THE USE OF PRESCRIBED BURNING IN JACK PINE MANAGEMENT IN SOUTHEASTERN MANITOBA

Project MS-245

by

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INTRODUCTION

Prescribed burning has been used for seedbed and site preparation in the Sandilands Provincial Forest since 1964. Results of subsequent seeding and planting to 1967 have been generally unfavourable. In 1967, studies 5 and 6 were initiated on a 46-acre jack pine cutover near Marchand to determine whether modifications of the basic burn and plant or seed treatment would lead to more successful results. Study 5 seeks to determine whether delaying artificial regeneration attempts on prescribe-burned cutovers will enhance success. Study 6 is to compare seedling establishment and survival on burned areas, scarified areas and burned-scarified areas.

For additional information on this project see the establishment and previous progress reports (Cayford 1965, Walker 1966, 1967, Walker and Dobbs 1968).

WORK COMPLETED IN 1968

Reexamination of 1965 and 1966 burns

Spring and fall planting carried out on three areas burned during 1965 and 1966 was examined in late August to determine survival after two growing seasons.

Regeneration trials on studies 5 and 6

The layout of burning and scarification treatments is shown in Figure 1. Planting and seeding plot locations are shown in Figure 2. The lines shown within the broadcast or natural seeded areas (Figure 2) are the transects established for assessing regeneration.

First spring planting was carried out on May 1-3, 1968; second fall planting on September 30-October 2, 1968. Planting stock was provided by the Manitoba Department of Mines and Natural Resources Pineland Nursery at Hadashville. Planting stock measurements are shown in Table 1.

First spring seeding was done on April 10, 1968. At the time of seeding the ground was completely free of snow cover. Second fall seeding was done on November 20, 1968; snow cover on the area at the time was approximately one and one-half inches. Seed was broadcast at the rate of 12 ounces per acre.

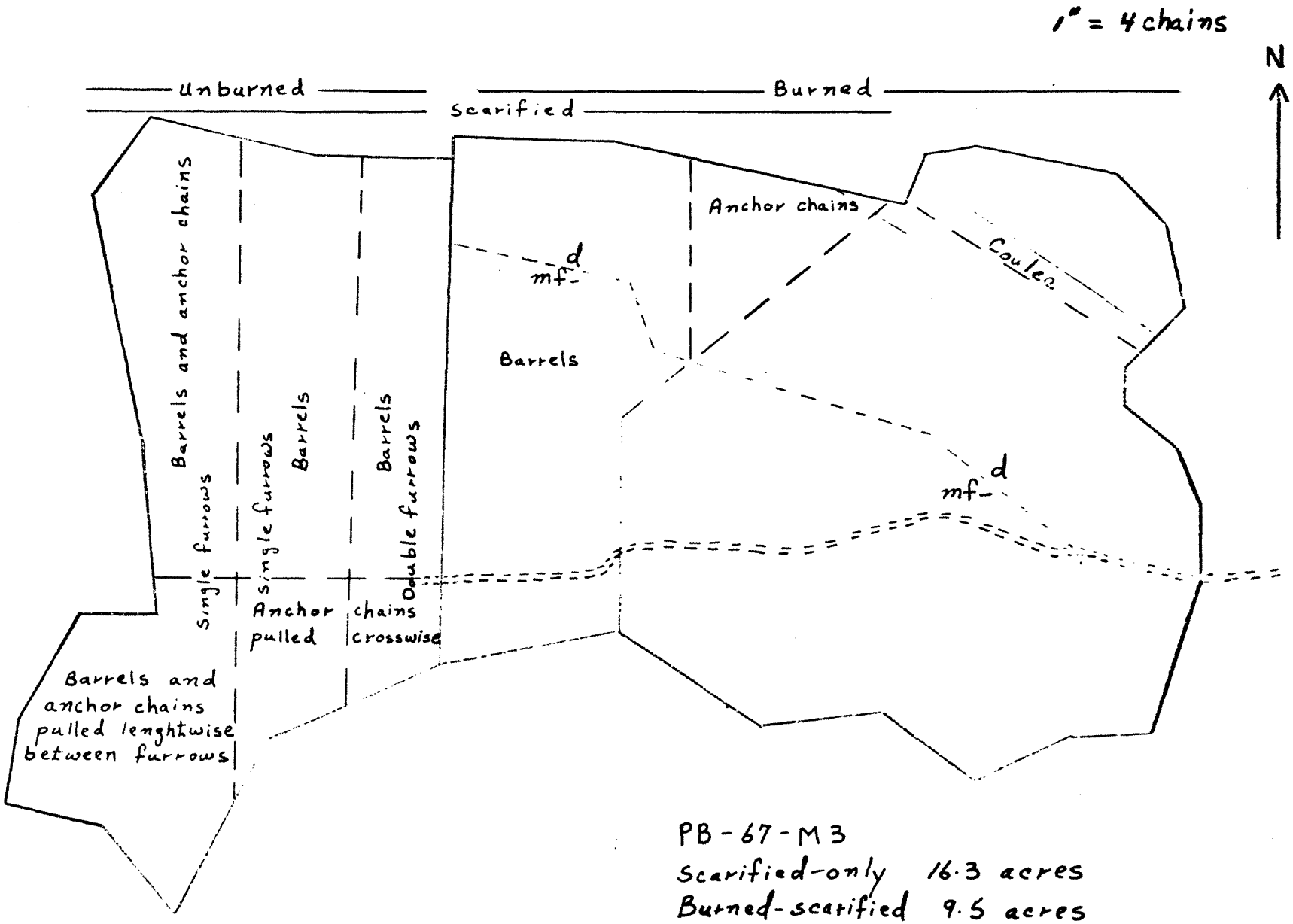

FIGURE 1. METHOD OF SITE PREPARATION FOR STUDIES 5 AND 6

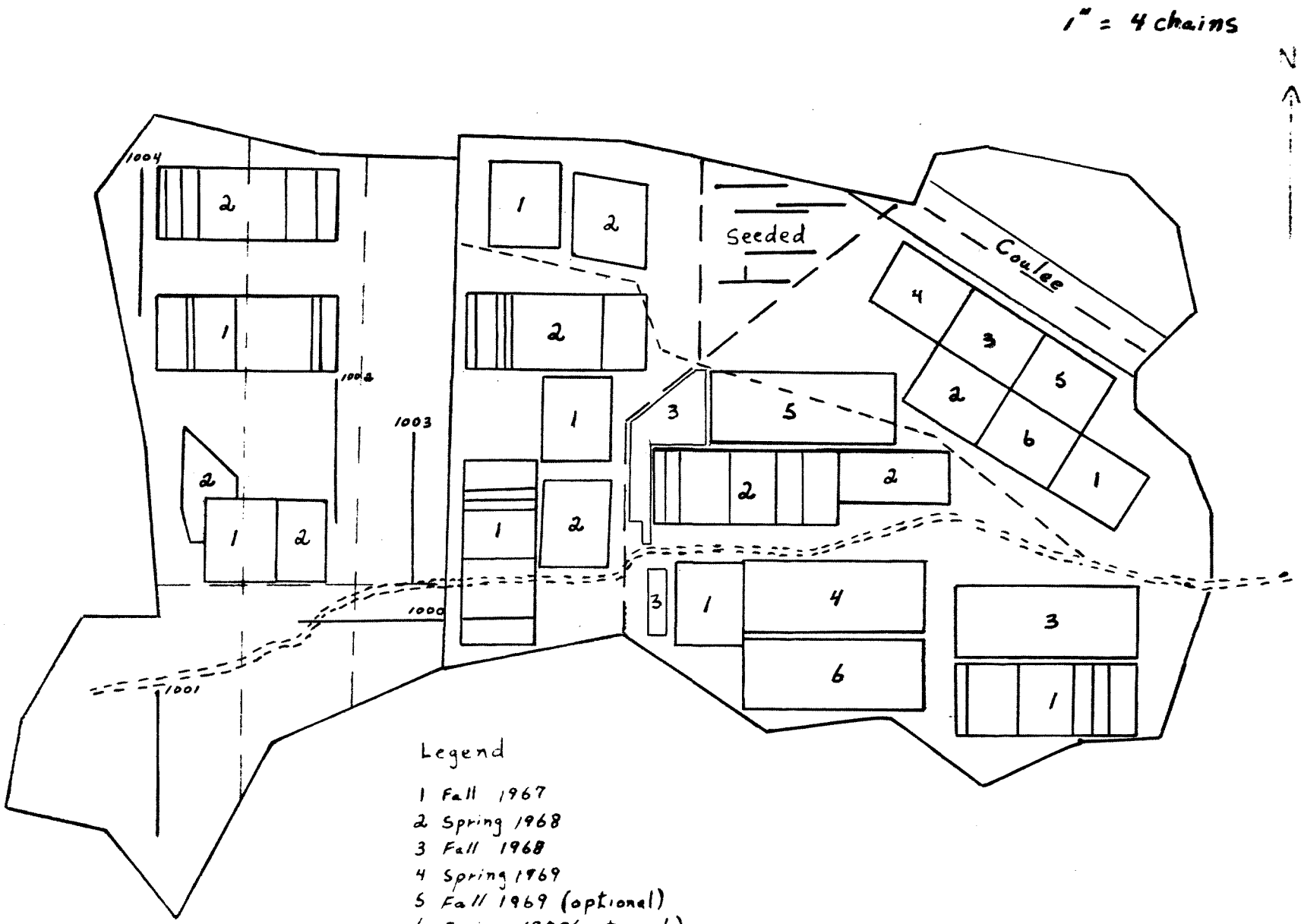

FIGURE 2. PLANTING AND SEEDING PLOTS ESTABLISHED FOR STUDIES 5 AND 6

Seed was collected in the Sandilands Provincial Forest by the Manitoba Department of Mines and Natural Resources during 1966. It was identified as seedlot no. 173. It was pretreated in March 1968 with Arasan and endrin (Walker 1967). Germination capacity of treated seed during March-April, 1968 was 85 per cent. Germination of treated seed in January, 1969 was 86 per cent.

RESULTS

Planting survival, 1965 and 1966 burns

A comparison of spring and fall planting survival and the effect of post-burn interval before planting is shown in Table 2. In the Hadashville district two adjacent areas were burned during 1965 and 1966. One area was planted one month after the burn and the other area one year after burning. Survival after one growing season (1967) was 14.3 and 30.9 per cent, respectively. These results suggest the advisability of a post-burn interval before planting. However, substantial mortality resulting from the 1967 summer-fall drought has wiped out this difference; survival after two seasons (as of fall, 1968) was 9.2 and 7.2 per cent, respectively. In the Woodridge district one area was burned during 1966 and planted one month later while a smaller portion was planted the following spring. First year results (1967) showed a marked effect in favour of spring planting; 69.4 per cent survival as compared to 19.0 per cent for fall planting. The 1967 drought did not noticeably affect survival on this area as essentially the same results were evident at the 1968 examination; spring planting survival was 63.5 per cent while that for fall planting was 16.0 per cent.

Planting and seeding assessment, studies 5 and 6

In reviewing the results of studies 5 and 6 it must be kept in mind that the late summer and fall of 1967 was hit by a severe drought and that the 1968 growing season was marked by above normal rainfall.

Fall, 1967 planting survival for the burned areas was higher on the "fresh" site (mf-) than on the dry (d) site (Table 3). Burning, followed by barrel scarification has increased survival over burning and no scarification for both the d and mf- sites, with the greater difference being shown on the dry site. Fall survival on the mf- site was best on the burned-scarified area while the unburned-scarified and burned-unscarified showed little or no difference. Spring planting survival was higher in all cases but this has been confounded by the drought and above normal rainfall. Some mortality on the burned-scarified area for both fall and spring planting was observed to be due to soil washing within the furrows and burying seedlings.

Seeding results for all three methods of site preparation (burning only, burning-scarification, and scarification only) were uniformly successful for studies 5 and 6 (Table 4). Stocking on the burned-unscarified fall seeded portion was lowest at 89 per cent and this also had the fewest number of seedlings per acre at 5,400.

TABLE 1

SUMMARY OF PLANTING STOCK MEASUREMENTS

Time of planting	No. of seedlings	Age	Average root length(inches)	Average top length(inches)	Avg. oven dry wts. (grams) Root	Top	Root/shoot ratio (oven dry)[1]
Spring	25	2-0	6.6	6.8	0.47	1.76	0.27
Fall	25	2-0	7.9	9.1	0.70	3.19	0.22

[1] dried at 105°C for 25 hours.

TABLE 2

SURVIVAL OF 1966 FALL AND 1967 SPRING PLANTING ON 1965 AND 1966 BURNS

Sept.-Oct., 1967 and Aug. 1968

Date of burn	Date of planting	Area	Number	Number of seedlings	Per cent 1967	Survival 1968	Average height inches, 1968
Aug. 23 1965	Sept. 25 1966	Hadashville	PB-65-H1	97	30.9	7.2	9.4
Aug. 26 1966	Sept. 25 1966	Hadashville	PB-66-H1	98	14.3	9.2	14.0
Aug. 3 1966	Mid-Sept. 1966	Woodridge	PB-66-W1	100	19.0	16.0	15.1
Aug. 3 1966	Early June 1967	Woodridge	PB-66-W1	85	69.4	63.5	12.1

TABLE 3

PLANTING RESULTS STUDIES 5 AND 6

August-September, 1968

Study	Method of seedbed preparation	Time of planting	Site*	Number planted	Per cent survival
5 6	Burned-unscarified	Fall, 1967	d	500	53
		Fall, 1967	mf-	500	71
		Spring, 1968	d	500	93
		Spring, 1968	mf-	500	93
6	Burned-barrel scarified	Fall, 1967	d	500	79
		Fall, 1967	mf-	500	85
		Spring, 1968	d	500	96
		Spring, 1968	mf-	500	97
6	Unburned-barrel scarified	Fall, 1967	mf-	500**	74
		Spring, 1968	mf-	500	93

* habitat types (Mueller-Dombois 1964)

** 38 seedlings killed through logging operations; per cent survival based on 462

TABLE 4

SEEDING RESULTS STUDIES 5 AND 6

August-September, 1968

Study		Method of seedbed preparation	Time of seeding	Per cent stocking	Seedlings per acre by seedbed		
					Scarified	Unscarified	Total
5	6	Burned-unscarified	Fall, 1967	89	No scarification	5,400	5,400
			Spring, 1968	96	No scarification	10,000	10,000
	6	Burned-barrel scarified	Fall, 1967	98	12,450	2,550	15,000
			Spring, 1968	92	9,400	4,250	13,650
		Burned-anchor chain-scarified	Fall, 1967	97	8,550	5,700	14,250
	6	Unburned-barrel scarified	Fall, 1967	100	9,300	200	9,500
			Spring, 1968	98	12,050	2,500	14,550
		Unburned-barrels only or barrels and anchor chains	Natural seeding	72	1,550	75	1,625

Scarification with anchor chains on the burned area, although not a part of the original studies was also carried out. This method was equally successful to any other in securing jack pine regeneration. Natural seeding on unburned-scarified areas, also not a part of the original studies, was assessed to obtain a comparison with broadcast seeding; this method showed the lowest stocking (72%) and the fewest seedlings per acre (1,625).

Seedling counts were made on scarified and unscarified portions of each area (burned and unburned). In all cases a greater number of seedlings were tallied on the scarified portions. On the burned-scarified areas some soil washing within the furrows was noted and some seedling mortality is expected. Shallower furrows on these areas would probably be sufficient scarification for both seeding and planting and thus reduce or eliminate this problem.

Greater differences between fall and spring seeding and between the different methods of site preparation were expected. Past studies on this project showed fall seeding to be more successful than spring. Greater differences in stocking in favour of scarified areas were also expected. The above normal rainfall for the year probably accounts for the equally successful results in all cases.

WORK PROPOSED FOR 1969

Spring and fall seeding and planting will be carried out on study 5 on the 1967 burn. Transects will be established on the seeded portions and a regeneration examination will be made during the fall of 1969 for areas seeded fall 1967, 1968 and spring 1968, 1969. A survival count will be made during the fall on all seedlings planted to date.

An additional area will be burned during 1969 and studies 5 and 6 will be replicated.

Study on the 1964 burn will be abandoned because of almost complete mortality resulting from the 1967 drought.

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