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THE USE OF HERBICIDES FOR CONTROL OF CALAMAGROSTIS GRASS IN PLANTATIONS OF THE PEACE RIVER

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Working Plan
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INTRODUCTION

Perennial reed grass species, particularly Calamagrostis scribneri, are a major obstacle to plantation establishment in the Peace River region. Due to aggressive encroachment by this native grass species, plantings following mechanical site preparation alone have often been unsuccessful. The use of herbicides for site preparation and brushing and weeding of grass competition must be explored. A preliminary investigation of herbicide effectiveness is therefore proposed for a benchmark Calamagrostis dominated site near Mile 106 of the Alaska Highway (see Figure 1). Introduced to foresters of the Northern Silviculture Committee at the 1982 Spring Workshop, this site typifies the vegetation control problems associated with grass competition. The cutlock of interest (TS A04561, C.P. A4) was logged in 1975 and site prepared with anchor chain drags the same year. Rapid invasion of Calamagrostis precluded planting the following year. The area was again site prepared in the spring of 1980 with a ripper-shank plow which deep trenched the site. White spruce seedlings of 2+0 bareroot stock were planted late in the same spring, and have since been subjected to intense grass competition. Seedling losses have been high and performance of survivors poor up to 1983.

The easy access afforded this site and the interest in the problem it represents to Peace River silviculturists make it a desireable location at which to initiate a herbicide-use study. While research support currently prohibits involvement in a large-scale study program, the small experiments and demonstrations subsequently proposed are timely, and may assist in the development of future research plans.

OBJECTIVES

1. To determine the efficacy of several potentially useful herbicide materials for control of Calamagrostis and improvement of white spruce seedling performance.

2. To create a demonstration area for chemical vegetation control.

3. To compare the use of two ground level herbicide applicators.

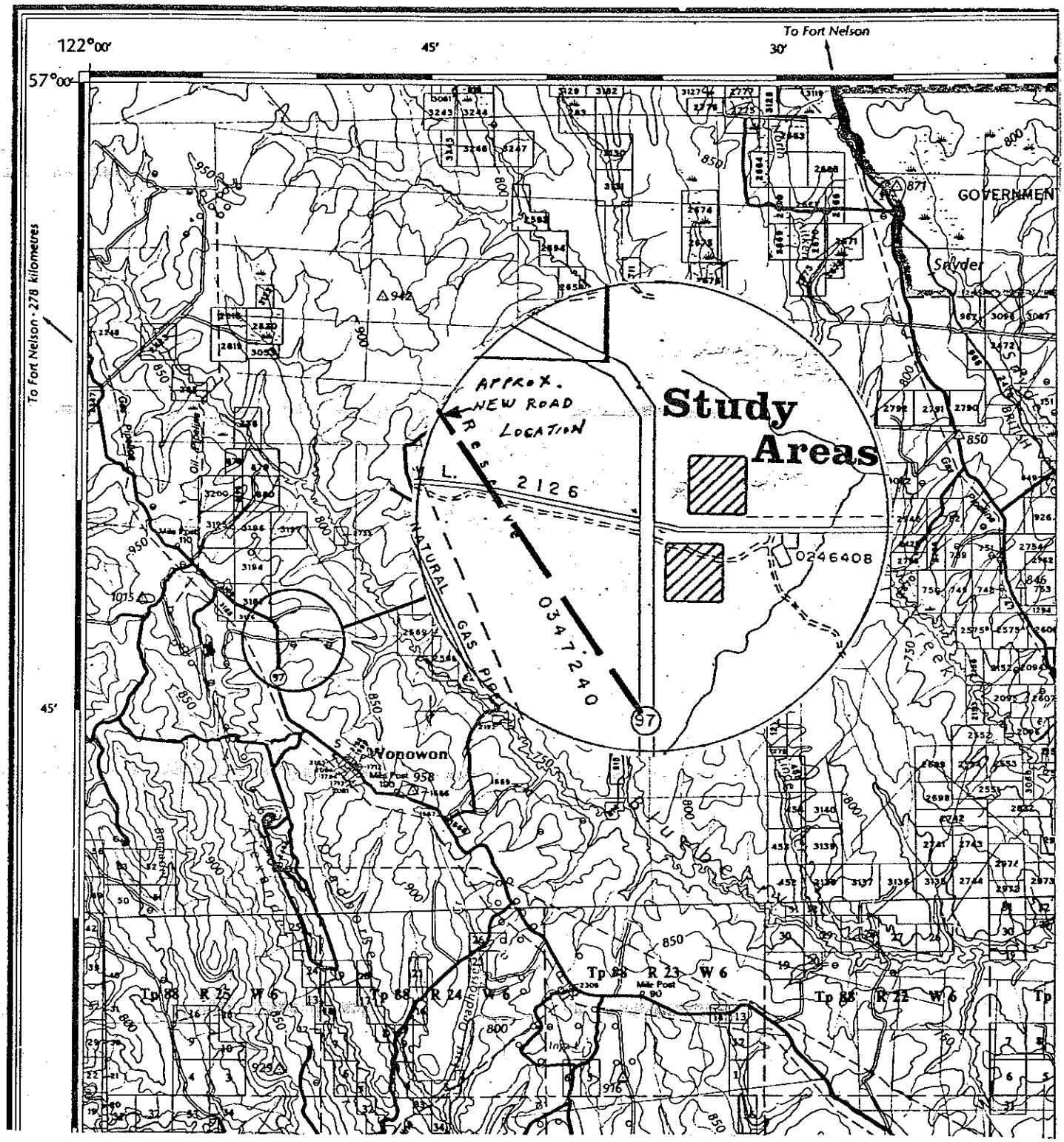

Figure 1. Location of Mile 106 Area Scale 1:250,000 (Inset Scale 1:15,840)

METHODS

The study comprises two parts. The first is a single factor experiment designed to compare the efficacy of glyphosate, hexazinone, simazine and dalapon as chemical site preparation agents aimed at promoting white spruce seedling establishment. The second part consists of an equipment comparison of the C.P. 3 backpack sprayer and the ultra-low-volume (U.L.V.) sprayer.

Chemical Comparison Study

Plot Layout - fifteen plots with square dimensions of 20 x 20 m were surveyed in May 19, 1983. A between-plot buffer of 3 m was provided in order to minimize adjacent plot treatment contamination. Each of these plots will be randomnly assigned one of five chemical treatments. Figure 2 illustrates the layout of plots on the site.

Proposed Treatments - five chemical grass-control treatments are proposed as follows:

T_0 - Control: no herbicide application
T_1 - Glyphosate (Roundup): 3 kg a.i./ha
T_2 - Hexazinone (Velpar Liquid): 3 kg a.i./ha
T_3 - Simazine (Princep 80W): 4 kg a.i./ha
T_4 - Dalapon (Dowpon): 6 kg a.i./ha

All chemicals will be applied in water solution using pressurized back-pack sprayers or ground level pressure boom (developed by Research Section). Glyphosate will be applied mid to late summer, 1984, to fully developed grass and shrub vegetation. Hexazinone, simazine and dalapon will be applied during the fall, 1983 or early spring, 1984.

Experimental Design - a completely randomized design will be used. Each treatment will be replicated three times. Treatment allocation is shown in Table 1.

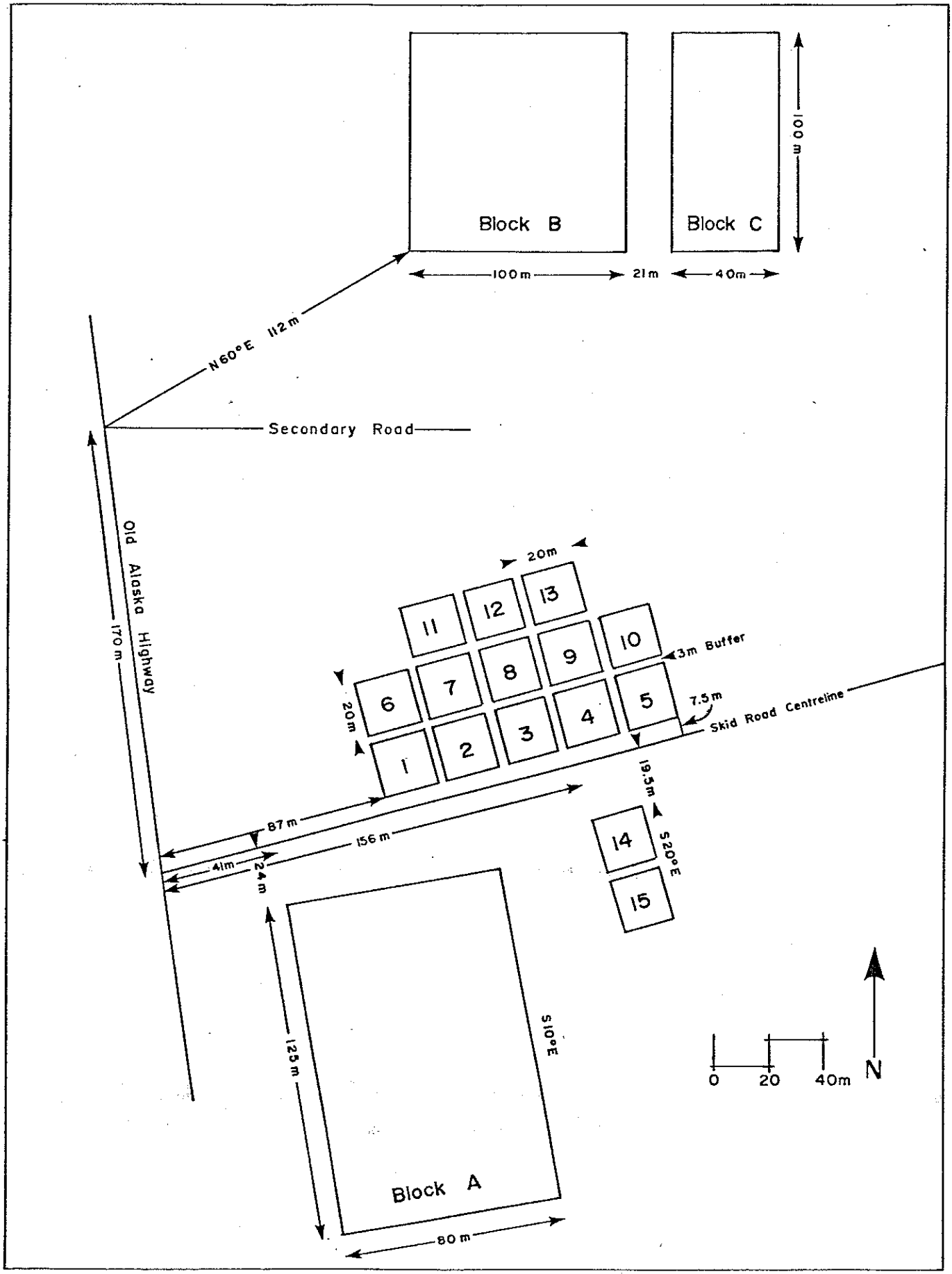

Figure 2. Plot Layout for Chemical and Equipment Comparisons

Table 1. Plot Treatment Allocation: Plot Numbers Corresponding to Replicates of Treatments

	Chemical Treatment				
	T_0	T_1	T_2	T_3	T_4
Replicate 1	2	5	1	3	4
2	6	14	7	11	8
3	13	15	10	12	9

Tree Seedling Establishment - all plots will be planted in the spring of 1984 with an appropriate white spruce stock at a 2 x 2 m spacing.

Measurements - given present staff restraints, detailed quantitative assessments of herbicide impact on vegetation are beyond the scope of this study. Of primary concern is the impact of the herbicide treatments on the establishment and subsequent growth of commercial tree seedlings. To this end, measurements of total height, current annual height increment, caliper, survival, condition, form and degree of overtopping by weeds will be recorded for each seedling of planted white spruce within an inner 25 tree core of each plot. Except for the degree of overtopping, which will be assessed annually, these measurements will be taken at the end of the first, third and fifth growing seasons after planting.

With respect to the impact of herbicides on target vegetation, comprehensive photographic records over time will be kept for all treatments. The average height of major weed species in each plot will be assessed annually. Determination of major weed species will be done subjectively, ie. those species with the greatest perceived canopy coverage and most likely to compete with the planted seedlings. A maximum of three species will be measured per plot. Systematic transect sampling will be used to determine average height of the weed species.

Proposed Analyses - the expermental design will allow for analyses of variance to be carried out on tree seedling growth data from the various treatments. Where there is suitable distribution of major weed species, average height of major species may also be subject to ANOVA. Photographic records and annual visual surveys of plot vegetation will permit qualitative assessments of the effectiveness of herbicide treatments for controlling competing vegetation.

Application System Comparison Study

An informal comparison of the C.P. 3 pressure sprayer and the backpack U.L.V. (ultra-low volume) applicator are proposed for the study area. In order to achieve this comparison three blocks (A, B and C) were surveyed for trials of the equipment, as shown in Figure 2.

G. Ackerman (Silviculture Branch) will be responsible for the equipment trial. Treated areas will be available for chemical efficacy assessments and seedling establishment. Glyphosate is anticipated to be the chemical applied in the tests.

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GRASSY site preparation using four herbicides. Fahlman, R. and Herring, L.J. Four herbicides were tested as a site preparation treatment for control of Scribner's reed grass and fireweed on a backlog site in the Peace River region of B.C. The experiment employed a completely randomized design consisting of 3 replicates of 4 herbicides plus controls. Treatment plots were 20 x 20 m, with twenty 5 m^2 assessment plots within each treatment plot. Glyphosate was applied by backpack sprayer on July 16, 1983. Other treatments were carried out on May 3, 1984. Dalapon and liquid hexazinone were applied with a knapsack sprayer and hand-held spray boom. A cyclone seeder was used to distribute granular hexazinone (10%). Post-spray planting of white spruce plugs (PSB 415) was completed on May 26, 1984. Results obtained one growing season after treatment are presented below. Analysis of variance was conducted on height data and on arc sine transformations of % cover data.

Treatment	Rate kg/ha	Reed Grass		Fireweed	
		% cover	avg ht (cm)	% cover	avg ht (cm)
contol	--	74 a	61.0 a	20 a	57.0 a
dalapon	6	66 a	56.5 ab	20 a	58.0 a
granular hexazinone	3	42 ab	48.0 ab	24 a	57.0 a
liquid hexazinone	3	39 b	45.0 bc	25 a	58.0 a
glyphosate	3	23 b	30.5 c	6 a	29.0 b

Means tested using Duncans new multiple range test (P = 0.05).

Glyphosate showed very good control of reed grass, compared to the control, cover was reduced by 69% and height by 50%. Liquid and granular hexazinone showed intermediate control of reed grass, with 47% and 43% reductions in cover and 26% and 21% reductions in height, respectively. Although not statistically significant, glyphosate was the only herbicide which showed evidence of fireweed control. There was no evidence of herbicide toxicity to crop trees in any of the treatments. After one growing season, no differences in crop tree growth response were evident. Further evaluations are warranted.