Forest Resources

Department of Indian and Northern Affairs

Teslin Silviculture Systems Demonstration

Progress Report to April 15, 1998

Prepared by:

John Bastone, R.P.F.
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Forest Resources
Whitehorse, Yukon
Canada

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Your file Votre référence

Our file Notre référence

May 15, 1998

To: Bill Gladstone and Jeff Monty

From: John Bastone

Re: Teslin Silviculture Systems Demonstration Update Information Package

Please find attached an information package on the Teslin Silviculture Systems Demonstration.

This package includes the following:

- a copy of the presentation Bill and I gave at the Forest practices Workshop in Teslin on March 25
- block maps
- before harvesting and after harvesting photos of cut blocks
- photos illustrating First Nation training
- a copy of the time and motion study forms used to monitor productivity

I will prepare a technical report when the harvesting, reforestation treatments and reclamation are completed later this year. I hope that this package is useful as information in the interim.

John Bastone

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Teslin Woodlot Project — Report

The Teslin Woodlot Project was established to illustrate various designs for forest harvesting and reforestation systems, and to provide an opportunity for forestry training in the process. This has been a cooperative project between the Teslin Tlingit Council and Forest Resources with a principal objective: to determine how traditional knowledge can be used, and traditional values and culture protected, by using alternative harvesting practices, and to generate increased opportunities for the First Nation.

PROJECT DESCRIPTION

The Teslin Woodlot Project area is located five km east of Teslin on the north side of the Alaska Highway. The cutblocks are accessible by an existing road, powerline and old cutline. The subject area has experienced past logging and is currently being accessed for firewood harvesting.

The terrain can be characterized as level to gently rolling. The soils are well drained and are primarily sandy loam. Lodgepole pine and white spruce are the two primary conifers species. Both species have different growing requirements: lodgepole pine is intolerant to shade and requires light for adequate growth; White spruce is more tolerant to shade and does not require as much light as pine.

PROJECT OBJECTIVES

1. to illustrate the use of patch with retention, shelterwood and selection systems harvesting forest stands;
2. to use the demonstration site as a template which can be referred to for sustainable harvesting;
3. to illustrate how alternative harvesting and reforestation methods can address other values such as traditional values;
4. to illustrate how alternative harvesting and reforestation methods can be used for fuel modification in the urban/forest interface and thereby reduce forest fire hazards and risks;
5. to allow for training in design and engineering of alternative harvesting systems;
6. to provide an on-site training opportunity.

PROJECT PLANNING

The harvest plan identifies the location of the proposed cutblocks within the identified planning area and the blocks reserved for future harvesting. In the plan, the cutblock boundaries are designed and identified and the type of silviculture system (prescription) is identified for each of the cutblocks.

The plan began with a detailed assessment of the project area. This assessment had three steps.

Step #1. By means of aerial photographs and a careful walk through, the stands most suitable for the demonstration were identified.

Step #2. A detailed timber inventory was conducted within the planning area to:

- estimate the volume of trees/hectare,
- the tree species/hectare and
- the tree diametre classes.

This data will be used to help design the type and location of the silviculture systems to be used.

The data collected is identified in the following table:

CLASSIC SILVICULTURE SYSTEMS

The five classic silviculture systems are:

1. SEED TREE SYSTEM

- leaves selected trees in a block either individually or in small groups to provide a natural seed source;
- number and distribution of seed trees depend on preferred density of seedlings, how frequently seed trees produce cones and travel distance of seeds.

Remaining Trees

- can be harvested when regeneration is established;
- can also be left for wildlife trees.

Advantages

- provide seed for natural regeneration;
- maintain some wildlife habitat.

Disadvantages

- blowdown risk to remaining trees;
- potential for damage to regeneration when harvesting seed trees.

2. SHELTERWOOD SYSTEM

- even aged management system;
- mature trees in a stand are removed in a series of harvests to establish a new even-aged stand: under the shelter of remaining trees;
- harvests in a stand occur in intervals of 5-10 years;
- mature trees provide protection and shelter to developing trees;
- final harvest may be excluded to provide stand structure for next crop.

Advantages

- protect soils;
- less visual impact than patch cutting;
- moderates site conditions for new regeneration by reducing extremes in temperature, moisture and wind;
- maintain wildlife habitat.

Disadvantages

- increases blowdown risk especially in shallow soils;
- health risks in stands may continue;
- often not suitable for shade intolerant trees;
- potential for damage to regenerating trees.

3. SELECTION SYSTEM

- uneven age system;
- removal % of trees of various sizes. Removal of mature trees in a stand can be completed over time (intervals of 15 - 30 years);
- can be done in groups or single tree;
- promotes continuous regeneration by creating gaps in the stand.

Advantages

- maintains continuous forest cover;
- minimizes visual impact;
- protects soils and water quality;

THE PROJECT DESIGN

The project will illustrate seven block designs by following the five classic silviculture systems. The blocks have been laid-out approximately in the manner of the attached map.

Block #1 — fuel modification
a) prescription is to remove 60%, 50% and 30% from parallel strips within the block;
b) harvesting will be done by low-impact, low radius Wolverine-type feller buncher;
damage to standing trees and understory minimized.

Block #2 — shelterwood harvesting
a) prescription is to remove 40% of the merchantable conifers;
b) harvesting will be done by low-impact, low radius Wolverine-type feller buncher;
c) damage to standing trees and understory minimized

Block #3 — irregular shelterwood harvesting
a) prescription is to remove 30% of merchantable conifers;
b) harvesting will be done by low-impact, low radius Wolverine-type feller buncher;
c) skidding lines (3.5 m - 4 m width) will be cut from which machines will reach into retention strips for additional trees (to account for a total of 30%);
d) trees will be bunched along the skidding lines for removal, thus damage to remaining trees and understory is minimized

Block #4 — patch cut with patch retention
a) prescription is to leave unharvested identified patches (totaling 35% of block area) within block;
b) harvesting to be done by standard track feller buncher JD 793
c) buffer to be maintained along existing trail;
d) damage to conifer understory minimized

Block #5 — strip shelterwood harvesting
a) prescription is to harvest 50% of merchantable trees by standard track feller buncher John Deere 793
b) harvesting alternate parallel strips (shelterwood and retention) of equal size within the block;
c) damage caused by falling and skidding to standing trees and understory minimized.

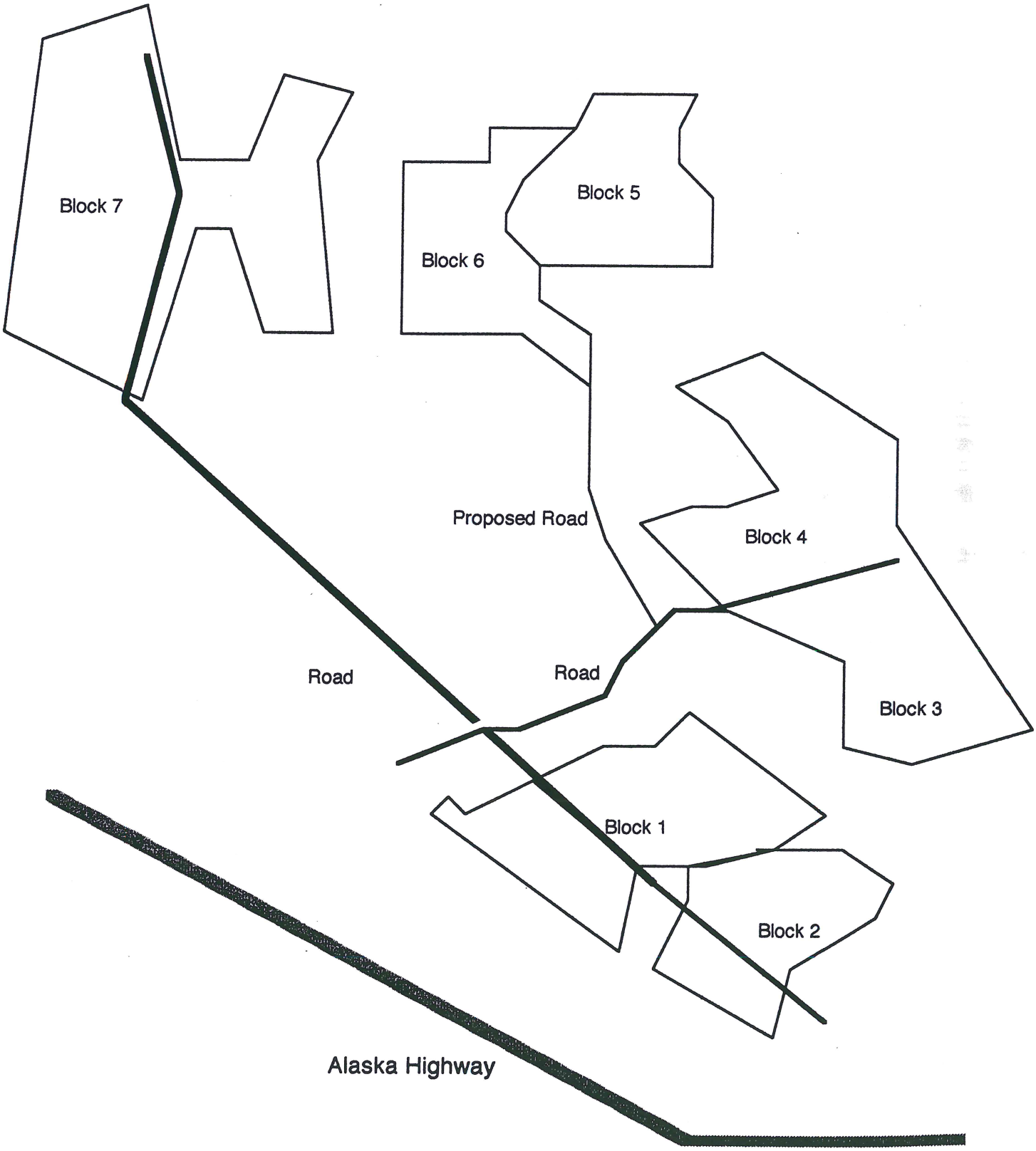
Block #6 — group shelterwood harvesting
a) prescription is to harvest 40% of merchantable trees within a block by standard track feller buncher JD 793;
b) harvesting in two one-half hectare irregular openings;
c) damage to standing trees and understory minimized.

Block #7 — shelterwood harvesting
a) prescription is to harvest 40% of merchantable trees within a block by standard track feller buncher John Deere 793
b) damage to standing trees and understory minimized.

FOLLOW-UP

Upon completion of the harvesting, the following work will be conducted:
1. Post harvest surveys to determine appropriate reforestation treatments. Options include:
   - light mechanical scarification
   - seeding

Site Block Layout



Block No: 1

Area: 17.5 ha

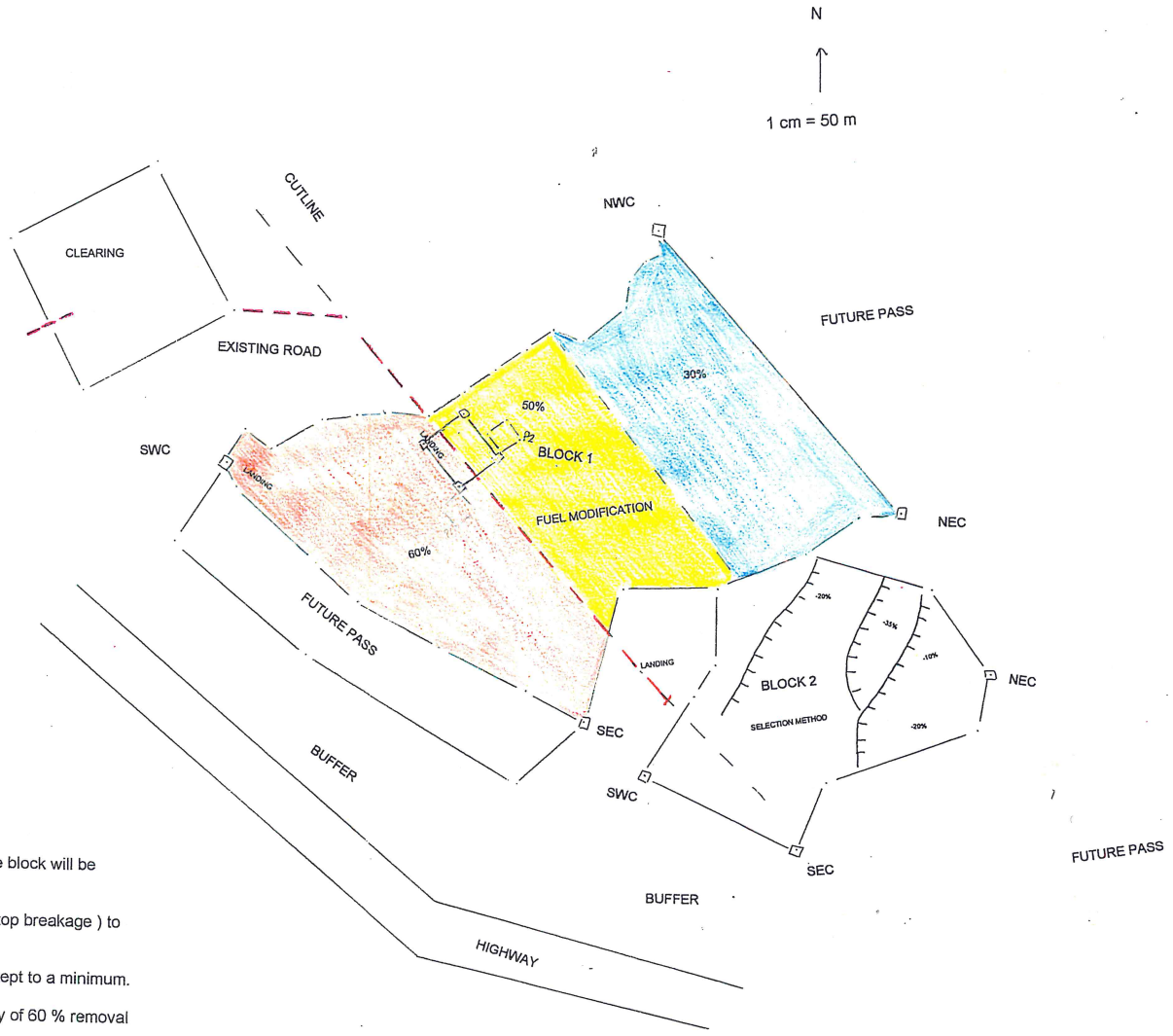
Stand Type: C/B 4/5 Pl Sw & D/C 3/2 Pl

Vol./ ha: 180 m3/ ha

Est. Total Vol.: 3,150 m3

Harvest System: Fuel Modification – 60%, 50% and 30% Removal

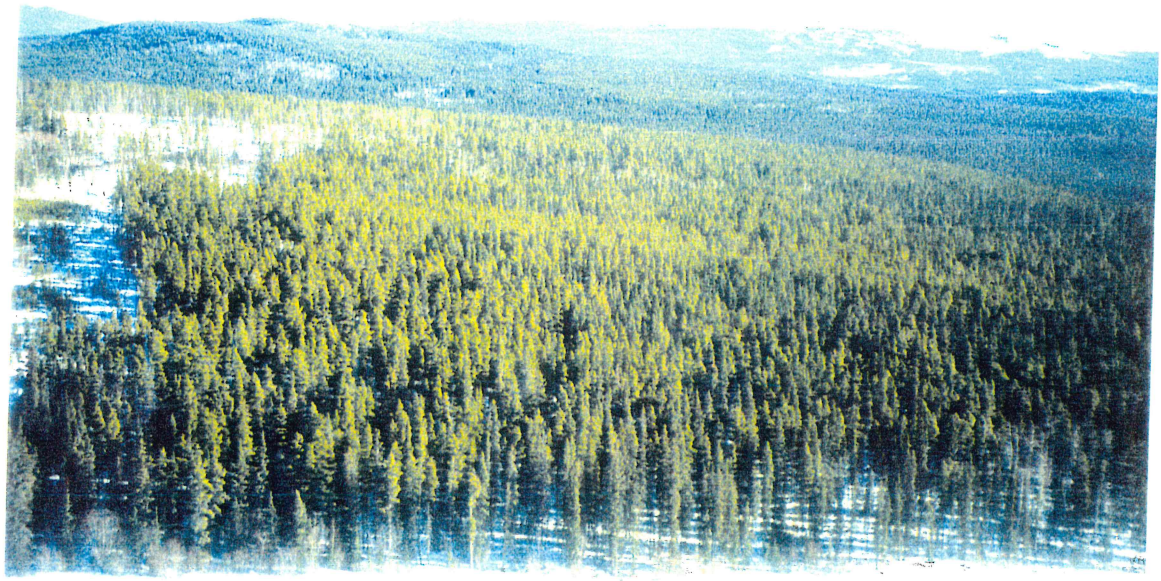
Est. Harvest Vol.: 1,500 m3



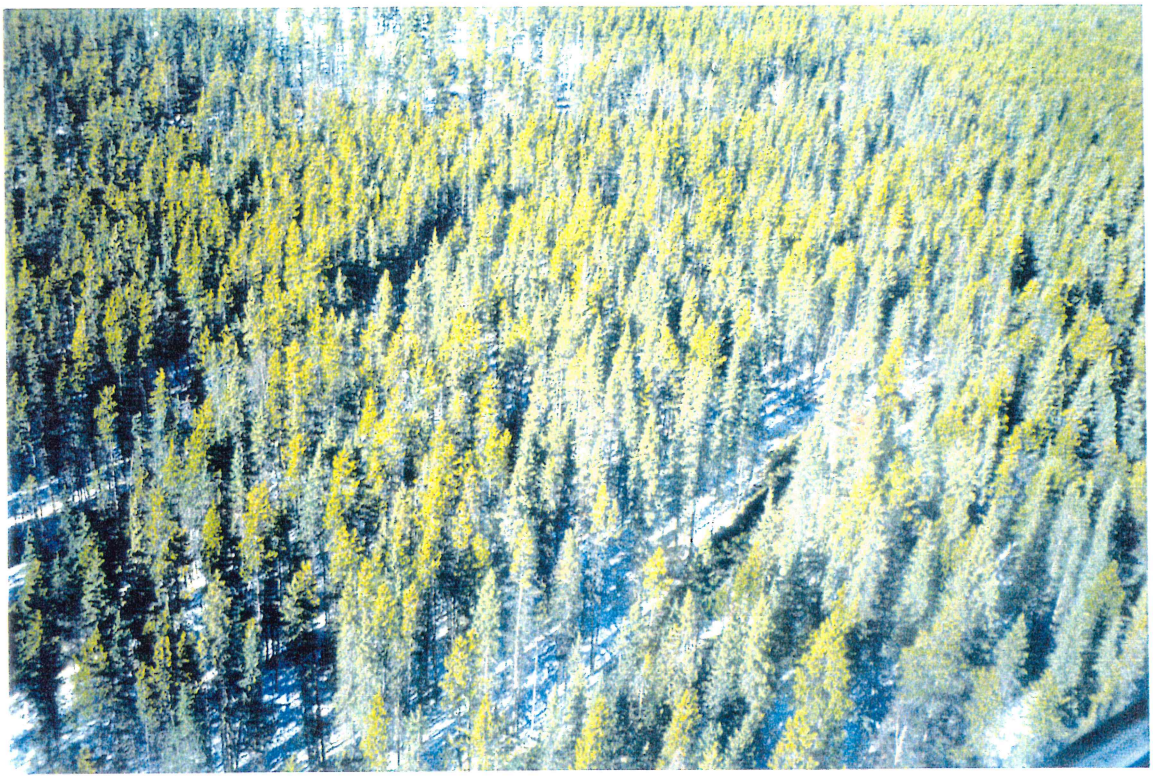
Block 1 Operating Conditions:

1. This block will be used to illustrate an example of fuel modification. The block will be harvested in gradients of 60%, 50% and 30%.
2. Falling and skidding operations must keep damage (i.e. scarring and top breakage) to the remaining trees to a minimum.
3. Damage to the conifer understory and deciduous component must be kept to a minimum.
4. An undisturbed 10 m treed buffer must be left next to the west boundary of 60 % removal portion of the block.
5. The block boundary is marked with orange flagging and the different removals are marked with yellow flagging.

Block 1: Prior to Harvesting



Block 1: Following Approximately 20% Removal



Block 1: Following Approximately 20 % Removal

Block 1: Following Skidding

Block No: 2

Area: 6.8 ha

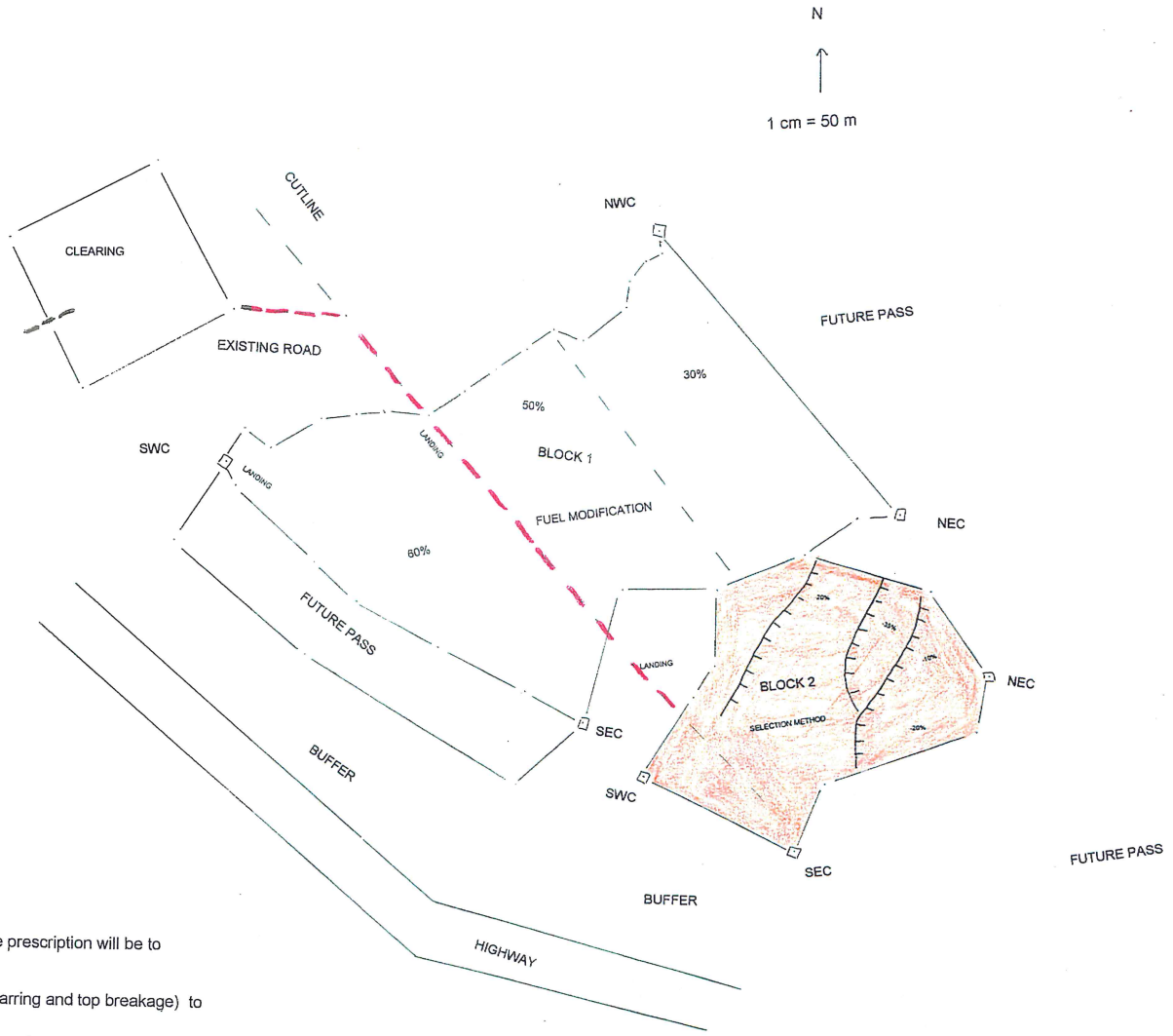
Stand Type: B/C 4/5 Sw Pl & A/B 4/5 Sw

Vol./ ha: 150 m3/ha

Est. Total Vol.: 1,020 m3

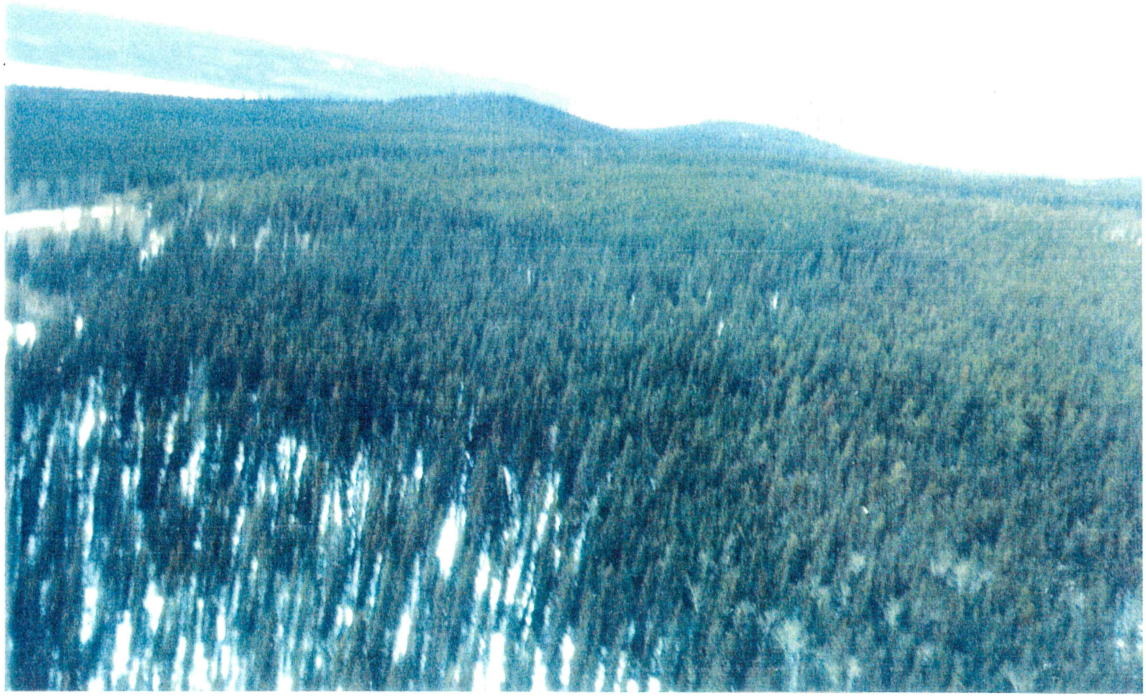
Harvest System: Group and Uniform Shelterwood: 40 % Removal

Est. Harvest Vo.: 400 m3

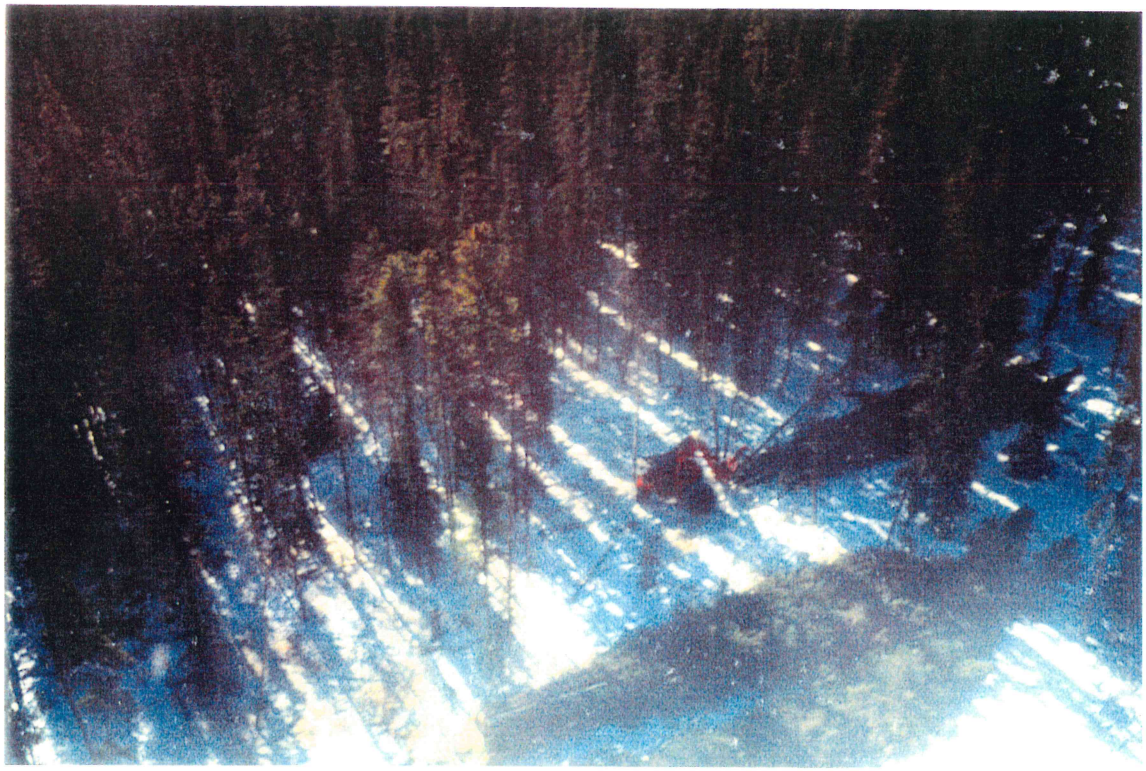


Block 2 Operating Conditions:

1. This block will be used to illustrate selection harvesting. The prescription will be to remove 40 % of the merchantable conifer stems.
2. Falling and skidding operations must keep damage (i.e. scarring and top breakage) to the remaining trees to a minimum.
3. Damage to the conifer understory must be kept to a minimum.
4. The block boundary is marked with range flagging.



Block 2: Prior to Harvesting



Block 2: 40% Removal in Progress

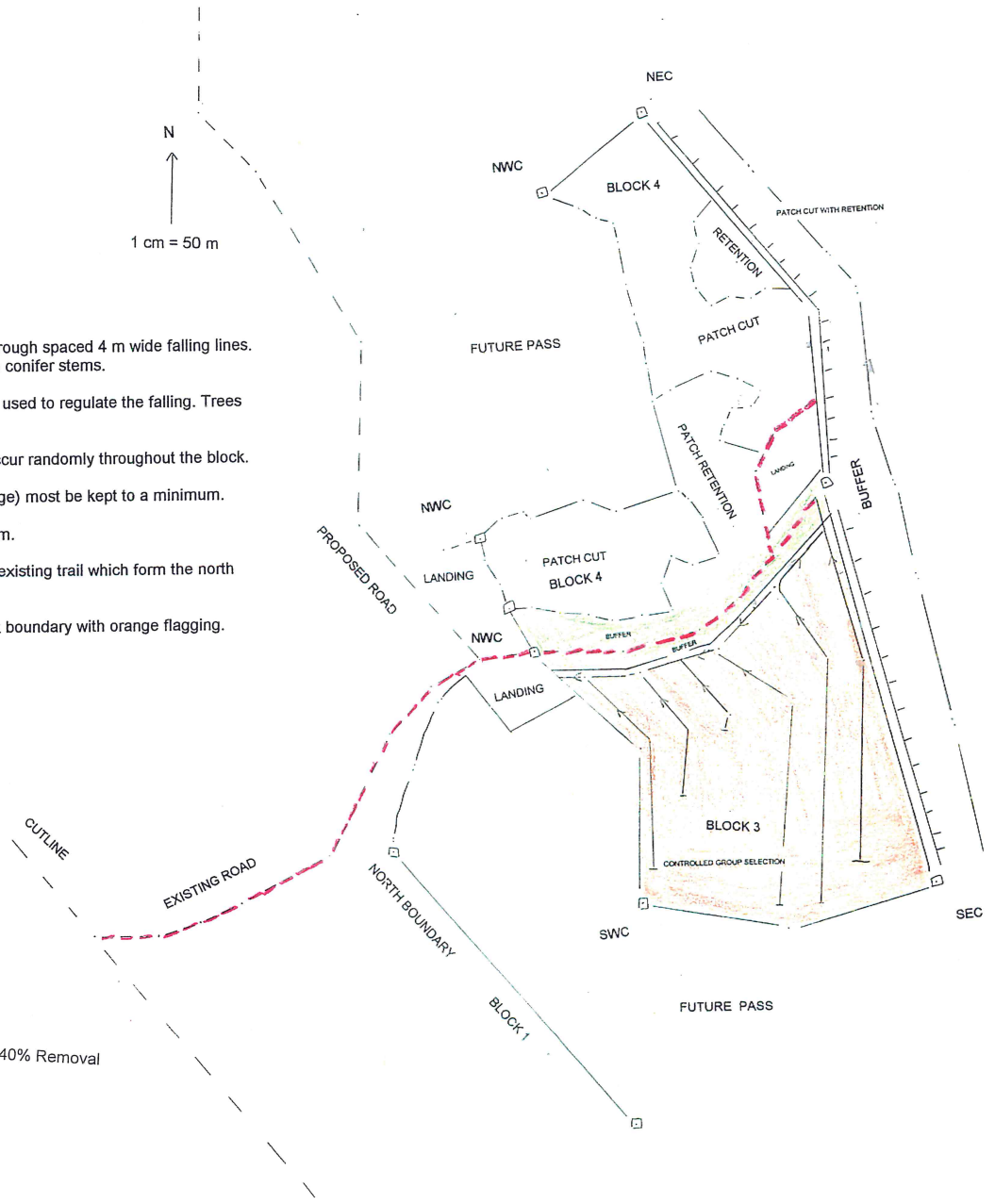
Block 2: Falling in progress

Block 2: Following Falling

Block 2: Following Falling

Block 3 operating conditions :

1. This block will be used to illustrate shelterwood harvested through spaced 4 m wide falling lines. The prescription will be to remove 40 % of the merchantable conifer stems.
2. The spaced falling and skidding lines within the block will be used to regulate the falling. Trees will be bunched on the lines.
3. Skidding will be confined to falling lines. Skidding can not occur randomly throughout the block.
4. Damage to the remaining trees (i.e. scarring and top breakage) most be kept to a minimum.
5. Damage to the conifer understory must be kept to a minimum.
6. An undisturbed 20 m buffer must be maintained next to the existing trail which form the north boundary of the block.
7. The falling lines are marked with pink flagging and the block boundary with orange flagging.



Block No: 3

Area: 10.5 ha

Stand Type: B/C 4/5 Pl Sw

Vol./ ha: 180 m3/ ha

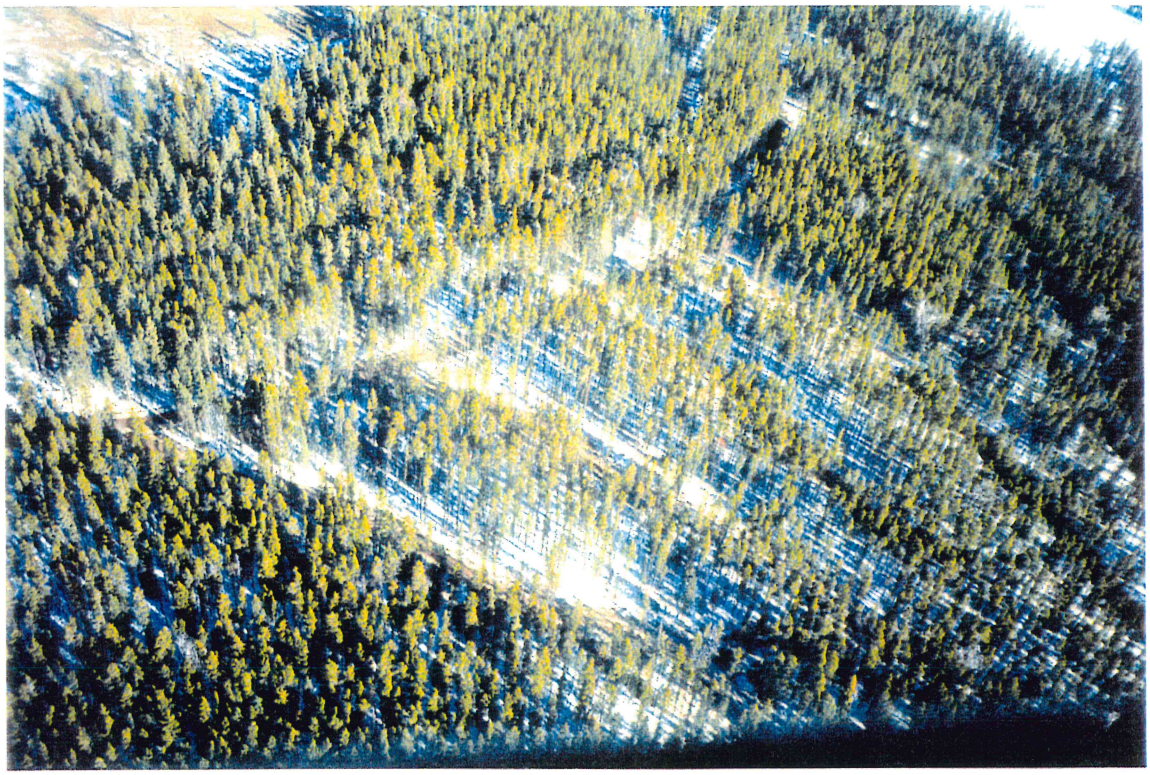
Est. Total Vol: 1,850 m3

Harvest System: Shelterwood through Spaced 4m wide falling lines: 40% Removal

Est. Harvest Vol.: 740 m3

Block 3 : Prior to Harvesting

Block 3: Following Falling



Block 3: Following Falling

Block 3: Following Falling

Aerial View of Wolverine Feller Buncher in Block 3

Unskidded Falling Lines in Block 3

Skidding in Block 3

Skidded Falling Lines in Block 3

Block No: 4

Area: 11 ha

Stand Type: B/C 4/5 Pl Sw

Vol/ ha: 180 m3/ ha

Est. Total Vol: 2,015 m3

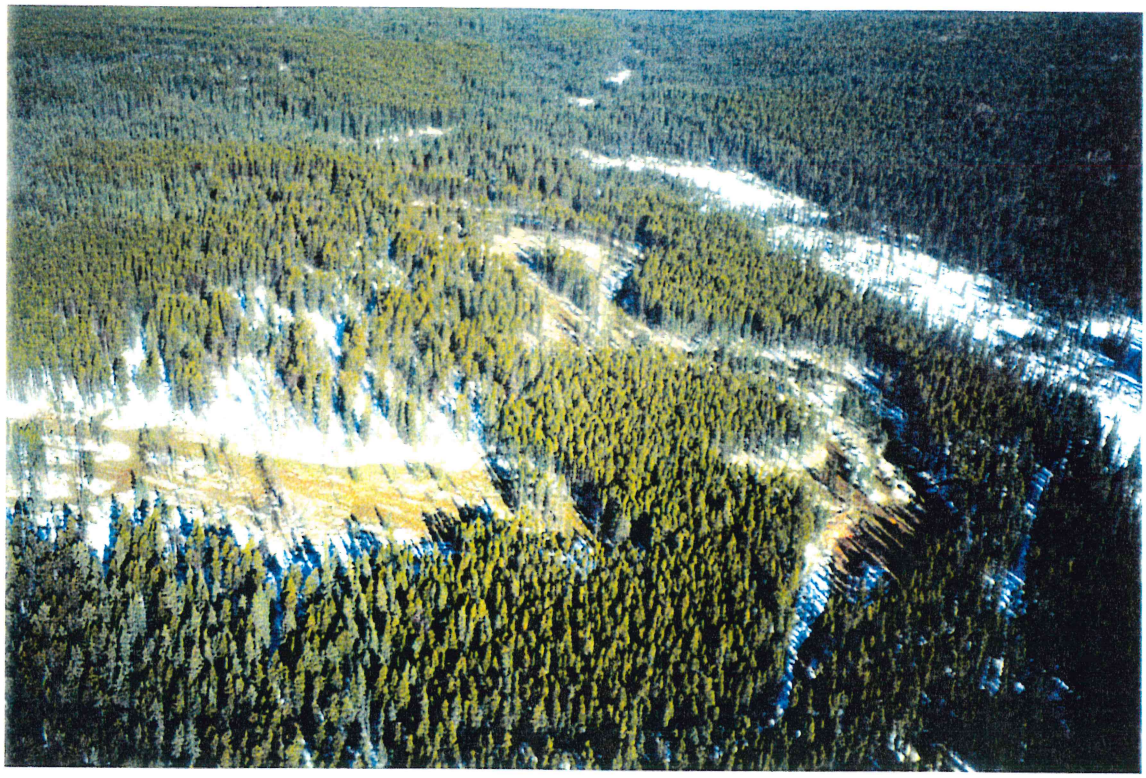
Harvest System: Patch Cutting with Retention: approx. 34 % retention

Est. Harvest Vol: 1,332 m3

Block 4 Operating Conditions :

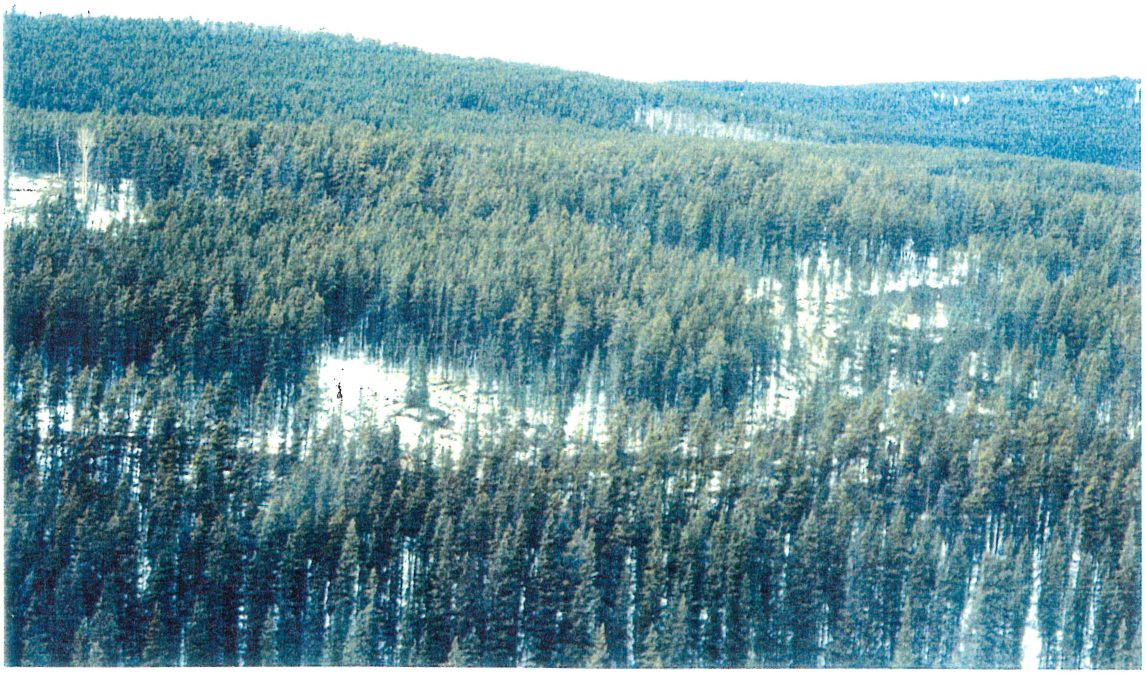
1. This block will be used to illustrate patch cutting with patch retention.
2. Harvesting must not occur in the identified patches within the block.
3. The undisturbed tree buffer must be maintained next to the existing trail which forms the south boundary of the block.
4. Damage to the conifer understory must be kept to a minimum.
5. The block boundary is marked with orange flagging.

Block 4: Prior to Harvesting



Block 4: Following Falling

Block 4: Following Falling



Block 6 Operating Conditions:

1. This block will be used to illustrate uniform shelterwood harvesting. The prescription will be to harvest 50 % of the merchantable stems.
2. Falling and skidding operations must keep damage (i.e. scarring and top breakage) to the remaining trees to a minimum.
3. Damage to the conifer understory and the unmerchantable conifer stems must be kept to a minimum.
4. The block boundary is marked with orange flagging.

N

1 cm = 50 m

Block No: 5

Area: 5.9 ha

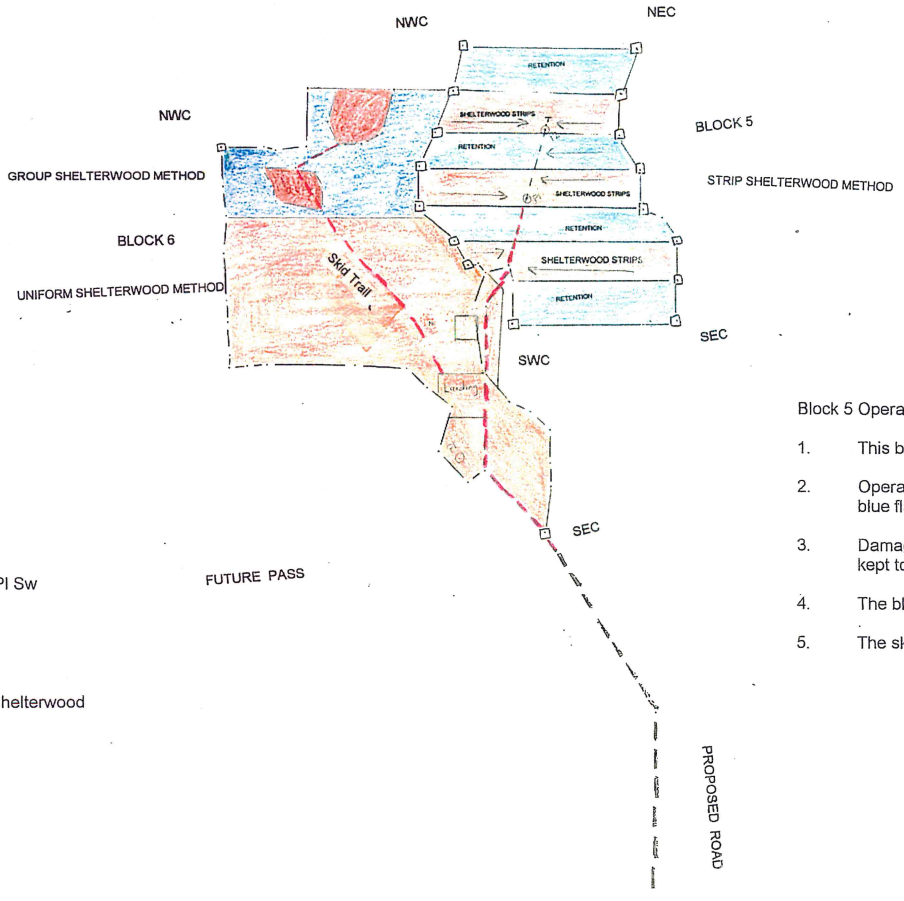
Stand Type: B/C 4/5 Pl Sw

Vol./ ha: 180 m3/ ha

Est. Total Vol.: 1,062 m3

Harvest System: Strip Shelterwood - 2.6 ha harvested

Est. Harvest Vol.: 468 m3



Block No: 6

Area: 7.5 ha

Stand Type: B/C 4/5 Pl Sw & D/C 4/3 Pl Sw

Vol./ ha: 120 m3/ ha

Est. Total Vol.: 900 m3

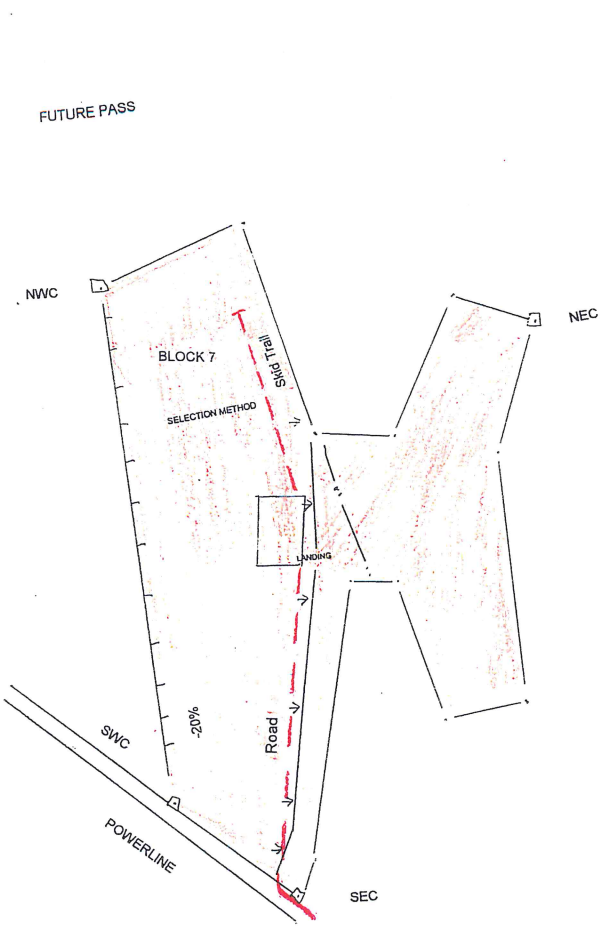
Harvest System: Group and Uniform Shelterwood

Est. Harvest Vol. 450 m3

Block 5 Operating Conditions:

1. This block will be used to illustrate strip shelterwood harvesting.
2. Operations must not occur outside the strips. The shelterwood strips are marked with blue flagging and the knots face inside the cutting areas of the strips.
3. Damage to the conifer understory and unmerchantable trees within the strips must be kept to a minimum.
4. The block boundary is marked with orange flagging.
5. The skid trail within the block is flagged with pink flagging.

Block 5: Strip Shelterwood Method



N

1 cm = 50 m

Block 7 Operating Conditions:

1. This block will be used to illustrate single tree and small group selection harvesting. The prescription will be to harvest 40 % of the merchantable stems.
2. Falling and skidding operations must keep damage (i.e. scarring and top damage) to the remaining trees to a minimum.
3. Damage to the conifer understory and unmerchantable conifer stems must be kept to a minimum.
4. The block boundary is marked with orange flagging.
5. Access to the block will be along the powerline. Therefore, care must be taken to avoid the power poles with equipment.

Block No: 7

Area: 16.0 ha

Stand Type: B/C 4/5 Pl Sw & B/A 4/3 Sw Pl

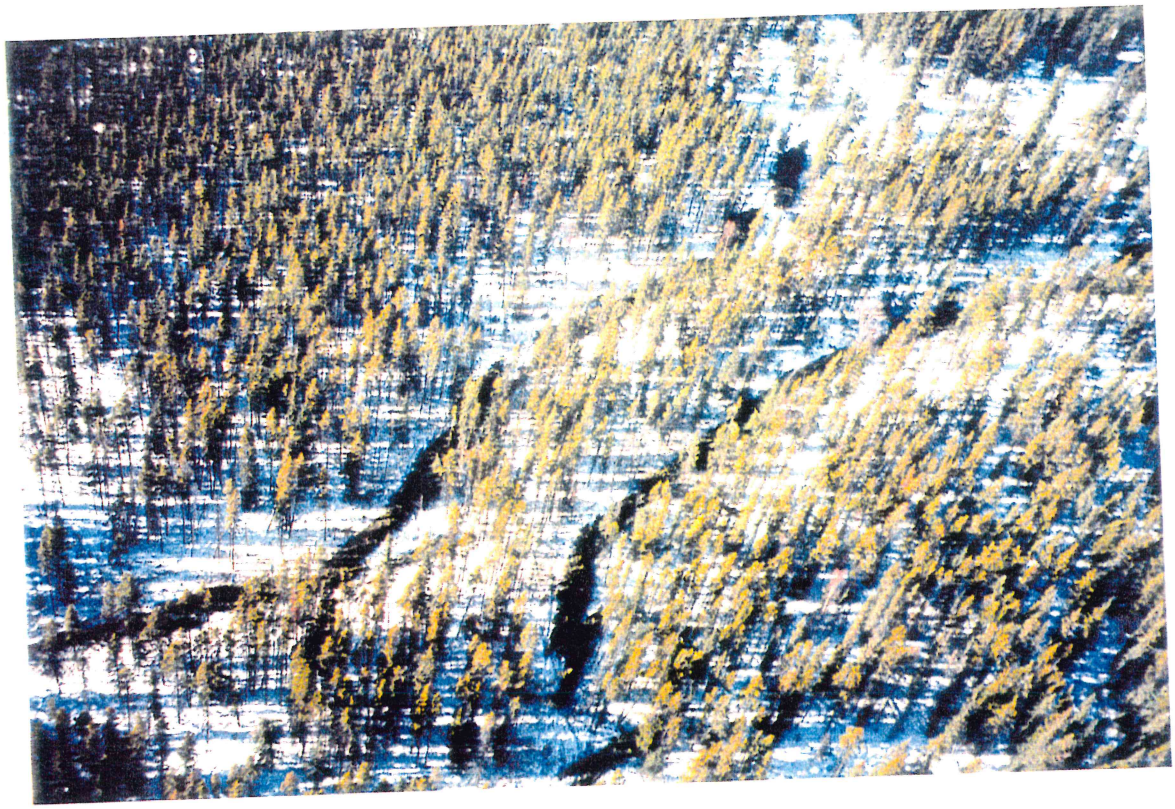
Vol./ ha: 130 m3/ ha

Est. Total Vol.: 2,080 m3

Harvest System: Selection – 40 % Removal

Est. Harvest Vol.: 832 m3

Block 7: Prior to Harvesting



Block 7: Falling following approximately 20 % removal

First Nation Training

First Nation Training

Production and Performance Study for Feller Buncher

Date:_____ Project:_____

Block #:_____ Stand Type:_____ Start Time:_____ End Time:_____

Silviculture System:_____

Grade: Ave. Grade:_____ Min. Grade:_____ Max. Grade:_____

Stems per Ha.:_____ Est. Spacing:_____

Tree #	Time to Set Felling Head (sec.)	SawingTime (sec.)	Dumping/ Bunching Time (sec.)	Time to Travel to Next Tree (sec.)	Delays	Total Time
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
Total						

Production and Performance Study for Skidding

Date:_____ Project:_____

Block #:_____ Stand Type:_____ Start Time:_____ End Time:_____

Silviculture System:_____

Grade: Ave. Grade:_____ Min. Grade:_____ Max. Grade:_____

Skid Distance: Mean Distance:_____ Min. Distance:_____ Max. Distance:_____

Turn #	Turn Start Time	Time to Travel Empty	Loading Time	Time to Travel Loaded	Unloading Time	Delays	# of Trees in Load	Est. Vol. of Load (m3)	Skid Distance (m3)	Total Turn Time
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
Total										