Photo Guide For Quantifying Forest Stands in British Columbia

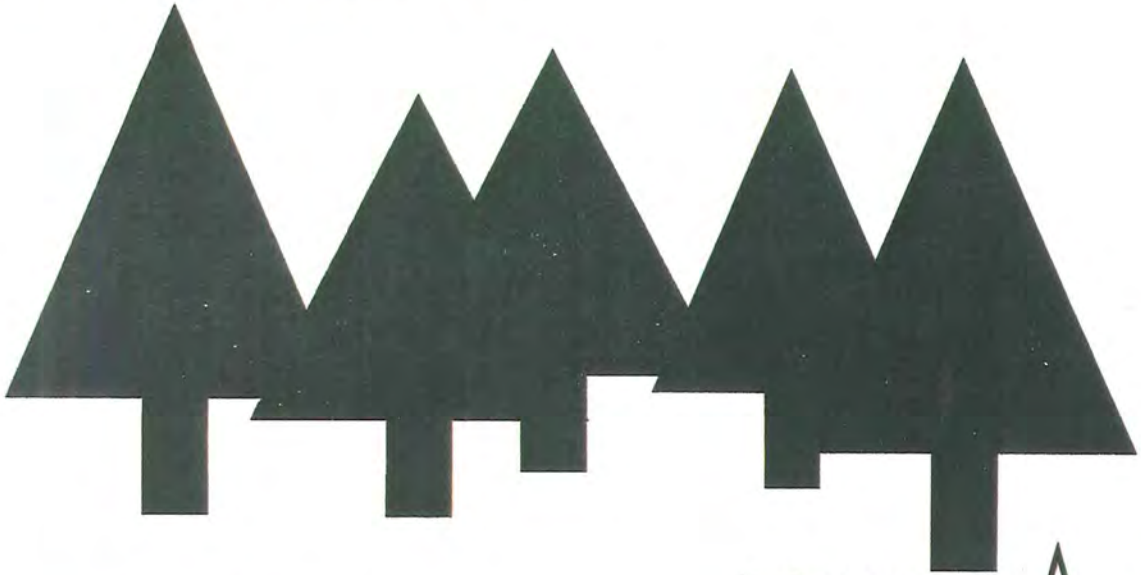

Photo Guide # 501
Forest Stands

A Cooperative Publication of:

hlg ventures ltd.

FOREST SERVICE BRITISH COLUMBIA

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ACKNOWLEDGEMENTS

This publication was assembled through the cooperative effort of the Kamloops Region Protection Staff, all the District R.O. Protection Officers and H.I.S. Ventures Ltd. The sample sites were located by the R.O. Protection Officers and sampled by H.I.S. Ventures Ltd. field staff.

Special recognition must go to Tom Lacey, R.O. Protection, Merritt District, Dennis Hutcheson, Regional Protection Officer, and to Ron Edward, Regional Fire Management Coordinator for initiating and coordinating the project.

ABSTRACT

This forest fuel photo guide has been developed to improve the process of quantifying fuel loading in the Province of British Columbia. The measurements included in Photo Guide #501 were completed throughout the Kamloops Forest Region, but many of the ecosystems and stand types are similar to those found elsewhere in the province.

Photo Guide #501 Forest Stands covers sites as they occur, without any form of treatment. These stands are not necessarily 'natural' due to fire exclusion policies.

The sites were measured using the standards established in the Field Handbook for Prescribed Fire Assessments in British Columbia: Logging Slash Fuels (FRDA 001). This measurement system was modified to include the ladder fuels present in many forest stands. The ladder fuels were measured separately from the surface fuels and are presented separately on the Data Sheet.

The Photo Guide is divided into sections by fuel type, as laid out in the Fire Behaviour Prediction System. Spruce-Balsam fuel types are not classified under this system. They have been classified as a M-2 fuel type for the present. Each fuel type is arranged into order of increasing fuel loading. Fuel loading is shown in Tonnes per hectare (T/ha) and kilograms per square meter (kg/m2). A number of plots have pre and post treatment measurements. The cross reference on the Data Sheet indicates where the other measurement of the plot can be found.

Trees

Latin Name	Common Name	Abb.
Abies lasiocarpa	Subalpine fir	Bl
Betula papyrifera	Paper birch	Ep
Larix occidentalis	Western larch	Lw
Picea engelmannii	Englemann spruce	Se
Pinus contorta	Lodgepole pine	Pl
Pinus monticola	Western white pine	Pw
Pinus ponderosa	Ponderosa pine	Py
Populus balsamifrea ssp.trichocarpa	Black cottonwood	Act
Populus tremuloides	Trembling aspen	At
Pseudotsuga menziesii	Interior Douglas-fir	Fd
Thuja plicata	Western red cedar	Cw
Tsuga heterophylla	Western hemlock	Hw

Brush and Shrubs

Latin Name	Common Name	Latin Name	Common Name
Acer glabrum	Douglas maple	Rhododendron albiflorum	white-flowered rhododendron
Alnus incana	mountain alder	Ribes lacustre	black gooseberry
Alnus virdis	Sitka alder	Rosa acicularis	prickly rose
Amelanchier alnifolia	saskatoon	Rosa gymnocarpa	baldhip rose
Artemisia frigida	pasture sage	Rubus idaeus	American red raspberry
Artemisia tridentata	big sagebrush	Rubus parviflorus	thimbleberry
Chrysothamnus nauseosus	rabbit brush	Salix bebbiana	Bebb's willow
Cornus sericea	red-osier dogwood	Salix scouleriana	Scouler's willow
Juniperous communis	common juniper	Sambucus racemosa	red elderberry
Ledum glandulosum	Glandular leaved labrador tea	Shepherdia canadensis	soopolallie
Lonicera involucrata	black twinberry	Sorbus sitchensis	Sitka Mountain-ash
Lonicera utahensis	Utah honeysuckle	Spiraea betulifolia	birch-leaved spirea
Mahonia aquifolium	tall oregon-grape	Symphoricarpos albus	common snowberry
Menziesia ferruginea	false azalea	Vaccinium membranaceum	black huckleberry
Oplopanax horridus	devil's club	Vaccinium scoparium	grouseberry
Paxistima myrsinites	false box		

Herbs

Latin Name	Common Name	Latin Name	Common Name
Achiliea millefolium	yarrow	Fragaria virginiana	wild strawberry
Agropyron spicatum	bluebunch wheatgrass	Galium triflorum	sweet-scented bedstraw
Antennaria racemosa	racemose pussytoes	Gaultheria ovatifolia	Oregon-wintergreen
Aralia nudicaulis	wild sarsaparilla	Goodtera oblongifolia	rattlesnake plantain
Arctostaphylos uva-ursi	kinnikinnick	Gymnocarpium dryopteris	oak fern
Arnica cordifolia	heart-leaves arnica	Linnaea borealis	twinflower
Arnica latifolia	mountian arnica	Lupinus arcticus	arctic lupine
Asarum caudatum	wild ginger	Orthilia secunda	one-sided wintergreen
Aster conspicuus	showy aster	Penstemon fruticosus	shrubby penstemon
Athyrium filix-femina	lady fern	Petasites palmatus	palmate coltsfoot
Balsamorhiza sagittata	arrow-leaved balsam root	Phleum pratense	common Timothy
Calamagrostis rubescens	pinegrass	Poa sandbergii	Sandberg's bluegrass
Chimaphila umbellata	prince's pine	Pteridium aquilinum	five leaved bramble
Clintonia uniflora	queen's cup	Rubus pedatus	western bracken
Cornus canadensis	bunchberry	Senecio triangularis	arrow-leaved groundsel
Disporum hookeri	Hooker's fairybells	Streptopus amplexfolius	clasping twisted stalk
Epilobium angustifolium	Fireweed	Tiarella unifoliata	one-leaved foam flower
Equisetum arvense	common horsetail	Valeriana sitchensis	sitka valerian
Festuca occidentalis	rough fescue	Veratum viride	Indian hellebore
Festuca scabella	western fescue	Viola orbiculata	round-leaved violet

Definition of Fuel Types

C-3	Mature Jack or Lodgepole Pine
C-4	Immature Jack or Lodgepole Pine
C-7	Ponderosa Pine - Douglas-fir
M-2	Spruce Balsam
O-1	Open Range - Sagebrush
S-1	Jack or Lodgepole Pine Slash
S-2	Spruce Balsam Slash
S-3	Coastal Cedar - Hemlock - Douglas-fir Slash

Key Words

Size Class	Categories for diameter of woody material measured in centimetres to calculate tonnes/Ha.
Stand Tending	Any silviculture treatment to a stand of timber, other than logging, which will effect the growth of the stand. Examples: brushing, juvenile spacing, herbicide application.
Ladder Fuels	All woody material, except tree needles and leaves, elevated above the surface fuels, to a height of 2.5 metres.
Height to Live Crown	A visual estimate of the average height above the ground that live needles are found on dominant and co-dominant trees.
Interface Fuel Modification	Forest land that has been modified by reducing surface and ladder fuels, and canopy closure to act as a fire break near homes, subdivisions, and communities.
Canopy Closure	The percent of the ground that would be covered by the dominant and co-dominant tree canopy if viewed from above.
Species Composition	The species of trees present on the site, listed by volume, and taken from inventory maps.
Biogeoclimatic Zones	Areas of similar ecosystems, that are products of a complex interaction of vegetation, animals, micro-organisms and physical environment.

Fuel Type C-3

DATA SHEET

Cross Ref _____

SITE INFORMATION

Unique # :	91-5-07-001	Plot # :	1	Canopy Closure (%) :	65	Dominant Understory	
Location :			Lillooet District	Height to Live Crown (m) :	4.5	Brush	% Cover
Map Sheet :	92I.082	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	*Vaccinium membranaceum*	5
Polygon # :			1136	Avg. Litter/Duff Depth (cm) :	1.75	*Juniperous communis*	4
Species Composition :			PI	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			MS xk	Species	%	*Calamagrostis rubescens*	40
Aspect (in deg.):			90	PI	100	*Arctostaphylos uva-ursi*	35
Treatment :			None			Mosses	3
Age of Treatment :			n/a			Seedlings	0

FUEL LOADING									
SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.14	0.14	0.1 - 0.5	0.02	0.02	0.1 - 0.5	0.16	0.16	0.02
0.6 - 1.0	0.56	0.70	0.6 - 1.0	0.00	0.02	0.6 - 1.0	0.56	0.72	0.07
1.1 - 3.0	0.61	1.31	1.1 - 3.0	0.11	0.13	1.1 - 3.0	0.72	1.44	0.14
3.1 - 5.0	0.52	1.83	3.1 - 5.0	0.13	0.26	3.1 - 5.0	0.65	2.09	0.21
5.1 - 7.0	0.00	1.83	5.1 - 7.0	0.00	0.26	5.1 - 7.0	0.00	2.09	0.21
7.1 +	0.56	2.39	7.1 +	0.00	0.26	7.1 +	0.56	2.65	0.27
TOTAL		2.39	TOTAL		0.26	TOTAL		2.65	0.27

Date of Assessment: 20-Aug-91	Assessor: B.Morrow	Company: H.I.S. Ventures Ltd.

DATA SHEET

Cross Ref _____

SITE INFORMATION

Unique # :	91-5-07-001	Plot # :	2	Canopy Closure (%) :	70		Dominant Understory	
Location :			Lillooet District	Height to Live Crown (m) :	7.0	Brush		% Cover
Map Sheet :	92I.082	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	*Alnus virdis*		7
Polygon # :			1286	Avg. Litter/Duff Depth (cm) :	3.40			
Species Composition :			PI	Fine Fuel Composition (<7.1 cm)		Herbs		
Biogeoclimatic Zone :			MS xk	Species	%	*Calamagrostis rubescens*		2
Aspect (in deg.):			30	PI	98	*Arctostyphylos uva-ursi*		T
Treatment :			None	Fd	2	Mosses		60
Age of Treatment :			n/a			Seedlings		0

FUEL LOADING									
SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.19	0.19	0.1 - 0.5	0.10	0.10	0.1 - 0.5	0.29	0.29	0.03
0.6 - 1.0	0.85	1.04	0.6 - 1.0	0.17	0.27	0.6 - 1.0	1.02	1.31	0.13
1.1 - 3.0	1.29	2.33	1.1 - 3.0	0.74	1.01	1.1 - 3.0	2.03	3.34	0.33
3.1 - 5.0	0.40	2.73	3.1 - 5.0	0.00	1.01	3.1 - 5.0	0.40	3.74	0.37
5.1 - 7.0	1.45	4.18	5.1 - 7.0	0.00	1.01	5.1 - 7.0	1.45	5.19	0.52
7.1 +	4.44	8.62	7.1 +	0.00	1.01	7.1 +	4.44	9.63	0.96
TOTAL		8.62	TOTAL		1.01	TOTAL		9.63	0.96

Date of Assessment: **20-Aug-91**	Assessor: **B.Morrow**	Company: **H.I.S. Ventures Ltd.**

DATA SHEET

Cross Ref _____

SITE INFORMATION

Unique # :	91-5-02-008	Plot # :	2	Canopy Closure (%) :	40	Dominant Understory	
Location :		Kamloops District		Height to Live Crown (m) :	0.5	Brush	% Cover
Map Sheet :	92P.039	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	*Vaccinium membranaceum*	80
Polygon # :			993	Avg. Litter/Duff Depth (cm) :	7.70	*Paxistima myrsinites*	30
Species Composition :			PISe(BI)	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			ESSF dc2	Species	%	*Linnaea borealis*	75
Aspect (in deg.):			180	Se	57	*Cornus canadensis*	60
Treatment :			None	Pl	30	Mosses	90
Age of Treatment :			n/a	Bl	13	Seedlings	80

FUEL LOADING									
SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.12	0.12	0.1 - 0.5	0.08	0.08	0.1 - 0.5	0.20	0.20	0.02
0.6 - 1.0	0.51	0.63	0.6 - 1.0	0.22	0.30	0.6 - 1.0	0.73	0.93	0.09
1.1 - 3.0	0.33	0.96	1.1 - 3.0	0.17	0.47	1.1 - 3.0	0.50	1.43	0.14
3.1 - 5.0	0.70	1.66	3.1 - 5.0	0.12	0.59	3.1 - 5.0	0.82	2.25	0.23
5.1 - 7.0	0.43	2.09	5.1 - 7.0	0.00	0.59	5.1 - 7.0	0.43	2.68	0.27
7.1 +	9.11	11.20	7.1 +	0.00	0.59	7.1 +	9.11	11.79	1.18
TOTAL		11.20	TOTAL		0.59	TOTAL		11.79	1.18

Date of Assessment: **21-Sep-91**	Assessor: **S.Butchart**	Company: **H.I.S. Ventures Ltd.**

DATA SHEET

Cross Ref **Photo Guide 502 pg. C3-3**

SITE INFORMATION

Unique # :	91-5-07-004	Plot # :	2	Canopy Closure (%) :	45	Dominant Understory	
Location :			Lillooet District	Height to Live Crown (m) :	4.5	Brush	% Cover
Map Sheet :	92I.082	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	***Ledum glandulosum***	25
Polygon # :			1259	Avg. Litter/Duff Depth (cm) :	4.95	***Alnus virdis***	1
Species Composition :			PIFd	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			MS xk	Species	%	***Calamagrostis rubescens***	40
Aspect (in deg.):			95	Fd	50	***Aster conspicuus***	2
Treatment :			None	PI	47	Mosses	90
Age of Treatment :			n/a	Se	3	Seedlings	1

FUEL LOADING

SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.13	0.13	0.1 - 0.5	0.19	0.19	0.1 - 0.5	0.32	0.32	0.03
0.6 - 1.0	0.57	0.70	0.6 - 1.0	0.30	0.49	0.6 - 1.0	0.87	1.19	0.12
1.1 - 3.0	0.72	1.42	1.1 - 3.0	0.97	1.46	1.1 - 3.0	1.69	2.88	0.29
3.1 - 5.0	1.07	2.49	3.1 - 5.0	0.66	2.12	3.1 - 5.0	1.73	4.61	0.46
5.1 - 7.0	0.99	3.48	5.1 - 7.0	0.00	2.12	5.1 - 7.0	0.99	5.60	0.56
7.1 +	11.17	14.65	7.1 +	0.00	2.12	7.1 +	11.17	16.77	1.68
TOTAL		14.65	TOTAL		2.12	TOTAL		16.77	1.68

Date of Assessment: **22-Aug-91**	Assessor: **B.Morrow**	Company: **H.I.S. Ventures Ltd.**

DATA SHEET

Cross Ref _____

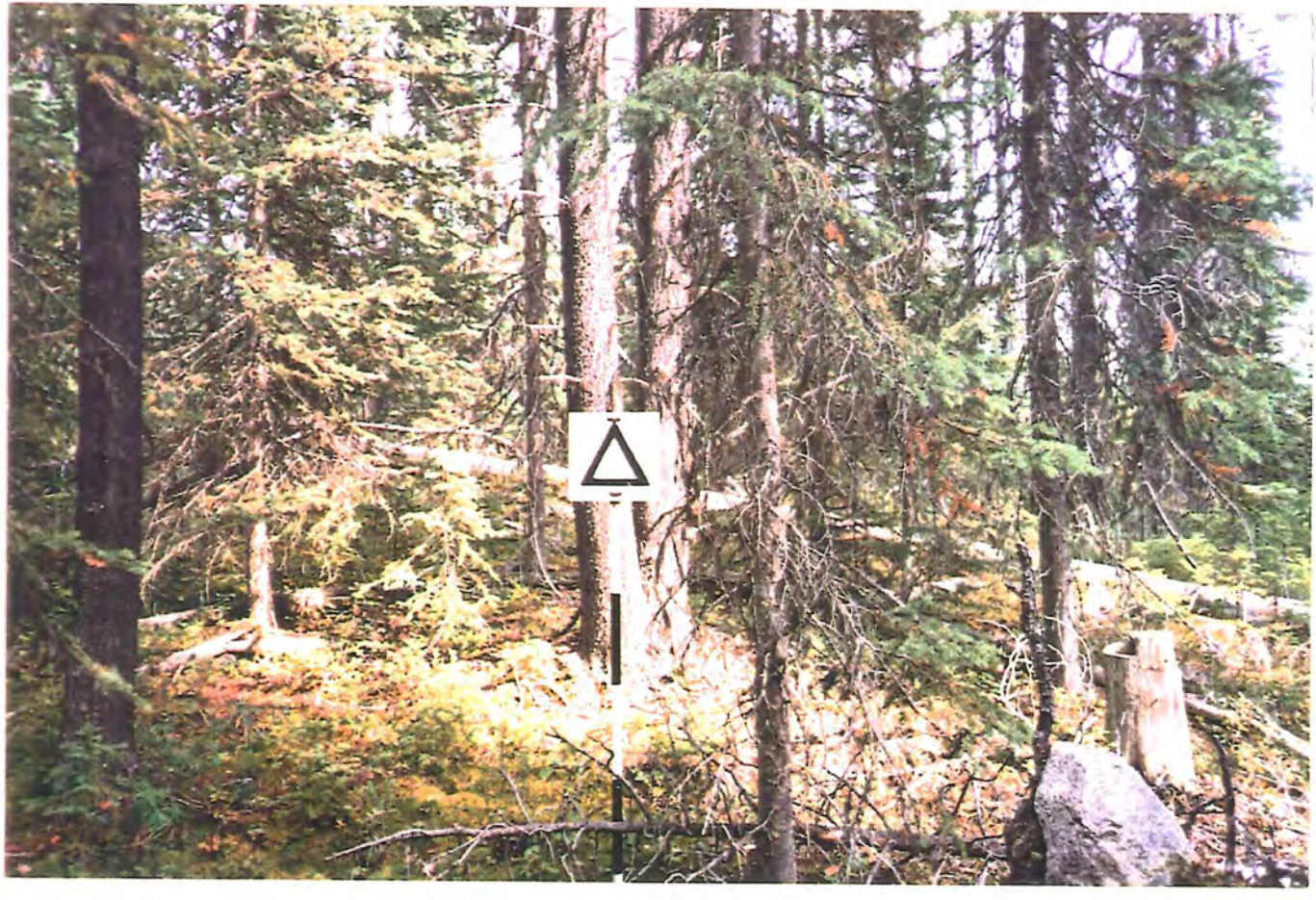
SITE INFORMATION

Unique # :	92-5-05-002	Plot # :	1	Canopy Closure (%) :	35	Dominant Understory	
Location :			Penticton District	Height to Live Crown (m) :	3.5	Brush	% Cover
Map Sheet :	82E.043	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	*Vaccinium membranaceum*	20
Polygon # :			182	Avg. Litter/Duff Depth (cm) :	2.38	*Juniperus communis*	5
Species Composition :			PI	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			MS dm1	Species	%	*Calamagrostis rubescens*	80
Aspect (in deg.):			190	PI	100	*Arctostaphylos uva-ursi*	70
Treatment :			Post & Rail			Mosses	0
Age of Treatment :			1 Year			Seedlings	0

FUEL LOADING

SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.71	0.71	0.1 - 0.5	0.00	0.00	0.1 - 0.5	0.71	0.71	0.07
0.6 - 1.0	0.76	1.47	0.6 - 1.0	0.00	0.00	0.6 - 1.0	0.76	1.47	0.15
1.1 - 3.0	1.71	3.18	1.1 - 3.0	0.00	0.00	1.1 - 3.0	1.71	3.18	0.32
3.1 - 5.0	5.62	8.80	3.1 - 5.0	0.00	0.00	3.1 - 5.0	5.62	8.80	0.88
5.1 - 7.0	4.57	13.37	5.1 - 7.0	0.00	0.00	5.1 - 7.0	4.57	13.37	1.34
7.1 +	3.67	17.04	7.1 +	0.00	0.00	7.1 +	3.67	17.04	1.70
TOTAL		17.04	TOTAL		0.00	TOTAL		17.04	1.70

Date of Assessment: 1-Oct-92	Assessor: S.Butchart	Company: H.I.S. Ventures Ltd.



DATA SHEET

Cross Ref _____

SITE INFORMATION

Unique # :	91-5-02-008	Plot # :	3	Canopy Closure (%) :	20	Dominant Understory	
Location :			Kamloops District	Height to Live Crown (m) :	1.3	Brush	% Cover
Map Sheet :	92P.039	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	***Vaccinium membranaceum***	90
Polygon # :			989	Avg. Litter/Duff Depth (cm) :	5.62	***Paxistima myrsinites***	40
Species Composition :			PISe	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			ESSF dc2	Species	%	***Linnaea borealis***	60
Aspect (in deg.):			190	PI	73	***Lupinus arcticus***	40
Treatment :			None	Se	17	Mosses	90
Age of Treatment :			n/a	Bl	10	Seedlings	60

FUEL LOADING

SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.09	0.09	0.1 - 0.5	0.00	0.00	0.1 - 0.5	0.09	0.09	0.01
0.6 - 1.0	0.18	0.27	0.6 - 1.0	0.00	0.00	0.6 - 1.0	0.18	0.27	0.03
1.1 - 3.0	0.11	0.38	1.1 - 3.0	0.00	0.00	1.1 - 3.0	0.11	0.38	0.04
3.1 - 5.0	0.13	0.51	3.1 - 5.0	0.00	0.00	3.1 - 5.0	0.13	0.51	0.05
5.1 - 7.0	0.70	1.21	5.1 - 7.0	0.00	0.00	5.1 - 7.0	0.70	1.21	0.12
7.1 +	16.77	17.98	7.1 +	0.00	0.00	7.1 +	16.77	17.98	1.80
TOTAL		17.98	TOTAL		0.00	TOTAL		17.98	1.80

Date of Assessment: **12-Sep-91**	Assessor: **S.Butchart**	Company: **H.I.S. Ventures Ltd.**

DATA SHEET

Cross Ref _____

SITE INFORMATION

Unique # :	92-5-05-001	Plot # :	1	Canopy Closure (%) :	60	Dominant Understory	
Location :			Chute Lake Road	Height to Live Crown (m) :	1.0	Brush	% Cover
Map Sheet :	82E.073	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	*Paxistima myrsinites*	40
Polygon # :			523	Avg. Litter/Duff Depth (cm) :	6.40	*Mahonia aquifolium*	40
Species Composition :			PIFd	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			MS xk	Species	%	*Calamagrostis rubescens*	40
Aspect (in deg.):			200	Pl	77	*Chimaphila umbellata*	30
Treatment :			None	Se	17	Mosses	40
Age of Treatment :			n/a	Dm	6	Seedlings	5

FUEL LOADING

SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.48	0.48	0.1 - 0.5	0.11	0.11	0.1 - 0.5	0.59	0.59	0.06
0.6 - 1.0	0.86	1.34	0.6 - 1.0	0.19	0.30	0.6 - 1.0	1.05	1.64	0.16
1.1 - 3.0	3.47	4.81	1.1 - 3.0	0.07	0.37	1.1 - 3.0	3.54	5.18	0.52
3.1 - 5.0	4.97	9.78	3.1 - 5.0	0.30	0.67	3.1 - 5.0	5.27	10.45	1.05
5.1 - 7.0	3.29	13.07	5.1 - 7.0	0.00	0.67	5.1 - 7.0	3.29	13.74	1.37
7.1 +	5.11	18.18	7.1 +	0.00	0.67	7.1 +	5.11	18.85	1.89
TOTAL		18.18	TOTAL		0.67	TOTAL		18.85	1.89

Date of Assessment: **30-Sep-92**	Assessor: **S.Butchart**	Company: **H.I.S. Ventures Ltd.**

DATA SHEET

Cross Ref _____

SITE INFORMATION

Unique # :	91-5-04-004	Plot # :	1	Canopy Closure (%) :	55	Dominant Understory	
Location :			Vernon District	Height to Live Crown (m) :	4.3	Brush	% Cover
Map Sheet :	82L.035	Fuel Type :	C3	Mineral Soil Exposure (%) :	0	***Paxistima myrsinites***	70
Polygon # :			123	Avg. Litter/Duff Depth (cm) :	4.95	***Alnus viridis***	20
Species Composition :			Pl(Fd)	Fine Fuel Composition (<7.1 cm)		Herbs	
Biogeoclimatic Zone :			IDF mw1	Species	%	***Cornus canadensis***	85
Aspect (in deg.):			182	Pl	95	***Linnaea borealis***	70
Treatment :			None	Lw	5	Mosses	10
Age of Treatment :			n/a			Seedlings	T

FUEL LOADING

SURFACE FUELS			LADDER FUELS			TOTAL FUEL LOADING			
Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Size Class	Tonnes/Ha	Cumm T/Ha	Cumm Kg/m^2
0.1 - 0.5	0.16	0.16	0.1 - 0.5	0.06	0.06	0.1 - 0.5	0.22	0.22	0.02
0.6 - 1.0	0.37	0.53	0.6 - 1.0	0.02	0.08	0.6 - 1.0	0.39	0.61	0.06
1.1 - 3.0	1.32	1.85	1.1 - 3.0	0.06	0.14	1.1 - 3.0	1.38	1.99	0.20
3.1 - 5.0	0.44	2.29	3.1 - 5.0	0.19	0.33	3.1 - 5.0	0.63	2.62	0.26
5.1 - 7.0	0.48	2.77	5.1 - 7.0	0.00	0.33	5.1 - 7.0	0.48	3.10	0.31
7.1 +	18.78	21.55	7.1 +	0.00	0.33	7.1 +	18.78	21.88	2.19
TOTAL		21.55	TOTAL		0.33	TOTAL		21.88	2.19

Date of Assessment: **21-Sep-91**	Assessor: **S.Butchart**	Company: **H.I.S. Ventures Ltd.**