

PESTICIDE USE
IN BRITISH COLUMBIA FORESTRY

1982

by
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Protection Branch

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ABSTRACT

Continued improvements and additions to the forestry pesticide use data base have resulted in a subsequent report to "Pesticide use in British Columbia Forestry, 1981", concerning various aspects of forestry pesticide use in 1982. Follow-up information included in this report represents 98 percent of all pesticide use permits issued to the B.C. Ministry of Forests and B.C. Forest Industry for the period 1982, and 96 percent of all permits issued previously to 1982 which could have been active in 1982. Included are tables and charts depicting amounts of each pesticide used, and respective areas treated. Also included are such details as: areas treated by control purpose and pesticide used; areas treated by method of application and pesticide used; areas treated by forest type identity; areas scheduled for treatment compared to areas actually treated by pesticide; reasons for pesticide use permit cancellations by area affected; as well as herbicide use trends from 1975-1982.

INTRODUCTION

Summarized in this report are the results of a survey conducted in 1983 on pesticide use in 1982 by the B.C. Ministry of Forests and B.C. forest industry.

The report is designed to succeed internal report PM-PB-8, entitled "Pesticide Use in British Columbia Forestry, 1981", published by the Ministry of Forests, Protection Branch in December 1982. It represents the results of a continuing project involving the B.C. Ministry of Forests, the Council of Forest Industries and the B.C. Ministry of Environment (Pesticide Control Branch) to provide accurate records of pesticide use on British Columbia forests and rangeland.

It is hoped that access to ongoing records and yearly summaries of actual pesticide use, will provide users and other individuals involved in forestry pesticide use issues, with an indication of the current extent of, and trends in, forestry pesticide use.

Data presented herein, on the processing of 1982 forestry pesticide use applications, includes the numbers of permits issued, implemented, cancelled and appealed. Environmental Appeal Board Decisions on all appealed permits are also shown.

Information on forestry pesticide use in 1982 includes the following:

- (1) total hectares of forest land treated with pesticides.

(2) total kilograms of pesticide active ingredient applied to forest land.

(3) total hectares of forest land treated with pesticide by control purpose - e.g., conifer release, pre-commercial thinning, insect control;

(4) total hectares of forest land treated with pesticides by method of treatment - e.g., tree injection methods, aerial helicopter spray;

(5) total hectares of forest land treated with pesticides by forest stand type identity - e.g., mature, immature, not satisfactorily restocked;

The above mentioned data is further differentiated by:

(i) user - e.g., B.C. Ministry of Forests, B.C. forest industry or a combination of both.

(ii) pesticide used - e.g., 2,4-D amine, glyphosate;

(iii) type of pesticide - e.g., herbicide, fungicide;

(iv) project type - e.g., research or operational.

Comparisons of previously mentioned information are illustrated by a series of bar charts. Other graphical comparisons include:

- (1) areas scheduled for pesticide treatments compared to areas actually treated;
- (2) reasons for pesticide use permit cancellations by area affected;
- (3) total areas of forest land treated with herbicides by the B.C. Ministry of Forests and B.C. forest industry, 1975-1982;

Also included is an appendix containing a graphical comparison of areas treated by controlled burning, mechanical brushing and herbicides by the Ministry of Forests 1982-83 fiscal year.

FORESTRY PESTICIDE USE INFORMATION SYSTEMS

Sources of information included in this report are:

- (1) The B.C. Ministry of Environment, Pesticide Control Branch electronic word processing files of pesticide use permits.
- (2) The B. C. Ministry of Forests, Silviculture Branch Stand Tending Reports as well as B. C. Ministry of Forests Protection and Range pesticide use permit holders.
- (3) A survey by the Ministry of Forests, Protection Branch, with the collaboration of the Council of Forest Industries of B.C., of all forest companies holding pesticide use permits in 1982.

Surveys of permit holders subsequent to 1982 will be conducted through the Ministry of Environment, Pesticide Control Branch. An example of their follow-up information request form is shown in Figure 1.

In 1983 the Ministry of Forests, Protection Branch, imported all of the Pesticide Control Branch electronic word processing files on forestry related pesticide use permits. These have been incorporated into an expanded Wang VS45 data base which holds information on each permit as well as its field implementation. Information may now be entered directly into this data base, and reports (i.e. summaries and extractions) generated from it.

FIGURE 1. EXAMPLE OF LETTER AND FOLLOW-UP FORM ISSUED TO FOREST
PESTICIDE USE PERMIT HOLDERS BY THE B.C. PESTICIDE
CONTROL BRANCH, 1983



Province of
British Columbia

Ministry of
Environment

Pesticide Control Branch
810 Blanshard Street
Victoria
British Columbia
V8V 1X5
Telephone 387-4321

November 16, 1983

British Columbia Minister of Forests
P.O. Box 4
Bella Coola, British Columbia
V0T 1C0

Attention: Mr. G. Burns
Resource Officer, Silviculture

Dear Sir:

Pesticide Control Act Pesticide Use
Permit for Use of 2,4-D Amine (P.C.P.
Act Reg. No. 16995) for Control of
Deciduous Brush for Conifer Release
Purposes, Dean River Valley, 21.7 km
N.W. of Bella Coola, Lot 48 VCL
(103 hectares)

To Forestry Pesticide Permit Holders:

The above information represents a Pesticide Use or Special Use Permit which was effective during 1983. To fulfill a requirement for more accurate records and in cooperation with C.O.F.I. and the Ministry of Forests, we are compiling data on the actual pesticide uses conducted in 1983. This will replace the annual request for follow-up information normally conducted by the Ministry of Forests, Protection Branch.

Please enter the information pertaining to this specific permit and return this form prior December 31, 1983.

Your cooperation in this matter is appreciated.

D. E. Cronin
Permit Coordinator

Pesticide Use in 1983 Under Permit No. 104-420-83/85

Pesticide	Quantity of Active Ingredient Used (kg)	Area Treated (ha)
		Total area:

STAND INFORMATION (if applicable, refer to back for explanation of terms)

Type Identity _____

Treated Stand Type Label:

1. Species & % _____
2. Average Age _____
3. Average Height (m) _____
4. Average dbh & Range (cm) _____
5. Site Class _____
6. Crown Closure (%) _____
7. Stems/ha _____

Height of Target Species (m) _____

If no work was conducted under this permit in 1983 please give reason.

RESULTS OF THE 1982 B.C. FORESTRY PESTICIDE USE SURVEY

Results of the 1982 B.C. Ministry of Forests survey of forestry pesticide use are represented in a series of graphs and tables on the following pages.

A total of 135 forestry related permits were issued by the B.C. Pesticide Control Branch in 1982. Of these, 79 (or 59 percent) were implemented, 49 (or 36 percent) were cancelled or postponed by the permit holders, and 7 (or 5 percent) were cancelled by the B.C. Pesticide Control Branch at the request of each permit holder.

Thirty-nine permits were appealed in 1982 compared to only 16 in 1981. All 39 of these permits were upheld by the Environmental Appeal Board.

Herbicides are currently the most commonly used chemicals in B.C. forestry. In terms of area treated, the herbicide most commonly used in 1982 was 2,4-D amine/ester with 2802.2 hectares treated. In contrast, fosamine (Krenite) was the herbicide most commonly used in 1981. Krenite was applied to 2762.2 hectares of forest land in that year. Because of the loss of temporary registration status only 36.4 hectares were treated with fosamine in 1982. MSMA, picloram and glyphosate followed 2,4-D amine/ester in 1982 in terms of area treated with, respectively, 856.0, 753.4 and 272.7 hectares.

The four most commonly used pesticides in 1982, in terms of weight, were 2,4-D amine/ester, picloram, glyphosate and MSMA with, respectively 4793.8, 776.7, 395.8 and 281.5 kilograms of applied active ingredient.

Treatment of forest land with herbicides for the purpose of conifer release remained the predominant type of pesticide application in 1982.

Conifer release operations using herbicides were carried out on 2664.7 hectares while pre-commercial thinning, brush control, site preparation, seed-tree control and right-of-way maintenance projects, together, were carried out on only 561.0 hectares or less than a third of this amount. Noxious weed control operations, primarily conducted on crown rangeland under the jurisdiction of the B.C. Ministry of Forests, involved 1040.8 hectares of pesticide treated land. Projects to control forest insect pests involved the treatment of 762.0 hectares of forest land. Insecticide use projects were mostly for the control of the Douglas-fir tussock moth and the spruce beetle.

Tree injection treatment (i.e. hack and squirt, frill and squirt, etc.), primarily used in conifer release operations, was the most common method of pesticide application in 1982. A total of 2676.4 hectares of forest land were treated by some type of tree injection method. Second to tree injection treatment, in terms of area treated, was the aerial spray application of 989.4 hectares, of which 949.4 hectares were treated by helicopter and 40.0 hectares by fixed wing aircraft. The third most common method of pesticide application employed truck mounted sprayers to treat 651.0 hectares of forest and rangeland.

Immature stands received most of the pesticides applied in 1982. A total of 3033.9 hectares of immature stands were treated by the B.C. Ministry of Forests and B.C. forest industry. The B.C. Ministry of Forests treated 717.0 hectares of mature forest land with pesticides. This area mostly involved insect control projects. Also, 812.8 hectares of non-forest or Crown rangeland were treated by the B.C. Ministry of Forests in 1982.

Of those permits for which reasons for cancellations or postponements were known, 1189.8 hectares were not treated because of budget problems, 314.8 hectares were not treated because of registration problems (this involved fosamine only), and 114.2 hectares were not treated because of technical problems. A total of 1230.7 hectares of pesticide treatments were postponed until 1983 or later. 2,4-D amine/ester showed the greatest discrepancy in terms of forest land scheduled for treatment (i.e. 7024.4 hectares) compared with forest land actually treated (i.e. 2802.2 hectares).

The B.C. Ministry of Forests increased its use of herbicides by a slight 269.0 treated hectares while the use of herbicides by B.C. forest industry declined sharply from 4232.0 treated hectares in 1981 to 1636.0 treated hectares in 1982. Overall forestry herbicide use declined in 1982 from the previous year by 2327.0 treated hectares.

TABLE I. THE FATE OF 1982 PESTICIDE USE PERMITS ISSUED
BY THE B. C. PESTICIDE CONTROL BRANCH, MINISTRY OF ENVIRONMENT

	MINISTRY OF FORESTS		FOREST INDUSTRY		TOTAL	
	#	%	#	%	#	%
PERMITS ISSUED (TOTAL)	96	100	39	100	135	100
PERMITS IMPLEMENTED BY HOLDER	57	60	22	56	79	59
PERMITS CANCELLED OR POSTPONED BY HOLDER	35	36	14	36	49	36
PERMITS CANCELLED BY THE PESTICIDE CONTROL BRANCH	4	4	3	8	7	5

TABLE II. THE FATE OF APPEALED 1982 PESTICIDE USE PERMITS
AS DETERMINED BY THE B. C. ENVIRONMENTAL APPEAL BOARD

	MINISTRY OF FORESTS #	FOREST INDUSTRY #	TOTAL #
PERMITS APPEALED	24	15	39
APPEALED PERMITS CANCELLED	0	0	0
APPEALED PERMITS AMENDED	0	0	0
APPEAL PERMITS SUPPORTED	24	15	39

TABLE III. SUMMARY OF PESTICIDE USE 1
1982

PESTICIDE	MINISTRY OF FORESTS		FOREST INDUSTRY	
	ha treated OP2	kg a.i. OP RES	ha treated OP	kg a.i. OP RES
ACEPHATE	1.0	0.5		
AMITROLE	3.0	1.1		
ASULAM			4.0	0.4
BIFENOX				0.005
B.T.	0.5	1.7 BIU ⁴		0.002
CARBARYL	2.5	1.3		
CARBOFURAN	24.5	3.5		
DICROTOPHOS	1.0	0.6		
FENVALERATE				0.0025
FERBAM	4.5	0.02		0.005
FOSAMINE (Krenite)			36.4	115.8
FRONTALURE	2.0	0.1		

1. Data presented includes pesticides applied to rangeland administered by the B. C. Ministry of Forests
2. Operational Projects
3. Research Projects
4. BIU - Billion International Units
5. PIB - Polyhedral Inclusion Bodies

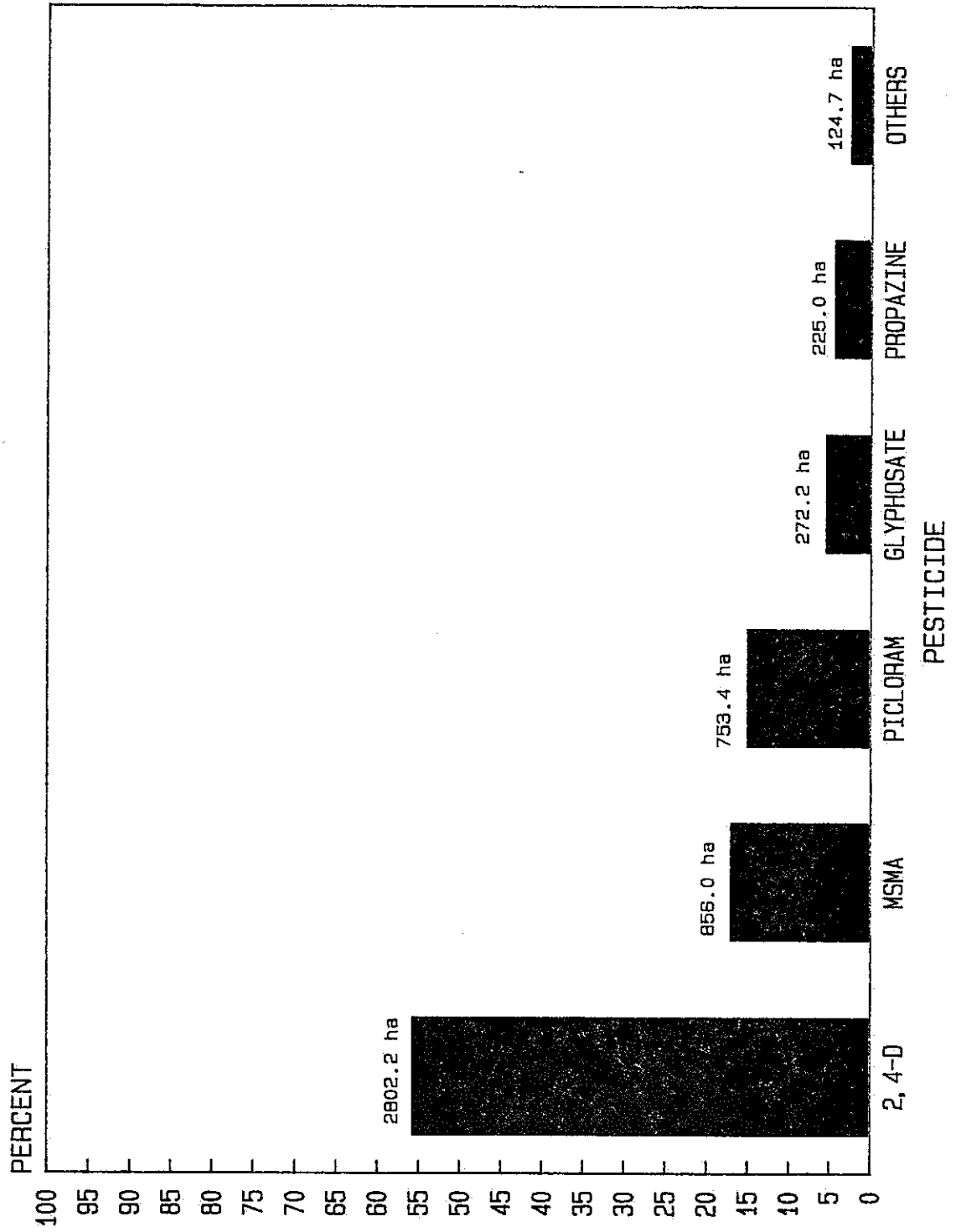
TABLE III. SUMMARY OF PESTICIDE USE 1
1982

PESTICIDE	MINISTRY OF FORESTS			FOREST INDUSTRY				
	ha treated OP ²	kg a.i. OP	RES	ha treated OP	kg a.i. OP	RES		
GLYPHOSATE	60.0	177.0	10.3	335.8	1.0	34.7	3.8	45.9
HEXAZINONE		0.2		0.3		1.0		2.2
LINURON		0.0013		0.3				
MSMA		712.0		23.9	144.0		257.6	
N.P. VIRUS		40.5		2121.0 PIB ⁵				
OXADIAZON						0.005		0.003
OXYDEMEION-METHYL		1.5		1.1				
PERMETHRIN		0.5		0.2				
PICLORAM	752.8	0.6	776.3	0.4				
PROPACINE		225.0		126.0				
THIRAM					1.0		0.8	
TRICLOPYR		0.6		0.1				
2,4-D AMINE	1386.9		3448.7		1415.3		1342.9	2.2

1. Data presented includes pesticides applied to rangeland administered by the B.C. Ministry of Forests
2. Operational Projects
3. Research Projects
4. BIU - Billion International Units
5. PIB - Polyhedral Inclusion Bodies

FIGURE 2. PERCENT PESTICIDE USE BY AREA TREATED ¹

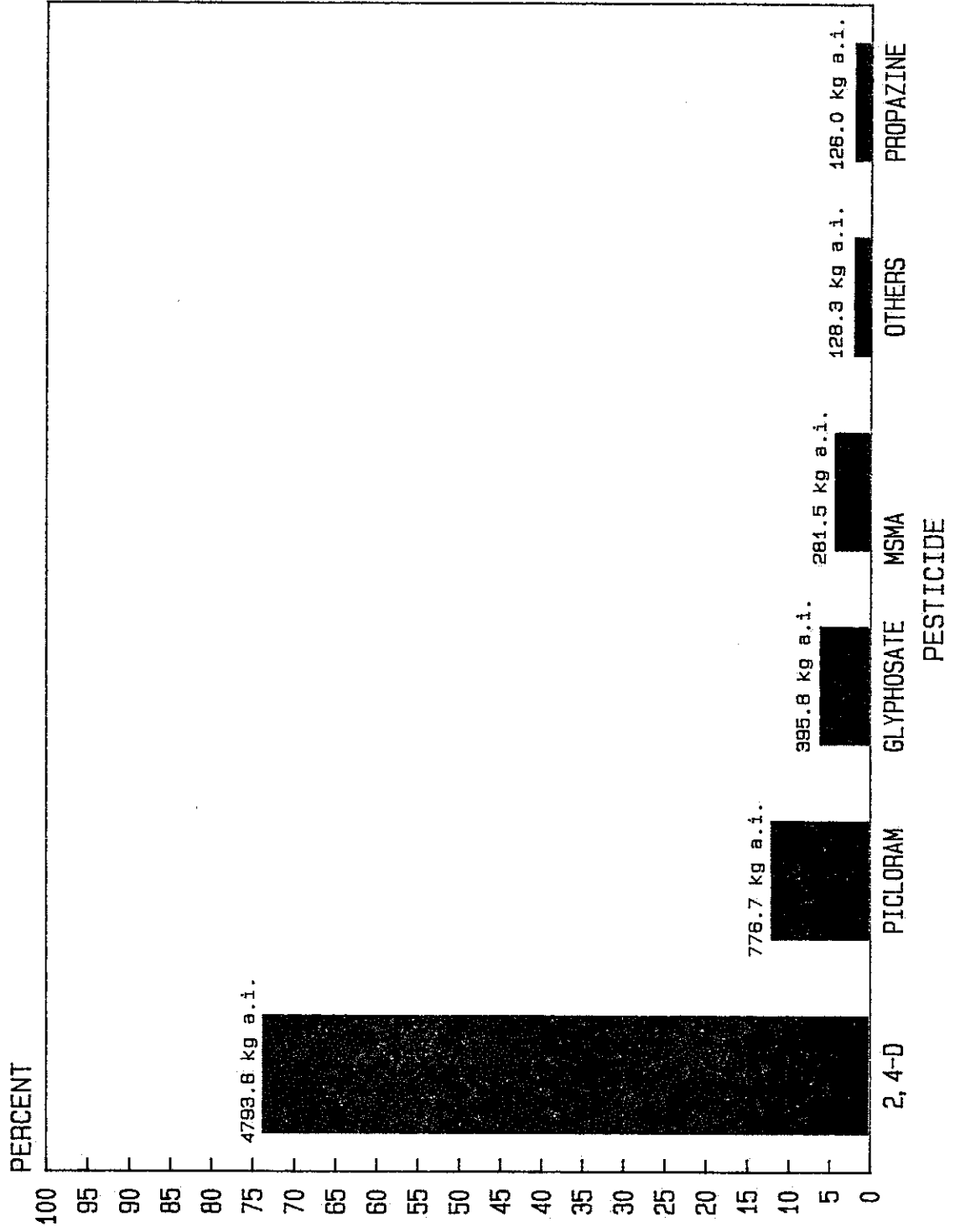
1982



¹ B.C. MINISTRY OF FORESTS AND B.C. FOREST INDUSTRY COMBINED

FIGURE 3. PERCENT PESTICIDE USE BY WEIGHT ¹

1982



¹ B.C. MINISTRY OF FORESTS AND B.C. FOREST INDUSTRY COMBINED

TABLE IV. HERBICIDE USE BY CONTROL PURPOSE
1982

PURPOSE	HERBICIDES USED	MINISTRY OF FORESTS ha Treated	kg a.i. used	FOREST INDUSTRY ha Treated	kg a.i. used
CONIFER RELEASE	Asulam			4.0	0.4
	Carbofuran	24.0	2.3		
	Glyphosate	50.8	78.0	16.3	15.7
	Hexazinone			1.0	2.2
	2,4-D	1349.1	3443.1	1219.5	833.4
PRE-COMMERCIAL THINNING	Glyphosate	0.02	0.04		
	Hexazinone	0.2	0.3		
	MSMA			144.0	257.6
BRUSH CONTROL	Glyphosate	18.2	12.8		
	2,4-D			121.1	60.4

TABLE IV. HERBICIDE USE BY CONTROL PURPOSE
1982

PURPOSE	HERBICIDES USED	MINISTRY OF FORESTS ha Treated	kg a.i. used	FOREST INDUSTRY ha Treated	kg a.i. used
NOXIOUS WEED CONTROL	Amitrole	3.0	1.1		
	Bifenox			0.005	0.002
	Glyphosate	60.0	10.3		
	Linuron	0.0013	0.3		
	Oxydiazon			0.005	0.003
	Picloram	752.8	776.3		
	Propazine	225.0	126.0		
SITE PREPARATION	Glyphosate	108.0	244.9	19.4	34.0
	Picloram	0.6	0.4		
	Triclopyr	0.6	0.1		
RIGHT-OF-WAY MAINTENANCE	Fosamine			36.4	115.8
	2,4-D	0.4	0.8	74.7	451.3
SEED TREE CONTROL	2,4-D	37.4	4.8		

TABLE V. INSECTICIDE AND OTHER TYPES OF PESTICIDE USE BY CONTROL PURPOSE
1982

PURPOSE	INSECTICIDES OTHER PESTICIDES ETC. USED	MINISTRY OF FORESTS ha Treated	kg a.i. used	FOREST INDUSTRY ha Treated	kg a.i. used
INSECT CONTROL	Acephate	1.0	0.5		
	B.t.	0.5	1.7BIU ²		
	Carbaryl	2.5	1.3		
	Carbofuran	0.5	1.1		
	Dicrotophos	1.0	0.6		
	Fenvalerate			0.0025	0.005
	Frontalure	2.0	0.1		
	MSMA	712.0	23.9		
	NPV	40.5	2121.0 PIB ¹		
	Oxydemeton-Methyl	1.5	1.1		
	Permethrin	0.5	0.2		
DEER CONTROL	Thiram			1.0	0.8
FUNGUS CONTROL	Ferbam	4.5	0.02		

¹ PIB = Polyhedral Inclusion Bodies

² BIU = Billion International Units

FIGURE 4 COMPARATIVE SUMMARY OF THE PURPOSE OF PESTICIDE USE BY AREA TREATED 1

1982

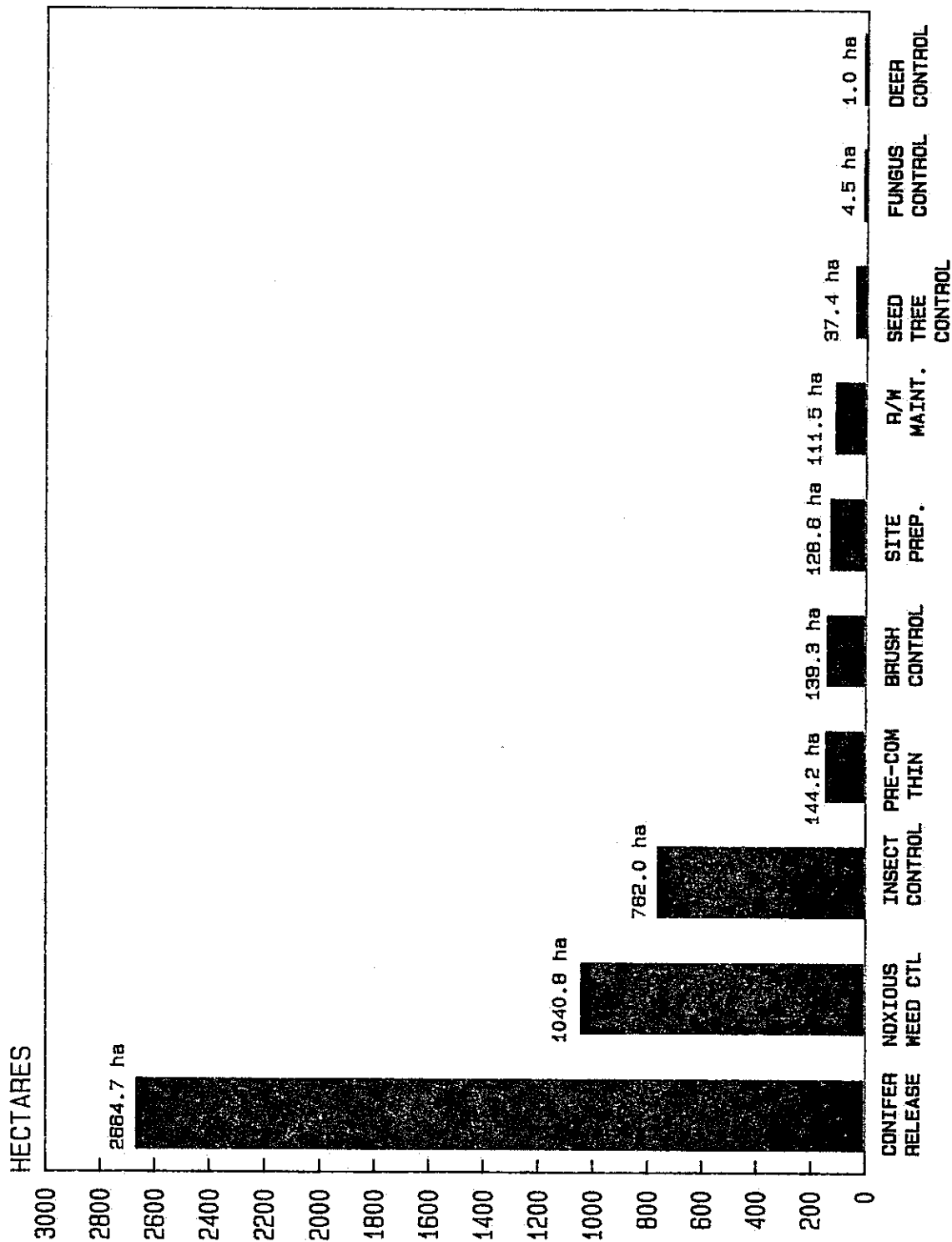


TABLE VI. PESTICIDE USE BY METHOD OF APPLICATION
1982

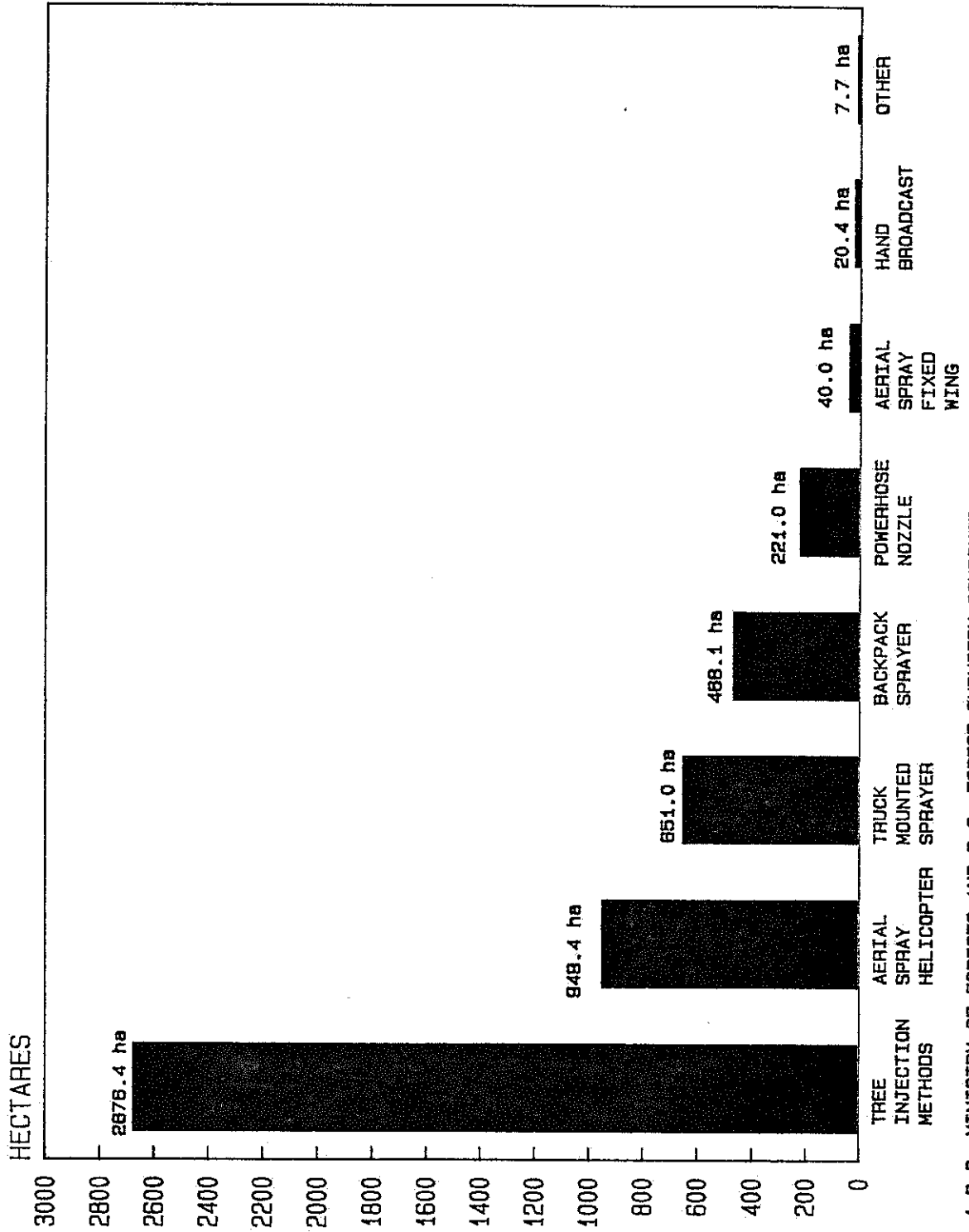
METHOD OF APPLICATION	PESTICIDES USED	MINISTRY OF FORESTS ha TREATED	FOREST INDUSTRY ha TREATED
TREE INJECTION TREATMENTS (hack & squirt frill & squirt cut stump, etc.)	Glyphosate	18.2	3.8
	MSMA	712.0	144.0
	2,4-D	544.5	1253.9
	Total	1274.7	1401.7
AERIAL SPRAY HELICOPTER	Glyphosate	107.4	
	2,4-D	842.0	
	Total	949.4	
TRUCK MOUNTED SPRAYER	Carbofuran	24.0	
	Fosamine		36.4
	Picloram	346.0	
	Propazine	225.0	
	2,4-D		19.6
	Total	595.0	56.0
BACKPACK SPRAYER	Amitrole	3.0	
	Asulam		4.0
	Carbaryl	2.0	
	Glyphosate	49.9	1.0
	Linuron	0.001	
	Picloram	303.8	
	Thiram		1.0
	Triclopyr	0.6	
	2,4-D		102.8
	Total	359.3	108.8

TABLE V. PESTICIDE USE BY METHOD OF APPLICATION
1982

METHOD OF APPLICATION	PESTICIDES USED	MINISTRY OF FORESTS ha TREATED	FOREST INDUSTRY ha TREATED
POWERHOSE NOZZLE	B.t.	0.5	
	Carbaryl	0.5	
	Ferbam	4.5	
	Glyphosate	60.0	11.5
	NPV	0.5	
	Permethrin	0.5	
	Picloram	103.6	
	2,4-D	0.4	39.0
	Total	170.5	50.5
AERIAL SPRAY FIXED WING	NPV	40.0	
	Total	40.0	
HAND BROADCAST	Glyphosate		19.4
	Hexazinone		1.0
	Total		20.4
OTHER	Acephate	1.0	
	Bifenox		0.005
	Carbofuran	0.5	
	Dicrotophos	1.0	
	Fenvalerate		0.0025
	Frontalure	2.0	
	Glyphosate	1.5	
	Hexazinone	0.25	
	Oxydemeton-Methyl	1.5	
	Oxydiazon		0.005
	Total	7.7	0.01

FIGURE 5. COMPARATIVE SUMMARY OF THE METHOD OF PESTICIDE APPLICATION BY AREA TREATED 1

1982



1 B.C. MINISTRY OF FORESTS AND B.C. FOREST INDUSTRY COMBINED

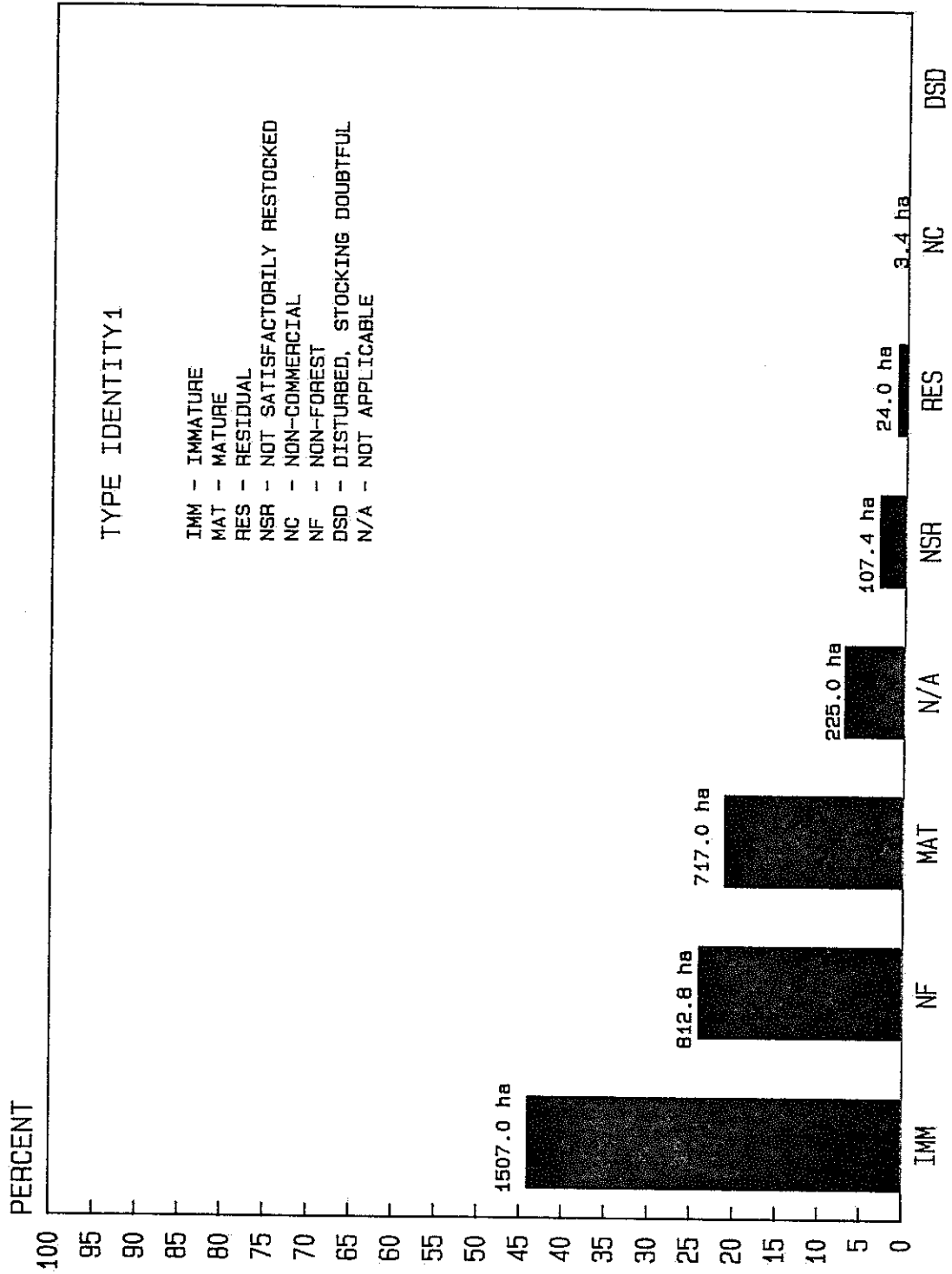
TABLE VII. AREAS TREATED BY FOREST INVENTORY
TYPE IDENTITY
1982

TYPE IDENTITY ¹	MINISTRY OF FORESTS HECTARES	FOREST INDUSTRY HECTARES
IMMATURE	1507.0	1526.9
MATURE	717.0	0.0
RESIDUAL	24.0	0.0
NON SATISFACTORILY RESTOCKED	107.4	19.4
NON-COMMERCIAL	3.4 ²	91.1 ²
NON-FOREST	812.8 ³	0.0
DISTURBED, STOCKING DOUBTFUL	0.0	0.0
NOT APPLICABLE	225.0 ⁴	0.01 ⁴

1. Reference: Province of British Columbia, Ministry of Forests, May 1979. Silviculture Manual, Chapter 4, Appendix 4 - 6.
2. Represents right-of-way maintenance pesticide applications.
3. Represents all pesticide applications to rangeland.
4. Represents pesticide applications for forest seed orchards and nurseries.

FIGURE 6. PERCENT AREA OF FOREST INVENTORY TYPE IDENTITY TREATED WITH PESTICIDES BY B.C. MINISTRY OF FORESTS

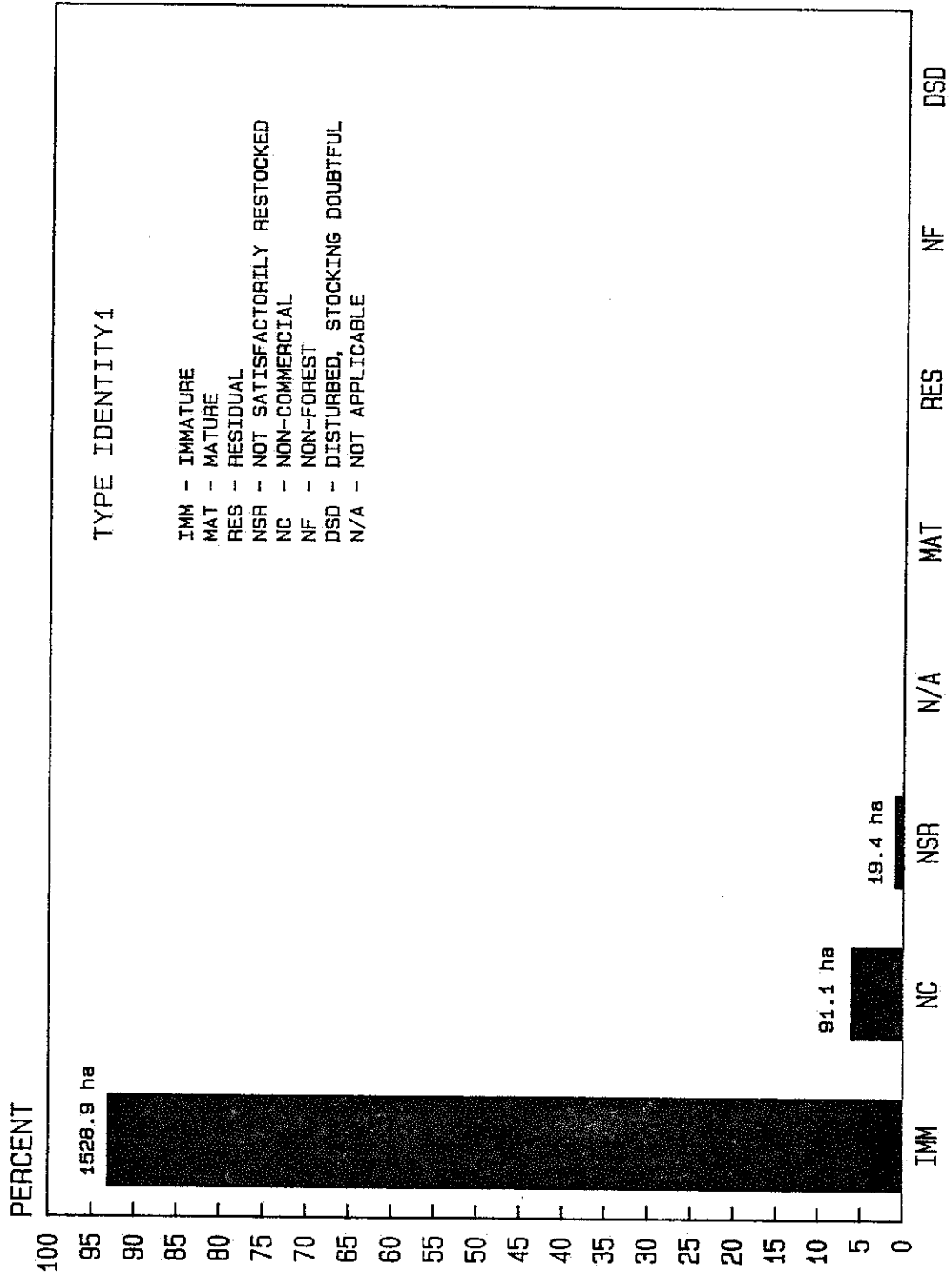
1982



1 REFERENCE: PROVINCE OF BRITISH COLUMBIA. MINISTRY OF FORESTS. MAY 1979. SILVICULTURE MANUAL. CHAPTER 4. APPENDIX 4-6.

FIGURE 7. PERCENT AREA OF FOREST INVENTORY TYPE IDENTITY TREATED WITH PESTICIDES BY B.C. FOREST INDUSTRY

1982



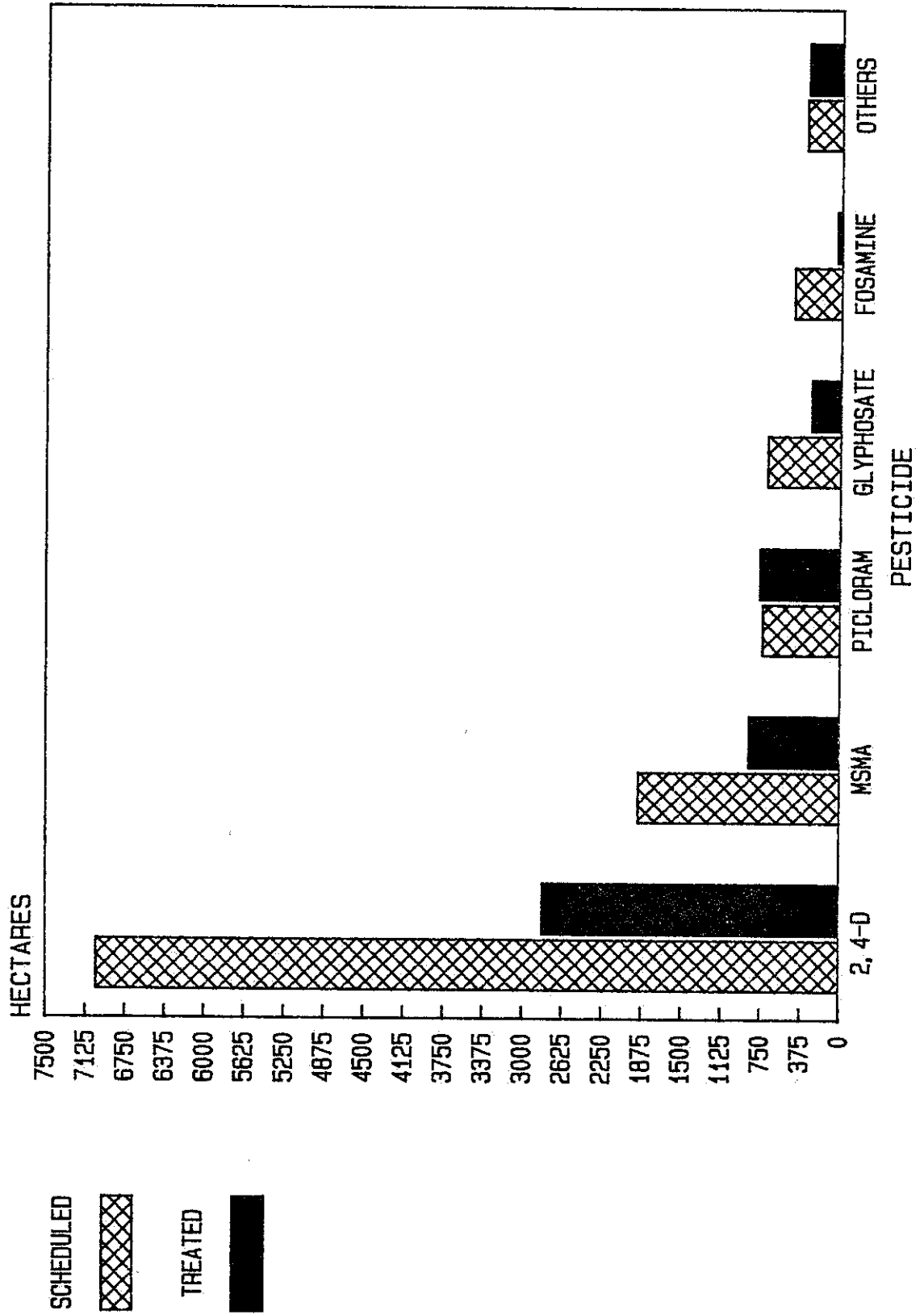
1 REFERENCE: PROVINCE OF BRITISH COLUMBIA. MINISTRY OF FORESTS. MAY 1979. SILVICULTURE MANUAL. CHAPTER 4. APPENDIX 4-6.

TABLE VIII COMPARISON OF AREAS SCHEDULED FOR
PESTICIDE TREATMENT WITH AREAS ACTUALLY TREATED
1982

PESTICIDE	MINISTRY OF FORESTS		FOREST INDUSTRY	
	Hectares scheduled for treatment	Hectares treated	Hectares scheduled for treatment	Hectares treated
2,4-D AMINE	2721.0	1386.9	4303.4	1415.3
MSMA	1394.4	712.0	510.5	144.0
PICLORAM	727.9	753.4	0.0	0.0
GLYPHOSATE	363.0	237.0	325.2	35.7
PROPAZINE	70.0	225.0	0.0	0.0
FOSAMINE	54.8	0.0	388.3	36.4
OTHERS	242.9	82.3	15.3	6.0
TOTALS	5574.9	3396.6	5542.9	1637.4

FIGURE 8. COMPARISON OF AREA SCHEDULED FOR PESTICIDE TREATMENTS WITH AREA ACTUALLY TREATED 1

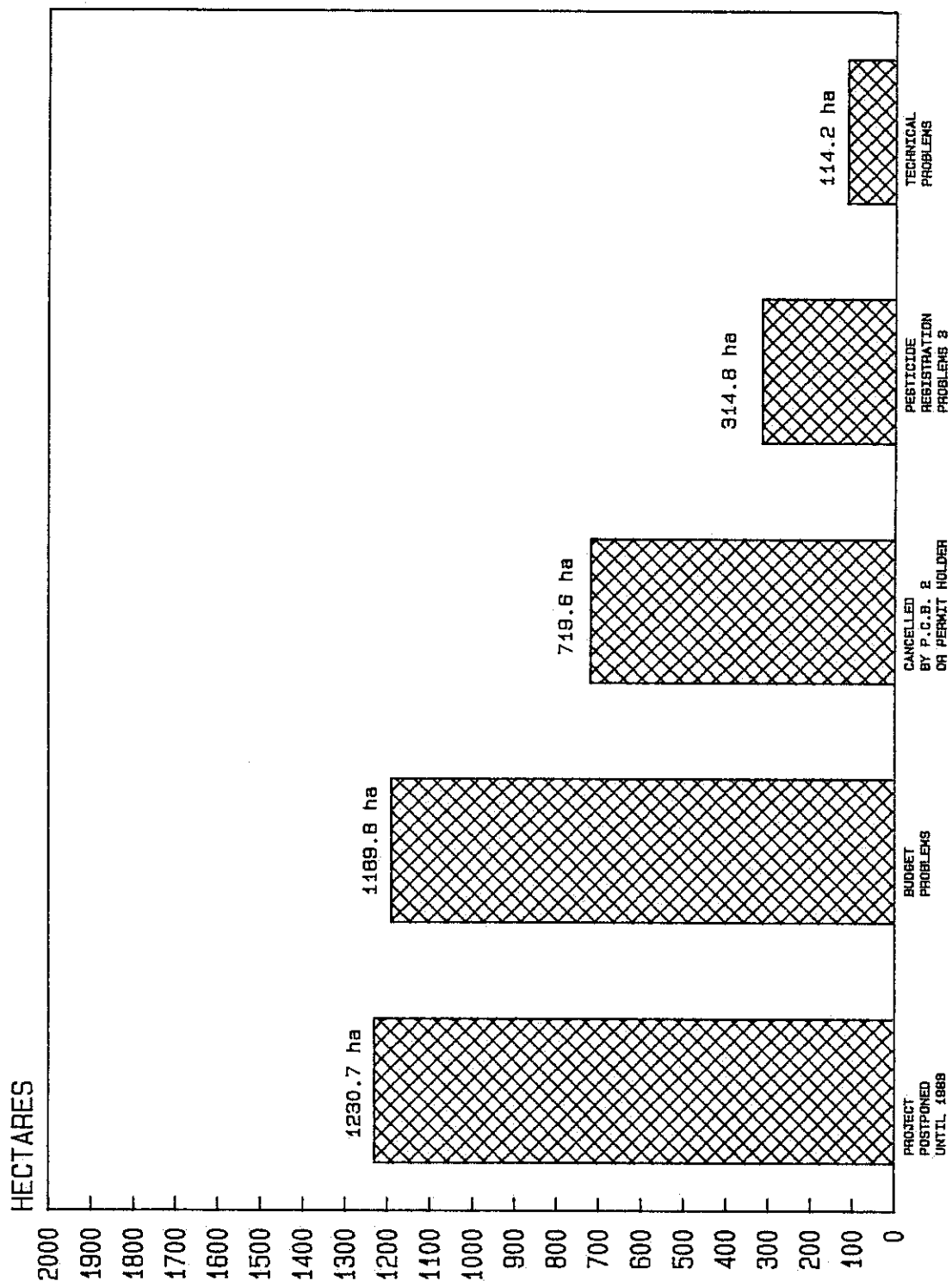
1982



1 B.C. MINISTRY OF FORESTS AND B.C. FOREST INDUSTRY COMBINED.

FIGURE 9. REASONS FOR PESTICIDE USE PERMIT CANCELLATIONS
BY AREA AFFECTED ¹

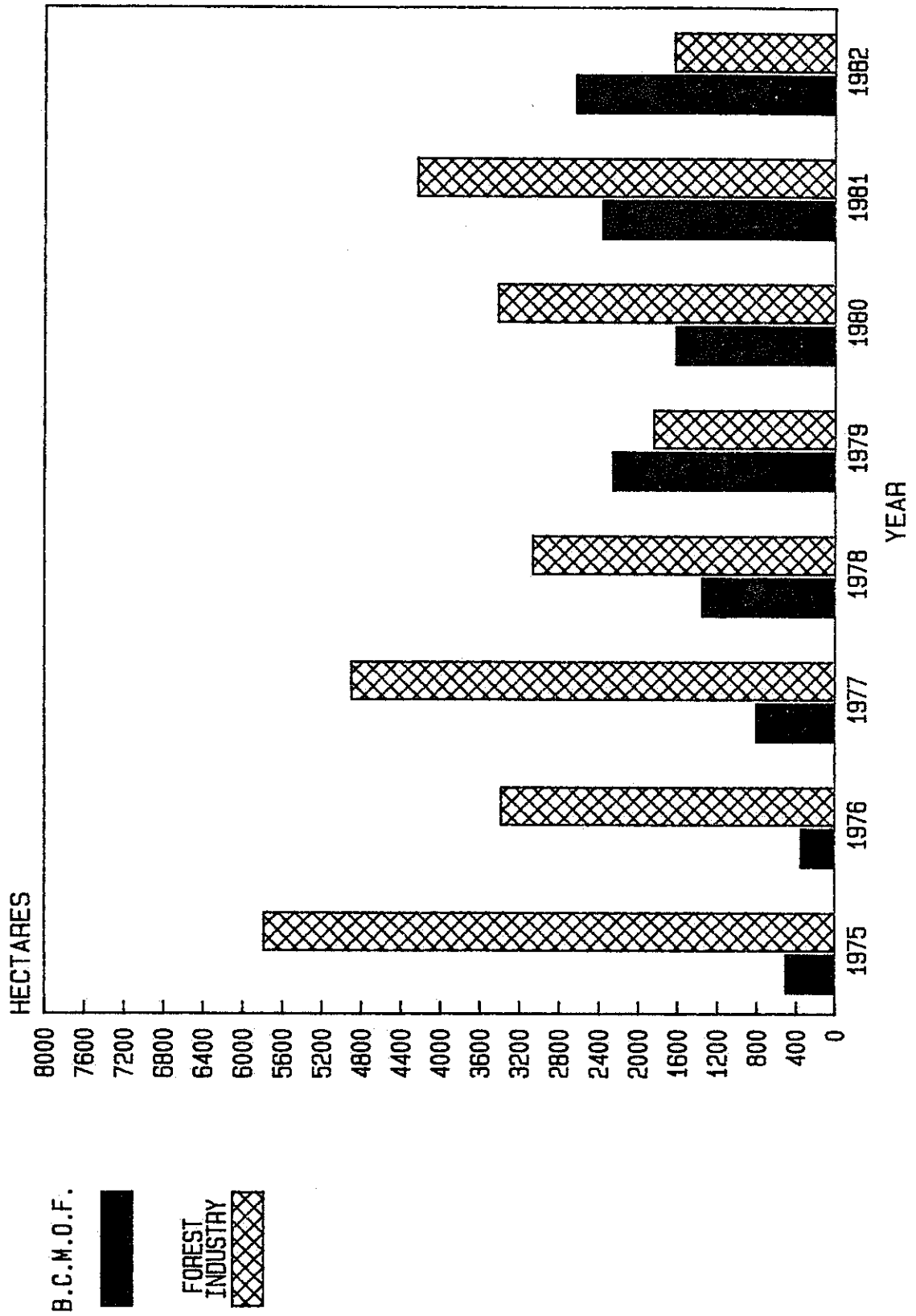
1982



¹ B.C. MINISTRY OF FORESTS AND B.C. FOREST INDUSTRY COMBINED
² P.C.B. - PESTICIDE CONTROL BRANCH B.C. MINISTRY OF ENVIRONMENT
³ FUSAMINE (KRENITE) PROJECTS ONLY

FIGURE 10. TOTAL HECTARES OF LAND TREATED WITH HERBICIDES
FOR FORESTY PURPOSES

1975-1982



DISCUSSION AND CONCLUSIONS

In terms of area treated, herbicide applications for the purpose of silvicultural stand tending goals remained the most outstanding form of forestry pesticide use in 1982, as in 1981. The use of insecticides increased by 627.5 hectares from 1981 but it is doubtful whether this is indicative of any trend. The general variety of pesticides used for research trials and operational projects also increased. Eleven new pesticides were used for forestry related purposes in 1982.

Although there was a marked decrease in herbicide usage in 1982 from the previous year, the demand for some herbicides in terms of area scheduled for treatment remained at nearly the same level, if not higher. For example, 7024.4 hectares were scheduled for treatment with 2,4-D amine/ester in 1982 compared to 6629.9 hectares scheduled for treatment with 2,4-D amine/ester in 1981. The loss of the temporary registration of fosamine (Krenite) and a lack of any viable substitute may have been a contributing factor in the decline of overall herbicide use. Other contributing factors were budget difficulties, related to a general forest industry economic slump, and technical problems.

It appears that foresters and related personnel in British Columbia will continue to use pesticides mostly as a silvicultural treatment within current registration and budget restraints. Also becoming more apparent is the desire, amongst forestry personnel, to become familiar with a wider variety of pesticides that may be useful in forest management.

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APPENDIX I. COMPARISON OF METHODS OF VEGETATION MANAGEMENT BY AREA TREATED

B.C. MINISTRY OF FORESTS

1982-83 FISCAL YEAR

