

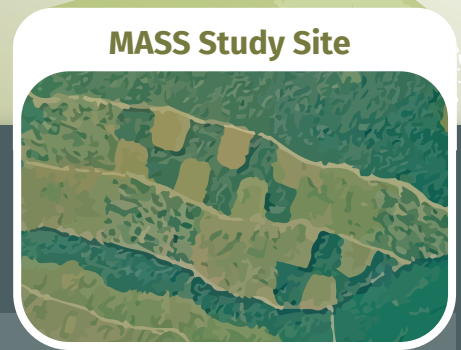
WHAT LIES BENEATH

HOW ALTERNATIVES TO CLEARCUTTING AFFECT UNDERSTORY VEGETATION IN BRITISH COLUMBIA'S COASTAL FORESTS



British Columbia's (B.C.) coastal montane forests are rich in plant and animal life that provides significant cultural, social and ecological benefits. They are also a valuable economic resource and are in high demand for their timber. However, forest regeneration following harvest is a key concern and challenge in these areas due to their high elevation and some unfavorable re-growth conditions created by large clearcuts. In addition, there is growing concern and awareness about the impacts of clearcutting on the region's biodiversity. Forest and other resource managers need to select silviculture treatments that achieve management goals, including restoring/retaining the many values these forests provide.

In response to these challenges, the Montane Alternative Silviculture Systems (MASS) project, a multi-agency partnership, was established to test and study new approaches to forest harvesting and regeneration in coastal montane forests on central Vancouver Island, B.C.



This study investigated the **effects of clearcutting and three alternative silvicultural systems on understory vegetation** compared to an undisturbed old-growth forest.

Specifically, they looked at **understory vegetation**:

1. **Cover and diversity** responses to four silviculture treatments.
2. Responses to **edge effects** within and surrounding patches of forest (retained aggregates) that were left uncut.

Sites were observed before harvest and at regular intervals up to 26 years after harvest and compared with an adjacent old-growth forest.

The four silviculture treatments:



CLEARCUTTING:
All trees harvested within the block.



PATCH CUTTING:
Small cutblocks alternating with uncut patches (50% patch retention).



DISPERSED RETENTION:
Retention of 25 trees dispersed throughout each hectare (sometimes called 'green tree retention').

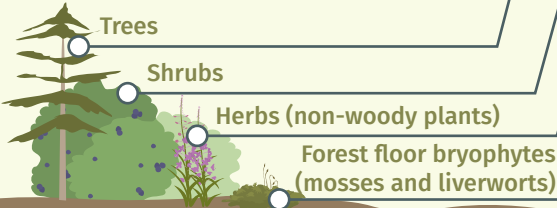


SHELTERWOOD:
Trees of all sizes and species left uniformly (~25% retention and 200 trees per hectare) to protect re-growth from the elements.

Silvicultural systems are the set of treatments applied before, during, and after a forest is harvested (over the life of the stand) to achieve specific forest characteristics. They are often designed to maximize timber production, but now more commonly consider other factors like ecological, social, and cultural values.

KEY TAKEAWAYS

In the year after harvesting, all silviculture treatments reduced understory vegetation cover due to ground disturbance and logging debris. Plant life-forms recovered at different rates:



- Recovered to pre-harvest cover after 15 years and exceeded pre-harvest cover after 26 years.
- Recovered to pre-harvest cover after 5-10 years and continued to increase following all non-clearcut treatments after 15 years.
- Cover was low pre-harvest, but rapidly increased between years 3 and 10 due to the fast growth of early-seral species (plants that grow first after a disturbance) like fireweed. This was least pronounced in the shelterwood treatment. They have since declined rapidly after year 15.
- Most negatively affected by forest harvesting compared to other plant species, with less than 5% cover following all treatments except shelterwood. They remain at one-third or less of their pre-harvest cover after 26 years.

All silviculture treatments temporarily increased the number and diversity of understory species compared to pre-harvest and old-growth control conditions and peaked at year 15. By year 26, the number and diversity of understory species began to decrease as early-seral species were outcompeted, but still above pre-harvest levels. After 26 years, the number and diversity of understory species was similar among all treatments.



Blueberry and huckleberry species were still increasing in all systems and berry production remained abundant—an important consideration for forest management given their significance for wildlife forage and First Nations traditional food gathering.

In some cases, vegetation cover, and the number and diversity of understory species varied by silviculture treatment:

CLEARCUTTING:

Large increase in herb cover and rapid recovery of shrubs



PATCH CUTTING:

Large initial increase in herb cover
Slower shrub recovery compared to clearcutting



Many of the vegetation responses in these treatments were similar to the clearcut.

DISPERSED RETENTION:

Large initial increase in herb cover and rapid recovery of shrubs



This is the only treatment with significantly higher number of species than the pre-harvest forest after 26 years, but the trend was similar for all treatments.

SHELTERWOOD:

Least amount of change between pre-harvest, old-growth conditions compared to other treatments because it retained undisturbed ground and more stand structure:



Slower conifer regeneration because of competition with shrubs and shade created by the overstory.



Retention patches did not have significant edge effects into the uncut areas and patches had a similar number and diversity of species to the pre-harvest forest. This suggests that aggregated retention can be effective for maintaining late-seral understory species that are more abundant in older forests.

MANAGEMENT IMPLICATIONS: RETAIN PATCHES OF INTACT FOREST

Because of the high winds in forests along BC's coast, retaining dispersed single trees is not practical in many areas due to high losses to windthrow. Therefore, retaining forest patches, especially of mature, or old-growth forest, may help mitigate the impact of harvesting on late-seral forest herbs and bryophytes.

These results are most applicable to montane ecosystems along BC's coast and in some forests in BC's Interior Cedar-Hemlock biogeoclimatic zone. For other regions, retention patch sizes and patterns should be adjusted to local conditions, species, and forest management goals.



Canadian Conservation and Land Management

TO LEARN MORE ABOUT THE MASS PROJECT ON THE CCLM, VISIT CCLMPORTAL.CA

Reference: Beese et al., 2022. [Understory vegetation response to alternative silvicultural systems in coastal British Columbia montane forests](#). Forest Ecology and Management.