THE ECOLOGICAL EFFECTS OF PRESCRIBED BURNING ON JACK PINE SITES IN SOUTHEASTERN MANITOBA

Project MS-243

by

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INTRODUCTION

In 1964 a research program was begun to investigate the use of prescribed burning in cut-over jack pine stands in southeastern Manitoba. The program dealt with three aspects of fire: site preparation, fire behaviour, and post-fire succession. This report is concerned with the ecological effects of prescribed burning.

WORK COMPLETED IN 1968

Vegetation Study

Post burn vegetation was sampled on the 1965 burn (#4553D) located in LSD3, Sec. 5, Twp. 7, Rge. 11E and on the 1964 burn located in Sec. 29 and 32, Twp. 5, Rge. 10E. Braun Blanquets cover abundance scale as presented by Philips (1959) was used to describe the vegetation. Vegetation on the 1964 burn was sampled on three one-acre blocks each containing 20 permanent and 20 temporary 1/4-milacre sample plots. Vegetation in the 1965 burn was sampled on ten 1/10-acre plots each containing 20 1/4-milacre vegetation plots.

Soils

Five samples were collected on each of 10 permanent 1/10-acre plots from the Bt horizon and from the 0- to 4-inch depth on each plot in the 1965 burn (#4553D). Samples were transported to the laboratory for analysis.

Rodent Population Studies

The survey of post-burn rodent populations was continued on burns 4554W and PB-67-M2. Sampling on burn 4554W was concluded in the fall of 1968. Trapping procedures have been described in earlier reports (Bruce 1967). The areas were trapped for a period of three days in the spring and fall of the year. Areas II and III were located near the edge and in the centre of burn area PB-67-M2 respectively.

RESULTS

Vegetation Study

1964 Burn. Table 1 gives the per cent coverage by species and total coverage of vegetation present on areas I, II and III four years after burning. Total vegetative cover on the area as a whole was similar to that in the preceding year. Arctostaphylos uva-ursi, Grasses and Carex sp. continue to be the predominant species.

TABLE 1

SUMMARY OF POST BURN VEGETATION--1964 BURN

Species	Per cent coverage							
	Area I		Area II		Area III		All areas	
	PSP	All Plots	PSP	All Plots	PSP	All Plots	PSP	All Plots
Arctostaphylos uva-ursi	8.45	7.94	10.98	14.88	7.90	8.95	9.11	10.59
Apocynum androsaemifolium	0.45	0.45	0.05	0.12	0.45	0.46	0.32	0.34
Amelanchier alnifolia	0.15	0.08	0.32	0.46	2.10	1.21	0.86	0.58
Anemone quinquefolia	0.12	0.18	0.38	0.45	0.18	0.14	0.23	0.26
Anemone canadensis						0.01		0.003
Antennaria canadensis	0.32	0.25	0.90	0.85	1.98	1.23	1.07	0.78
Anemone patens	2.42	2.95	0.20	1.00	2.72	2.36	1.78	2.10
Compositae sp.	1.12	0.58	0.62	0.71	1.78	1.83	1.17	1.04
Carex sp.	10.40	9.22	8.20	7.86	2.18	2.40	6.93	6.49
Campanula rotundifolia	0.38	0.32	0.50	0.64	0.75	0.45	0.54	0.47
Ceanothus americanus		0.08	0.18	0.09	0.15	0.10	0.11	0.09
Equisetum arvense		0.01						0.003
Frageria virginiana	0.02	0.01		0.01	0.35	0.22	0.12	0.08
Gaultheria procumbens			0.32	0.17			0.11	0.06
Galium boreale	0.50	0.40	0.65	1.18	0.98	0.99	0.71	0.86
Grasses	5.95	4.52	9.52	9.36	6.28	8.08	7.25	7.32
Heuchera richardsonii		0.01			0.02	0.01	0.07	0.01
Lithospermum canescens	0.08	0.29	0.35	0.28	0.40	0.66	0.28	0.41
Lathyrus ochroleucus			0.15				0.05	.008
Maianthemum canadense	0.12	0.18	0.10	0.12	0.08	0.06	0.10	0.12
Potentilla tridentata	0.60	0.52	1.40	1.10	1.08	1.22	1.03	0.95
Prunus pumila	0.32	0.25	0.18	0.33	0.18	0.16	0.23	0.25
Prunus virginiana	0.18	0.78	0.45	0.38	0.90	0.48	0.51	0.55
Prunus pennsylvanica					0.15	0.08	0.05	0.03
Rosa acicularis	2.48	2.38	1.85	1.48	0.85	1.85	1.73	1.90
Symphoricarpos albus					0.20	0.79	0.07	0.26
Salix sp.	0.30	0.30			0.15	0.15	0.15	0.15
Spiraea alba	0.45	0.45	0.30	0.31	0.02	0.01	0.26	0.26
Thalictrum venulosum						0.08		0.03
Vaccinium angustifolium	2.35	2.75	3.52	3.67	2.45	2.62	2.77	3.01
Viola sp.	0.25	0.18	0.02	0.07	0.12	0.10	0.13	0.12
All species	37.41	35.08	41.14	45.52	34.40	36.69	37.68	39.11

1965 Burn 4553D. Post-burn vegetation coverage on the 1965 burn is shown in Table 2. Total coverage on the area three years after burning was 48.2 per cent, only slightly reduced from the previous year's coverage. Grasses, Arctostaphylos uva-ursi and Ceanothus americanus continue to be dominant on the area.

Rodent Population Studies

The number of mammals trapped during the spring and fall periods on burns 4554W and PB-67-M2 are shown in Tables 3 and 4 respectively. Peromyscus maniculatus and Microtus pennsylvanicus drummondii continue to be the most prevalent species in the burn areas and Clethrionomys gapperi lorengi the most prevalent on the control areas. A moderate reduction from the previous year's estimate was noted in the fall population.

WORK PROPOSED FOR 1969

Work on 1964 and 1965 Burns

Vegetation studies: Plant succession on the burn areas will be studied in late June or early July using the permanent and temporary sample plots established in 1964 on the 1964 burn and the permanent sample plots established in 1965 on the 1965 burn. Sampling technique will be as outlined in earlier reports.

Soil chemistry 1965 burn: Soil samples from the 0 - 4 inch level and Bt horizon will be collected from each plot. Chemical analysis to determine calcium, phosphorus, potassium, nitrogen and magnesium content will also be carried out. Samples will be taken one year from the previous sampling date.

Work on Burn PB-67-M2

Rodent population studies: At present it is uncertain whether trapping will be continued in 1969.

REFERENCES

Bruce, N. The Ecological Effects of Prescribed Burning on Jack Pine Sites in Southeastern Manitoba. Unpublished Internal Report MS-46, 1967. 19 p.

Budd, A.C. and Keith F. Best. 1964. Wild plants of the Canadian prairies. Canada Dept. Agriculture Res. Br. Publ. 983: vii + 519 pp.

TABLE 2

SUMMARY OF POST BURN VEGETATION. BURN 4553D

Species	Per cent cover by plot											
	1	2	3	4	5	6	7	8	9	10	Total	Avg.
Arctostaphylos uva-ursi	4.7	5.1	14.6	7.7	2.0	2.7	2.9	1.4	8.0	5.5	54.6	5.5
Apocynum androsaemfolium	1.6	3.6	2.2	0.9	1.7	1.6	2.1	2.4	2.5	0.2	18.8	1.9
Amelanchier alnifolia	2.6	0.6	0.2	1.3	0.2	2.4	0.7	1.5	0.5	0.02	10.0	1.0
Anemone quinquefolia	0.2	0.5	0.4	0.3	0.1	0.2	0.4	0.3	0.2	0.05	2.6	0.3
Antennaria canadensis	0.2	0.5	0.02	0.08	0.2	0.6	0.5	1.1	0.2	0.2	3.6	0.4
Anemone patens	0.3	0.2	0.2	0.8	0.7			0.4	1.8	0.6	5.0	0.5
Anemone cylindrica				0.2						0.2	0.4	0.04
Compositae sp.	3.9	0.9	2.2	1.8	1.7	2.7	2.0	2.6	1.2	0.5	19.5	2.0
Cornus canadensis								0.2			0.2	0.02
Carex sp.	1.9	1.8	0.7	0.6	1.6	3.6	2.2	1.2	0.7	2.0	16.3	1.6
Campanula rotundifolia	0.3	0.5	0.5	0.1	0.2	0.2	0.4	0.8	0.5	0.3	3.8	0.4
Ceanothus americanus	6.6	2.4	5.4	5.4	2.0	3.7	8.0	1.3	4.1	0.3	39.2	3.9
Epilobium angustifolium	0.02										0.02	0.002
Equisetum arvense					0.02			0.07	0.02	0.05	0.16	0.02
Frageria virginiana	0.6	0.2	1.8	0.9	0.04	0.6	0.7	0.6	0.2	0.3	6.3	0.6
Gaultheria procumbens		0.02	0.2	0.05	0.02		0.02				0.3	0.03
Galium boreale	6.2	4.4	2.6	3.4	2.1	3.6	6.0	4.6	3.0	0.4	36.3	3.6
Juniperus communis		0.02									0.02	0.002
Lithospermum canescens	1.6	1.2	0.5	0.5	1.0	0.5	1.2	0.8	0.6	0.2	8.1	0.8
Linnaea borealis		0.02					0.02				0.04	0.004
Maianthemum canadense		0.05	0.2	0.5	0.02	0.02	0.02	0.05	0.05		0.9	0.09
Melampyrum lineare					0.02						0.02	0.002
Potentilla tridentata	0.1	1.2	0.2	0.7	0.3	0.3	0.3	0.2	0.7	0.4	4.4	0.4
Prunus pumila	0.4	0.4	0.3	0.05	2.0	0.8	0.3	1.2	0.2	0.2	5.8	0.6
Prunus virginiana	0.2	0.4	0.9	0.2	1.0	1.8	2.1	2.7	0.3	0.3	9.9	1.0
Prunus pennsylvanica								0.2			0.2	0.02
Petasites sagittatus		0.02	0.02								0.04	0.004
Rosa acicularis	1.6	4.6	2.3	1.4	1.6	7.0	0.6	1.4	3.8	0.5	24.8	2.5
Rubus strigosus	1.9										1.9	0.2
Rhus radicans							0.2	0.2			0.4	0.04
Symphoricarpos albus	7.2	3.3	2.0	3.4	0.8	7.2	8.6	0.6		0.2	33.3	3.3
Thalictrum venulosum				0.9		0.02			0.02	3.8	4.7	0.5
Vaccinium angustifolium	0.4	4.9	1.3	0.9	2.2	1.6	0.4	1.9	1.2	0.9	15.7	1.6
Viola sp.	0.2	0.2	0.4	0.08	0.1	0.05	0.2	0.08	0.08	0.1	1.5	0.2
Vicia americana						0.02					0.02	0.002
Grasses	13.9	6.9	16.6	19.5	12.3	12.1	13.8	17.5	13.0	15.4	141.0	14.1
Anemone canadensis							0.2				0.2	0.02
Unidentified sp.										0.2	0.2	0.02
Total coverage	56.6	43.9	55.7	51.7	34.3	54.4	53.9	45.6	42.9	32.8	481.8	48.2

Nomenclature according to Budd, A.C. and Keith F. Best (1964).

TABLE 3

RODENT SURVEY BURN AREA 4554W

Species	Burn				Control			
	Mice caught		Mice per acre		Mice caught		Mice per acre	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Peromyscus maniculatus	10	7	0.79	0.55	1	0	0.08	-
Zapus hudsonius hudsonius					1	0	0.08	-
Clethrionomys gapperi lorengi					5	3	0.52	0.31
Microtus pennsylvanicus drummondii	2	3	0.23	0.34	2	5	0.23	0.57
Blarina brevicauda manitobensis					1	0	0.08	-
Sorex cinereus cinereus					0	1	-	0.08
Citellus tridceemlineatus	1	0	*0.20					

* Home radius not known. Number per acre based upon five acres.

TABLE 4

RODENT SURVEY BURN AREA PB-67-M2

Species	Control				Area II				Area III			
	Mice caught		Mice per acre		Mice caught		Mice per acre		Mice caught		Mice per acre	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Peromyscus maniculatus					11	12	0.87	0.95	11	11	0.87	0.87
Zapus hudsonius hudsonius	2	0	0.16						1	0	0.08	
Clethrionomys gapperi lorengi	7	6	0.73	0.62								
Eutamias minimus borealis	1	0	0.20									
Microtus pennsylvanicus drummondii	13	2	1.48	0.23	2	5	0.23	0.57	1	8	0.11	0.91
Sorex cinereus cinereus	1	3	0.08	0.23								
Blarina brevicauda manitobensis												
Citellus tridceemlineatus												
Unidentified specimen	2	0	*0.40						2	0	0.40	

* Home radius not known. Number per acre based upon five acres.