May 18, 1989.

1986 - 5 installations established (all except hillcock) using Herring & halibut veg, night, protocol A and B.
- Base line measurements completed.

1987 - Hillcock installation established + base line measurements completed
- Others re-measured.

1988 - Re-measured all 6 installations

1989 - All 6 installations to be re-measured July/August
- When data collection completed, a contract will be let to load information, analyse & write interim report

It is expected that report will assess efficacy of treatments & impact to range & wildlife values.
It is suspected that it's too early yet to evaluate crop tree responses - perhaps 1991.
Stand Release Trial

Officer I/C: R. Gray

Location: Kamloops, Salmon Arm, Kelowna, Penticton, Vernon and Lillooet

Region/District: Kamloops/Penticton, Vernon, Salmon Arm, Lillooet

Objective: To compare crop tree response to various manual biological (grazing) and herbicide treatments. To provide demonstration areas for the promotion of vegetation management programs. To compare treatment efficacy of weed control of various species.

Progress:
1986 - 5 installations established (all except Lillooet) using Herring & Pollock vegetation management protocol A and B.
- Base line measurements completed.

1987 - Lillooet installation established and baseline measurements completed.
- Other 5 installations remeasured.

1988 - remeasured all 6 installations.

1989 -

1992 - interim report being finalized. Initial data shows some treatments have insignificantly different responses, but trend line suggests this may change.

Next Scheduled Assessment/Treatment: July/Reg. '93 which will provide 7 year results.

Report Distribution: Silviculture Branch Library
Regional Research Officers - All Regions
Silviculture Officer - Kamloops Regions

Incomplete

March 1991
TRIAL SUMMARY FORMAT

86 714 K

Vegetation VIgnet, Assessment in the Kamloops Forest

TITLE: Regen - Stand Release Trials

OFFICER I/C: Ron Greig, Contractor = Suzanne Simard

LOCATION: Kamloops, Kedburna, Vernon, Sicamous Arm,

Kamloops (chillies to be installed in 1987)

REGION/DISTRICT: Kamloops Region - 5 locations (6 locations total by 1987)

OBJECTIVE: 1) To compare crop tree response to various manual, biological (growing) & herbicide treatments.
2) To provide demonstration areas for the promotion of the new species.
3) To compare treatment efficacy in raised control of various species.

PROGRESS:

Interim report Dec/89
Final report Dec/91

NEXT SCHEDULED ASSESSMENT/TREATMENT: Measurements 1, 2, 3 + 5 growing seasons after treatments.

REPORT DISTRIBUTION:

Research Officer - Kips Rig

Silv. " "

Silv. Branch - Victoria

Note: Trial follows the Herring/Hollich protocol for reg. report, assessment.

Working plan attached.
Vegetation Management Assessment in the Kamloops Forest Region
Stand Release Trials

WORKING PLAN

June 2 1986
1.0 The Problem

Competing vegetation has been identified as a major contributor to regeneration failure and poor plantation performance in the Kamloops Forest Region. Approximately 143,000 hectares of good and medium sites in the region need vegetation control. Twenty-four thousand hectares are expected to be added to this backlog annually (Boateng, 1984).

Before foresters can effectively and economically manage vegetation, they must become familiar with the types and consequences of control measures available. Demonstration areas in the major brush complexes in the Kamloops Forest Region can provide comparisons of the available vegetation management techniques and information on crop tree response, crop tree tolerance and efficacy.

2.0 The Objectives

1. To provide six demonstration areas in the Kamloops Forest Region which display various conifer release treatments. The sites will support a brush complex typical of the area and a young plantation or natural stand that contains enough conifers in a suppressed or threatened condition that a benefit from release is anticipated.

2. To obtain data regarding the effectiveness of various treatments for controlling vegetation and for promoting conifer growth.

3.0 Methods of Investigation

3.1 Treatments

The installations will consist of three or four treatments replicated three times. Generally the treatments will consist of the following:

1. untreated (control)
2. manually cut
3. herbicide (either two different rates of application or two different herbicides (glyphosate and hexazinone)).

The manual cutting will be done by a FWAP crew stationed in the appropriate district. The herbicide will be applied using solo backpack sprayers.
3.2 Experimental Design and Layout

The installations will meet the experimental design and layout standards outlined in "Experimental Design Protocol for Forest Vegetation Management Research: Level B Protocol" by L.J. Herring and J.C. Pollack (hereafter referred to as Protocol B), unless otherwise noted.

The experiments will be laid out in either a completely randomized design or a randomized complete block design, depending on the uniformity of the site. Each treatment will be replicated at least two times.

Each treatment plot will be 50m*60m (0.3 hectares) including a 5m buffer strip. The actual treated area, or measurement plot, will therefore be 40m*50m (0.2 hectares). Random assignment of the treatment plots will be made after they have been laid out on the ground. Photo-points will be established at each measurement plot corner. Photos will be taken in a direction 45 degrees from the measurement plot boundary.

Within each treatment plot, twenty 10m2 (r=1.78m) subplots will be laid out in a systematic 4*5 grid. The first plot will be randomly located. The specimen crop trees and target species within the subplots will be marked with metal tags which are numbered sequentially throughout the trial. On manually treated areas, tagging of resprouting target species will be done during the first reassessment.

4.0 Measures and Records

Trials will be assessed immediately before herbicide application in 1986 (baseline assessment) and one (1987), two (1988), three (1989) and five (1991) growing seasons after treatment. Assessments will be done at the height of full vegetation development (mid-July to mid-September).

Field notes will be entered on 80 column wide computer coding forms (FS 390). The measures to be taken are outlined in Protocol B.

5.0 Proposed Analysis

Trial data will be entered into the Ministry of Forests mainframe computer and analysed using SAS programs. One-way or two-way ANOVAs will be used, depending on the experimental design employed. The ANOVA tables for the completely randomized and randomized complete block design are given in Appendix 1 of Protocol B.
6.0 Maintenance

Measurement variables identified during the baseline assessment will be reassessed as described in 4.0. During the reassessments, corner posts and subplot stakes will be replaced where necessary.

Further brushing (manual or chemical) of sprouts will not be done. Missing observations will not be replaced.

Photographic records of the treatment plots will be maintained throughout the reassessment period.

7.0 Communication of Results

A report containing the analysis of the baseline assessment, description of each installation and instructions for future data collection will be provided.

The R.O. Silviculture in the appropriate district will be provided with pesticide use data for reporting purposes to the Ministry of Environment. The district will also be provide with the necessary documentation to establish map notations.

Installations will be registered with Research Branch in Victoria.

Pesticide treatment signs will be erected at each installation.

8.0 Responsibilities

<table>
<thead>
<tr>
<th>Phase</th>
<th>Responsibility</th>
<th>Date Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site selection</td>
<td>Ron Gray (FS) and Suzanne Simard (contractor)</td>
<td>June 2, 1986</td>
</tr>
<tr>
<td>Trial installations</td>
<td>Suzanne Simard and assistant</td>
<td>July 31, 1986</td>
</tr>
<tr>
<td>Herbicide application and baseline assessment</td>
<td>Suzanne Simard and assistant</td>
<td>Sept 15, 1986</td>
</tr>
<tr>
<td>Analysis and Report</td>
<td>Suzanne Simard</td>
<td>October 31, 1986</td>
</tr>
<tr>
<td>Reassessments</td>
<td>Ron Gray</td>
<td></td>
</tr>
</tbody>
</table>
9.0 Materials and Labour

A crew of two persons is required to carry out the field work. FWAP crews will assist in the manual brushing and, where necessary, in the establishment of exclosures.

The equipment required to establish the installations includes:

- 2m tall pressure treated 3-4" fence posts (treatment plot corner posts)
- metal tags for treatment plot corner posts
- 1m tall cedar subplot stakes
- metal tags for subplot stakes
- orange spray paint
- orange flagging
- metal tags for crop tree and target specimens
- shovels
- axes
- hip chain/thread
- 50 m nylon chain
- compass
- suunto
- dbh tape
- caliper
- measuring tape
- measuring stick
- trowel
- camera/film
- sling psychrometer
- anemometer
- backpack sprayer (glyphosate application)
- spot gun (hexazinone application)
- herbicide
10.0  Cost

10.1  Working plan and site selection
Estimated 20 mandays @ $140.00/manday = 2,800.00

10.2  Labour

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimated Mandays per trial</th>
<th>Estimated Mandays for six trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial layout</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Corner post installation</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Subplot layout</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Manual cut supervision</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Herbicide application</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Subplot assessments</td>
<td>8</td>
<td>48</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>132</td>
</tr>
</tbody>
</table>

Total labour cost ($110.00/manday) = 14,520.00

10.3  Analysis and report
Estimated 35 mandays @ $140.00/manday = $4,900.00

10.4  Equipment

Layout and assessment equipment = $500.00
Safety equipment = $800.00

10.5  Travel

Vehicle: Estimated 18,000 km @ $0.47/km = $8,460.00
Lodging: Estimated 80 nights @ $50.00/night = 4,000.00
Food: Estimated 140 mandays @ $27.50/day = 3,850.00

10.6  Total contract cost

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working plan and site selection</td>
<td>2,800.00</td>
</tr>
<tr>
<td>Labour</td>
<td>14,520.00</td>
</tr>
<tr>
<td>Analysis and report</td>
<td>4,900.00</td>
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<tr>
<td>Equipment</td>
<td>1,300.00</td>
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<tr>
<td>Travel</td>
<td>16,310.00</td>
</tr>
<tr>
<td>Total</td>
<td>39,830.00</td>
</tr>
</tbody>
</table>
11.0 Specifications of the Installations

11.1 Devick Lake, Kamloops District

Opening: 92-I-16-h:16
Tenure: TS A07212 CB 12 BLK 4
Location: One kilometer southwest of Community Lake.
History: Clearcut, 1977 (44 ha.)
        Chain scarified, 1978
        Manually brushed, fall 1984
Subzone: MSbl
Elevation: 1200m
Aspect/Slope: East/10%
Stocking: P1 (Se, B1)
Brush spp.: Alnus viridis, Epilobium angustifolium
Exp. design: Nested randomized complete block design
Factors:
  1. With exclosure
  2. Without exclosure
Replications: Two
Treatments: 1. control
            2. Glyphosate @ 3 l/ha.
            3. Glyphosate @ 6 l/ha.
            A control block was reserved during the 1984
            manual brushing. Twenty subplots will be
            installed for observational purposes.
Analysis: Nested ANOVA
11.2 Mission Creek-Belgo Creek, Penticton District

Opening: 82-E-14-h:31

Location: Approximately 40 km. east of Kelowna, between Mission Creek and Belgo Creek

History: Clearcut 1981, 1982

Subzone: MSb3

Elevation: 1320m

Aspect/Slope: West/20%

Stocking: P1

Brush spp.: Alnus viridis, Salix spp., Vaccinium scoparium, Epilobium angustifolium

Exp. design: Randomized complete block design

Replications: Three

Treatments: 1. control
            2. manually cut
            3. Glyphosate @ 3 l/ha.
            4. Glyphosate @ 6 l/ha.

Analysis: Two-way ANOVA
11.3 Ellis Creek, Penticton District

Opening: 82-E-6-f:14

Location: 35.5 km east of Penticton on F.S. Road 201

History: Mechanically cleared, 1980
Broadcast burned, 1982
Planted to Pl Lw, 1983

Subzone: MSb3

Elevation: 1400m

Aspect/Slope: Northeast/10%

Stocking: Pl, Lw

Brush spp.: Alnus viridis, Salix spp.

Exp. Design: Nested randomized complete block design
Factors:
1. With exclosure
2. Without exclosure

Replications: Two

Treatments: 1. control
2. manually cut
3. Glyphosate @ 4 l/ha.
4. Hexazinone @ 8 l/ha.

Analysis: Nested ANOVA
11.4 Enterprise Creek, Lillooet District

Opening: 92-I-12-?

Tenure: FL A18700 CP 36 BLK 1

Location: 20 km west of Lillooet

History: Clearcut, 1979, 1980

Subzone: IDPd

Elevation: 850m

Aspect/Slope: Northwest/25%

Stocking: F

Brush spp.: Calamagrostis rubescens

Exp. design: Randomized complete block design

Replications: Three

Treatments: 1. control
2. Glyphosate @ 3 l/ha.
3. Velpar @ 10 l/ha. or Glyphosate @ 6 l/ha.

Analysis: Two-way ANOVA
11.5  Larch Hills, Salmon Arm District

Opening: 82-L-11-h:200

Tenure: TSHL A01619 CP 6 BLK 4

Location: 20 km southwest of Salmon Arm

History: Clearcut, 1978
Broadcast burned, 1980
Planted to F, 1982

Subzone: ICHm2

Elevation:

Aspect/Slope: Southeast/20%

Stocking: F (C)

Brush spp.: Populus tremuloides, Rubus spectabilis, Epilobium angustifolium, Salix spp.

Exp. design: Randomized complete block design

Replications: Three

Treatments: 1. control
2. Glyphosate @ 3 l/ha.
3. Glyphosate @ 6 l/ha.

Analysis: Two-way ANOVA
11.6 North Fork - Otteson Rd., Vernon District

Opening: 82-L-8-d:8

Tenure: TSA A04747 BLK B

Location: 10 km east of Cherryville

History: Clearcut, 1976-1977
Broadcast burned, 1979
Planted to S, 1982

Subzone: ICHm2

Elevation: 1433

Aspect/Slope: Southwest/25%

Stocking: Se, Pl, F

Brush spp.: Salix spp., Epilobium angustifolium,
Rubus spectabilis, Populus tremuloides

Exp. design: Randomized complete block design

Replications: Three

Treatments: 1. control
2. Glyphosate @ 3 l/ha.
3. Glyphosate @ 6 l/ha.

Analysis: Two-way ANOVA
11.7 Community Lake, Kamloops District

Opening: 92-1-16-h:7

Location: One km west of Community Lake

History: Clearcut, 1971, 1972
Mechanically scarified, 1974
Planted to Se, 1980

Subzone: MSbl

Elevation: 1200m

Aspect/Slope: West/10%

Stocking: Pl, Se

Brush spp.: Populus tremuloides, Calamagrostis rubescens

Exp. design: Two Sx trials: Planted Se
Natural Pl

Replications: One

Treatments: 1. control
2. Glyphosate: backpack
   hack and squirt

Analysis: t-test