

Understory Succession following Ecosystem Restoration Treatments in Ingrown Dry Forests

Reg Newman¹, Hillary Page², and John Parminter³

Dry forests of ponderosa pine (*Pinus ponderosa*) and interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) occur along the valleys at low- to mid-elevations within the southern interior of British Columbia.

Fire suppression, overgrazing, and selective logging in these forests are believed to have caused forest encroachment on grasslands and ingrowth within open forests. Encroachment is tree establishment in previously treeless openings. Ingrowth is excessive tree recruitment, primarily by shade-tolerant species, such as interior Douglas-fir, within low-density, open forests



Ingrown ponderosa pine stand near Cranbrook, BC.

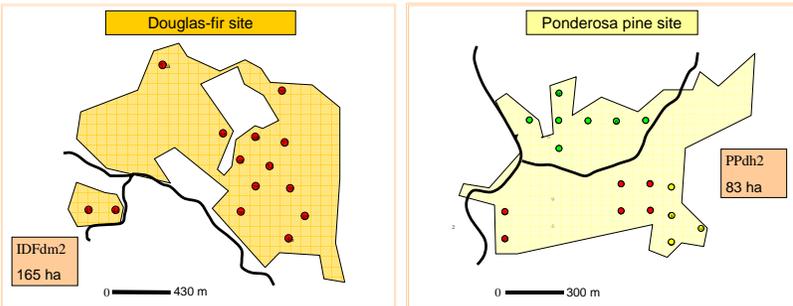


Treated ponderosa pine stand near Cranbrook, BC.

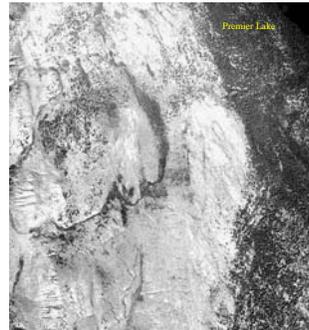
Restoration of ingrown stands usually begins with a harvest pass to remove merchantable timber and reduce overstory stocking to between 70 and 400 stems per ha. Slashing is used to eliminate excess intermediate layer trees that cannot be safely removed in a prescribed fire.

In the East Kootenay region of BC, restoration prescriptions are based on land use guidelines set by the Kootenay-Boundary Land Use Plan. The Rocky Mountain Trench Restoration Program estimates that 135 000 ha of ingrown forest will be restored to grassland or open forest by the year 2030.

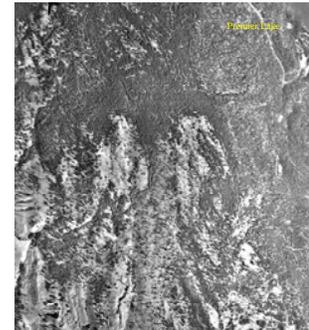
Project Objective: to document the changes in understory plant community following thinning and prescribed burning of ingrown forests



Restoration of ingrown stands of ponderosa pine (PPdh2) (*Pinus ponderosa*) and interior Douglas-fir (IDFdm2) (*Pseudotsuga menziesii* var. *glauca*) was carried out using a prescription of partial cutting and slashing in 1999 and 2000. Partial cutting consisted of thinning the forest canopy and removing intermediate layer trees. Slashing consisted of cutting pre-commercial, intermediate layers to reduce the risk of crown fire during prescribed understory burns. The PPdh2 stand was subjected to a prescribed fire in April 2004. The restoration treatment removed an average of 48 m³/ha of tree volume from the ponderosa pine site, leaving 27 m³/ha. Merchantable stem density decreased by 513 stems/ha, leaving 192 stems/ha on the site. Understory light increased by 30% following the treatment. The harvest pass removed an average of 68 m³ ha⁻¹ of tree volume from the Douglas-fir site, leaving 59 m³ ha⁻¹. Merchantable stem density decreased by 261 stems per ha, leaving 243 stems per ha on the site. Understory light increased by 27% following harvest.



Premier Lake - 1954



Premier Lake - 1994

The photo pair above illustrates forest cover changes during a 40 year period near Premier Lake. It has been estimated that 1500 to 3000 ha of open forest and grassland are lost annually to ingrowth and encroachment in the East Kootenay region of BC.



Ingrowth often results in the retrogression of understory plant communities, the loss of habitat for sensitive wildlife species, and an increased risk of catastrophic wildfires. Changes in forest structure within ingrown forests reduces forage availability for wildlife and livestock. For example, a lack of light and increased competition from pinegrass may limit the abundance of important forage species such as bluebunch wheatgrass and rough fescue. Habitat value for grassland and open-forest dependent wildlife species such as the badger is also diminished with ingrowth.

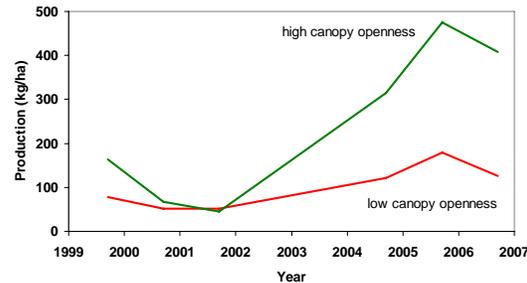


Figure 1. Production of all grasses combined at the ponderosa pine site from 1999 (pre-treatment year) to 2006.

Forage production of all grasses combined was tripled at the ponderosa pine site on areas partially-cut to allow a 44% increase of understory light compared to areas partially-cut to allow 17% more understory light (408 kg/ha versus 125 kg/ha, respectively) (Fig. 1). Most of the forage increase was due to pinegrass (*Calamagrostis rubescens*) with some contribution from bunchgrass. Total forage production was almost doubled at the Douglas-fir site.

The ratio of rough fescue (*Festuca campestris*) frequency to pinegrass frequency has decreased slightly over time at both sites, an indication that pinegrass is "winning the race" relative to rough fescue (Fig 2).

It is evident that desirable plant species such as rough fescue have not yet been able to reproduce substantially with the treatments employed, and under the environmental conditions experienced over the study period. Possible limiting conditions include grazing by cattle, elk and deer, and drought.

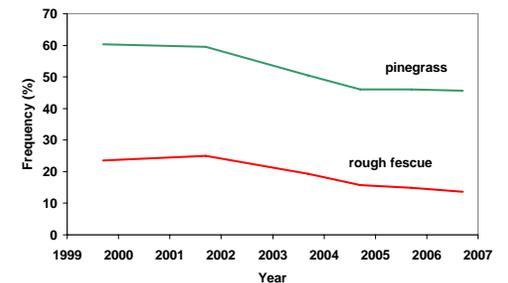


Figure 2. Frequency of pinegrass and rough fescue at the ponderosa pine site from 1999 (pre-treatment year) to 2006.



¹ Research Branch, BC Ministry of Forests and Range, Kamloops, BC V2C 2T7, Canada
² Sage Ecological Research, Invermere, BC V0A 1K0, Canada
³ Research Branch, BC Ministry of Forests and Range, Victoria, BC V8W 1N1, Canada

Restoration treatments were made possible by the BC Habitat Conservation Trust Fund. This study was funded (in part) by the FIA Forest Science Program of the B.C. Ministry of Forests and Range. Don Gayton and Tim Ross assisted in the development of this poster. Darrell Smith, Dave White, Gail Berg, and Rocky Mountain Forest District staff provided support for the project.