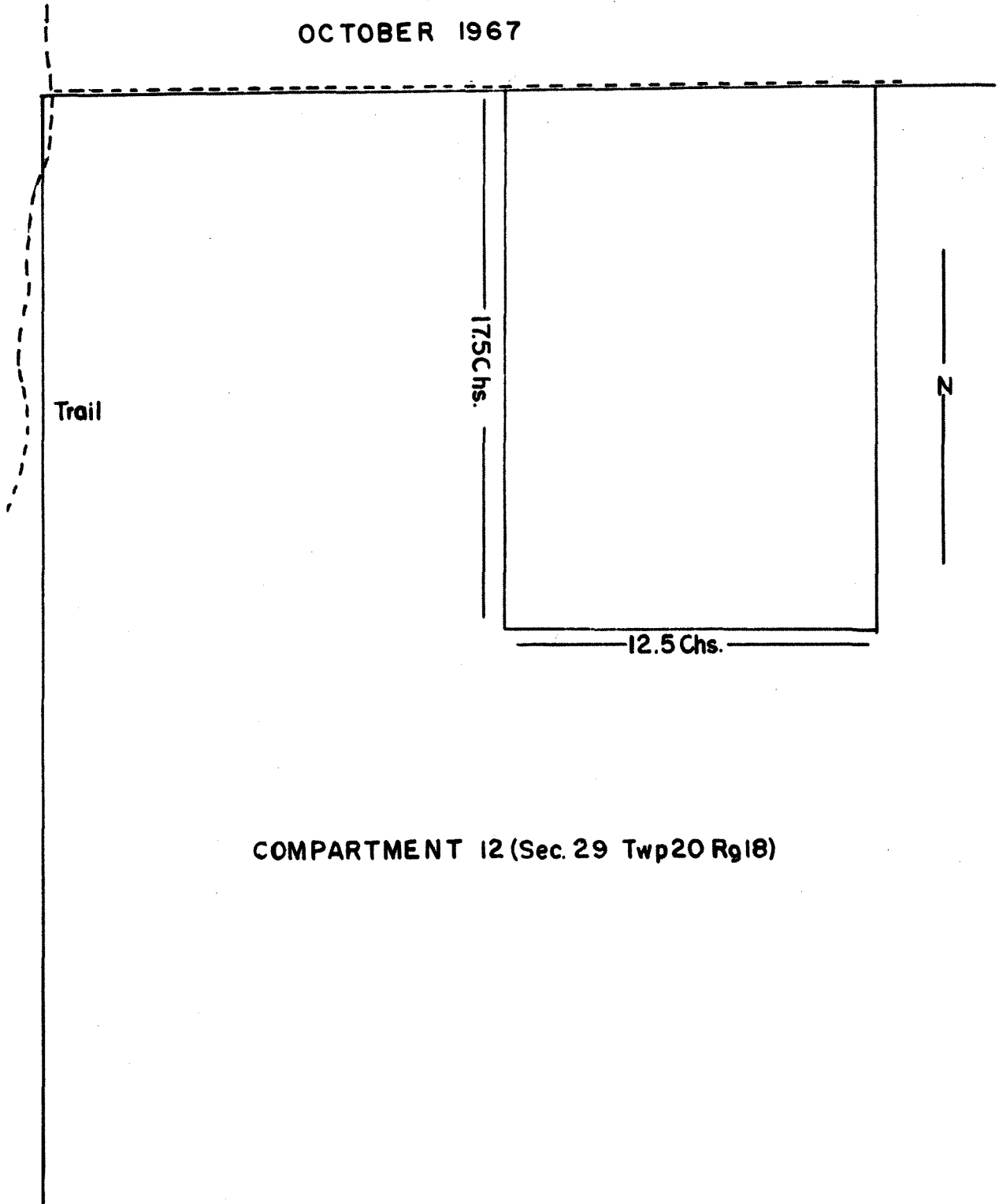


Figure 2

PLANTING STRIPS BULLDOZED TO MINERAL SOIL
OCTOBER 1967



COMPARTMENT 12 (Sec. 29 Twp20 R918)

FIG 3

ROADS AND TRAILS AS OF 1967
IN THE
RIDING MOUNTIAN FOREST EXPERIMENTAL AREA

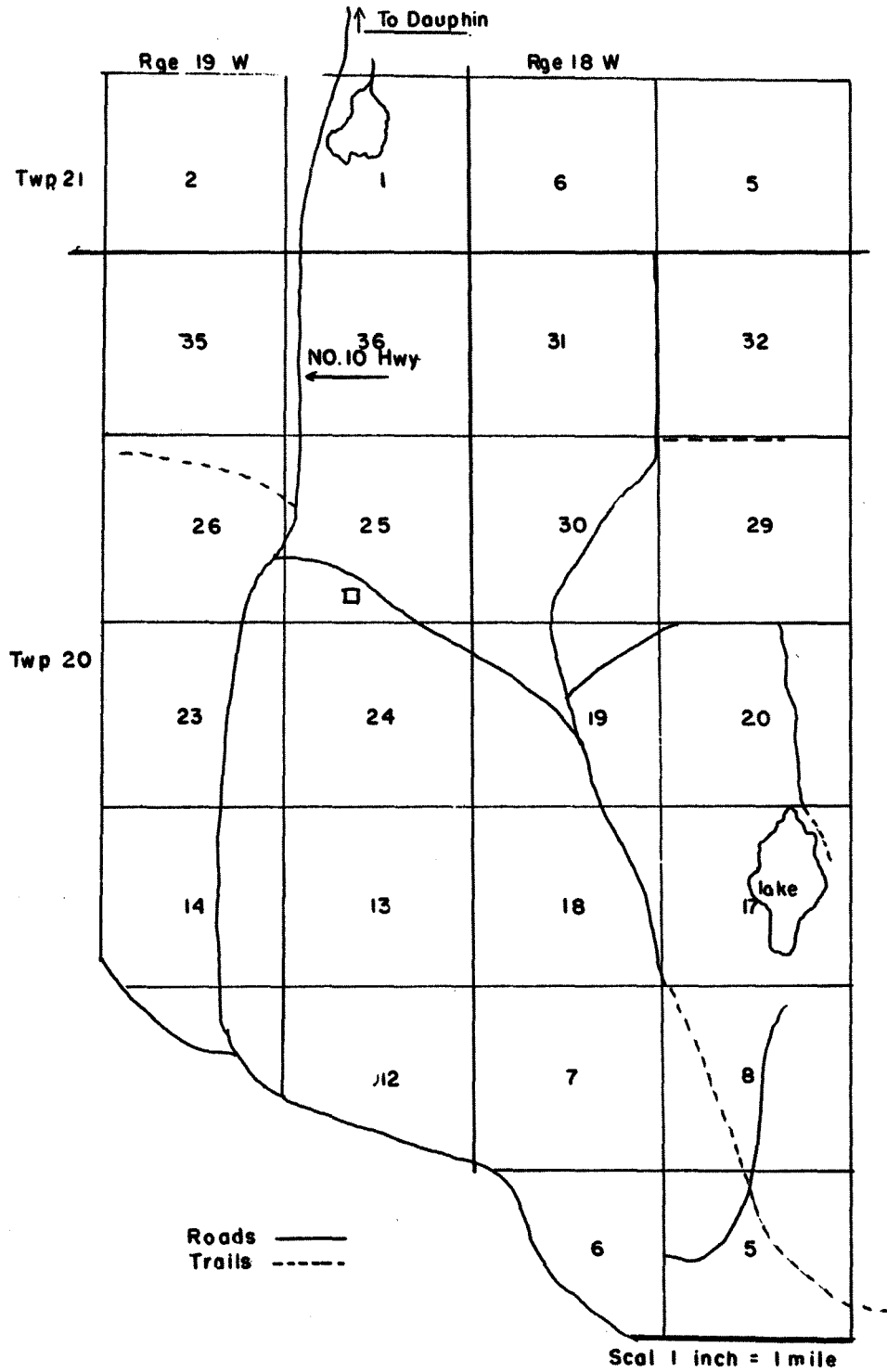


Figure 4.

GENERAL

The following table lists projects for which some assistance was provided during the 1967 field season.

Project Number	Type of work	Man days
MS-229	Clearing and burning	26
	Assemble barrel scarifying equipment	6
	Supervise and assist in clear-cutting and piling logs on 3 acre aspen research plot in Compartment 9	21
	Repair fences around plantations	2
MS-61	Weather station and fire index records recorded throughout the season	Daily supervision
MS-124	Reexamination of regeneration quadrats	6
	Dynamite water reservoirs in black spruce swamp, fire protection precaution for burning areas	2

SUMMARY TABLE

PROGRESS OF SILVICULTURAL OPERATIONS, RIDING MOUNTAIN FOREST EXPERIMENTAL AREA

Project	Previously reported	Since last report	Total to date
Marking timber	1,752 acres	0	1,752
Planting	250 acres	19	269
Herbicide treatment	424.4 acres	0	424.4
Seedbed treatment			
(a) for seeding	1,174 acres	0	1,174
(b) for planting	63 acres	20	83
Seeding broadcast	67	0	67
Girdling hardwoods	146	0	146
Thin and release	132.6 acres	0	132.6 acres
Pruning	33 acres	0	33 acres
Area logged	2,146 acres	0	2,146 acres
Timber removed	4,278,645 f.b.m.	0	4,278,645 f.b.m.