Integrated Forest /Range Research
Five-year Plan (1985 -1990) - Project 3.38

INTRODUCTION

The British Columbia Forest Act directs the Ministry of Forests (MOF) to "encourage maximum productivity of the forest and range resources in the Province" (Section 4a) and to "plan the use of the forest and range resources of the Crown so that the production of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with ministries and agencies of the Crown and with the private sector" (Section 4c).

Based on these multiple use objectives, current MOF policy requires the seeding of harvested or burned forest land with forage plants, particularly where the ranching industry is locally important, so as to provide a consistent source of high-quality forage (B.C. Min. For. 1985).

Multiple use objectives, however, occasionally place alternative resource values in conflict. Seeding of harvested or disturbed forest lands to domestic forages followed by livestock grazing, may result in damage, reduced growth, or mortality of regenerating trees. Where damage to trees does occur, the land may remain classified as Not Satisfactorily Restocked (NSR).

Despite these potential problems, research by Mclean and Clark (1980) near Kamloops, concluded that seeding domestic forages and grazing cattle on clearcuts can be compatible with regenerating trees, assuming proper management. Although this compatibility among cattle, grass, and trees is accepted in principle by many resource managers, some skepticism remains. Much of this doubt stems from inadequate research, incomplete information, and conflicting operational results.

A report prepared under Project 3.38 summarizes a comprehensive five-year plan of research to 1) clarify the biological interactions among grass, trees, and cattle and 2) provide reliable information to assist resource managers with integrated forest/range management in the Cariboo, Kamloops, and Nelson Forest Regions. The recommendations reported are based on a literature review, site visits, and personal interviews.

Attention is focused on those research programs most likely to provide the biological and economic information needed to implement integrated forest/range management.

These topics fell broadly into six categories:

1) competition between trees and herbaceous plants;

2) effects of livestock damage on tree survival and growth;

3) management prescriptions for forage seeding;

4) prescriptions for cattle management;

5) Interactions between silvicultural and grazing activities; and

6) resource economics.

To establish priority among alternative research projects, five criteria were selected based on the 1985-1990 FRDA Agreement, B.C. MOF Research Branch guidelines, and items emphasized by interviewees. It was determined that priority should be given to research that:

- addresses issues of controversy among resource managers;
- provides information directly pertinent to forest backlog problems;
- improves operational backlog forestry by identifying silvicultural obstacles to reforestation;
- demonstrates reforestation programs at field locations; and
- supports current investigative programs by providing information currently lacking or incomplete.

RECOMMENDED RESEARCH

The following research topics were identified based on the above criteria and are recommended in order of priority.

1. Research and Demonstration of the Impacts of Operational Cattle Grazing and Forage Seeding on Reforestation

Most interviewees identified demonstration projects as the most effective means for determining the impacts of operational livestock grazing and forage seeding activities on backlog reforestation.

This investigation and others clearly establish that insufficient data are available on which to base management decisions regarding livestock grazing and regenerating conifers.
Specific experimental evidence is needed to document:

- the relative competitive abilities of pinegrass and domestic forage such as clovers, crested wheatgrass, orchardgrass, smooth brome, and timothy;
- the proportion of damage to regenerating trees caused by livestock grazing; and
- the impact of livestock damage on tree survival and growth. Rather than taking a strict experimental approach, it was recommended that demonstration projects should strive to assess the relative influences of operational grazing and forage seeding on tree survival and growth.

Exclosures within grazed clearcuts could be used to identify the proportion of basal scarring on seedlings caused by trampling from cattle. These exclosures could be partitioned, with sub-portions seeded to domestic forages and the remaining portions left in native vegetation. This partitioning allows assessment of the effects of plant competition on tree survival and growth, as well as the potential of cattle to increase tree survival and growth by reducing herbaceous plant competition.

Specific objectives of these demonstration projects include:

- determining the relative effects of domestic forage and native vegetation on survival and growth of crop trees in the presence and absence of grazing by domestic livestock;
- assessing the proportion of physical damage to regenerating conifers caused by cattle; and
- identifying those cattle grazing factors most likely responsible for tree damage and mortality within various biogeoclimatic subzones.

2. Effects of Basal Scarring and Shoot Damage on Lodgepole Pine and Spruce Seedling Survival and Growth

Widespread disagreement and uncertainty exist regarding the effects of basal scarring on tree survival and growth, both between ecologists and silviculturists, and among silviculturists. Although wounding, in principle, likely produces some initial decline in growth rates, no data are available which quantify functional relationships among wounding severity, growth reduction, and survival of Engelmann spruce and Douglas fir. Further research would supplement existing information on lodgepole pine wounding by red squirrels and snowshoe hares (Sullivan and Sullivan 1982, Sullivan 1984) and identify the impact of cattle trampling damage on reforestation.

Objectives of the research are to determine the effects of:

- different levels of seedling girdling on tree survival and growth;
- different levels of shoot removal on tree survival and growth;
- girdling and shoot removal on seedlings of two different age classes; and
- season of damage on tree survival and growth.

3. The Effects of Grazing Pressure on Conifer Seedling Damage

Specific grazing management programs that minimize damage to regenerating trees still remain largely unknown or unverified in British Columbia. Suggestions for such programs have included intense grazing with high forage utilization for short grazing periods, moderate forage utilization for short grazing periods, and moderate forage utilization for extended grazing periods. An alternative belief is that grazing cannot occur on new plantations without unacceptable trampling damage to trees.

New research is required to establish the relationship between NSR forest sites and specific management programs. It is recommended that this research should extend the work of Mclean and Clark (1980) to a variety of biogeoclimatic zones throughout the southern interior.

Previous research on forest grazing in B.C. has focused on the independent manipulation of stocking rate (trees/ha) and duration of grazing to determine potential impacts on regenerating conifers. The true cause of trampling damage, however, is likely associated with grazing pressure, which reflects the amount of searching effort required by cattle to satisfy their forage needs.

Grazing pressure describes the ratio of animal demand per unit weight of forage at any instant in time (Scarnecchia 1985). It combines the number of livestock on a unit area and the duration of the grazing period. Theoretically, grazing pressure and seedling damage are directly related, but this relationship has not yet been confirmed. Since grazing pressure is a function of the number of animals and the number of days grazing, it is possible to achieve equal levels of grazing pressure with very different combinations of variables (i.e. 200 animals x 14 days grazing would produce the same pressure as 100 animals x 28 days grazing). One question which needs to be addressed is whether both combinations would result in the same seedling damage.
This research should be approached in two phases. First phase objectives are to determine:

- the grazing pressure threshold that results in unacceptable physical damage to conifer tree seedlings;
- if equal levels of grazing pressure produce the same levels of seedling damage; and 
- the relationship between percent utilization of forage and grazing pressure. This last objective could provide managers with a more convenient method of assessing potential damage to tree seedlings.

Second phase objectives include:

- repeating the research in all important subzones where cattle use may affect NSR status; and 
- developing guidelines for grazing in plantations on a subzone basis.

4. Effects of Forest Herbicides on Survival and Production of Key Herbaceous Species

Although it has not previously been considered a priority, the increasing use of herbicides to control competing woody and herbaceous vegetation on regenerating clearcuts has prompted greater interest in the topic. Information from these studies will enhance integrated forest/range management by identifying the potential negative impacts of herbicide use on forage production. Such impacts could adversely affect both the livestock industry and wildlife habitat quality.

The studies will attempt to:

- determine the effect of Vision® (glyophosate) on the survival and production of key herbaceous plant species; 
- develop stocking level guidelines based on the changes in forage production levels following herbicide application; and 
- enhance long-term planning for re-allocation of animal unit months of grazing in forested areas treated by herbicides.

5. The Effects of Cattle Grazing and Forage Seeding Rates on the Survival and Growth of Conifers and Control of Native Vegetation

Although demonstration projects may provide operational comparability, they sometimes fail to yield statistically or scientifically conclusive results. Therefore, demonstration projects need to be supplemented and confirmed with experimentally rigorous research programs.

This research proposal provides experimental support for recommended Project 1, which investigates the impacts of cattle grazing and forage seeding on reforestation. It satisfies similar criteria to Project 1 but will be confined to a single research site to achieve replication of experimental units.

The objectives of the proposal are to determine:

- the effect of four seeding rates on suppressing native vegetation and the subsequent benefits to conifer survival and growth; 
- the effect of three levels of grazing intensity on suppressing native vegetation and the survival and growth of conifers; 
- the effects of variable seeding rates on plant density and forage production; 
- the effects on cattle weight gain, of variable grazing intensities and forage production as produced by different seeding rates; and 
- to develop management prescriptions for seeding rates and cattle use on seeded plantations.

IMPLEMENTATION OF RESEARCH RECOMMENDATIONS

The research and demonstration projects recommended above include only a small fraction of potentially useful topics. Depending on availability of funds, additional topics can also be considered. Since other topics may be perceived by some as being more important than those recommended, it is essential that all research participants review the recommendations and give their input so that any concerns may be addressed.

A research and demonstration program of this size requires a research team of several participants, including silviculturists and range agrologists. Ideally, the research team should include resource managers as well as scientists. Research administration should involve a Steering Committee, Management Committee, Program Manager and Project Leaders, with the Management Committee including representatives of government, ranchers, and private timber companies.

Research and demonstration projects should occur primarily in the Kamloops Forest Region, where the interactions among grazing, seeding of domestic forages, and forestry are most intense. However, demonstration projects should also occur in the Cariboo and Nelson Forest Regions to provide geographical and ecological variety and increased accessibility to demonstration sites. Forest backlog and grazing interactions are most prevalent in the dry subzones of the ESSF, IDF, ICH, and MS biogeoclimatic zones, making these priorities as research sites.
Information derived from operational studies and experiments should be widely distributed through reports, workshops, and field days. Reliable information, based on research, will enhance communication among resource managers and contribute to successful integrated forest/ra range management.

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REFERENCES


