

Thinning Guidance for British Columbia

Version 2.0

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Office of the Chief Forester



Ministry of
Forests

Summary of changes

Date	Section or Appendix	Description
2025-02-01	New Guidance Document	This is the first version of Thinning Guidance for BC. Includes Appendix 1 practice guidance when thinning for timber in BC.
2026-07-01	New Appendix 5 Corrections	Thinning for a wildfire risk reduction objective. Corrections in the text. Clarification of commercial thinning definition in Appendix 1. Damage criteria change related to forks in Pli.

Acknowledgement

Many people contributed to the production of this guidance by offering advice, providing computer growth and yield simulations, conducting operational trials, revising the document, or monitoring the outcomes of previous thinning activities. Thank you for continuing to drive innovative practices forward in this province.

Cover photo: Winter recreation in a thinned stand. Bryce Bancroft. Used with permission.

Contact

For more information on thinning in British Columbia, to request cutblock history reports or to get an editable version of the example stocking standards, contact the Intensive Silviculture Specialist at the Ministry of Forests, Forest Science, Planning and Practices Branch by email:

ThinningSupport@gov.bc.ca.

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Purpose

To support forest professionals and delegated decision-makers in the development and implementation of thinning prescriptions and the approval of associated stocking standards.

Appendix 1 contains specific guidance for traditional commercial thinning prescriptions and practices with the goal of reducing the time to achieve a target diameter or piece size, producing a higher-quality log sooner while maintaining social and ecosystem objectives.

Appendices 2-4 contain technical information to support thinning prescription development.

Appendix 5 contains specific guidance when planning and carrying out fuel treatments for wildfire risk reduction that utilize thinning to improve effectiveness of fire suppression efforts.

This document replaces the Interim Guidance for Commercial Thinning – Interior British Columbia, published May 2021, and is meant to adhere to clearly defined forestry principles related to stand growth for the entire province.

Message from the chief forester

Actively managing and thinning our forests supports access to fibre to sustain diversified manufacturing, focusses on improving the value of our timber resources, and helps improve timber flow at the forest scale while maintaining complementary social and stewardship objectives such as hydrologic functioning condition or stand resiliency to disturbances.

The intent of this thinning guidance is to provide a science-based foundation that fosters collaboration and trust among industry, Indigenous nations, and government staff; promotes innovation; reduces administrative complexity; and is a part of an adaptive management framework that leads to increased opportunities and benefits in our forests. It builds on the Guidelines for Commercial Thinning (B.C. Ministry of Forests 1999)¹. If an element of thinning advice is not contained here, refer to that document.

My expectation is that this guidance will be considered, and a professional quality rationale will be produced when creating thinning prescriptions, retention standards, and plans for the next harvest entry.

Definition and legislative context

Thinning is the cutting of individual trees from a stand to maintain or improve the health of remaining trees by providing space and resources for growth (e.g., sunlight, water, and nutrients).²

For the purposes of this guidance, commercial thinning (CT) is a silvicultural intervention that is part of a broader silvicultural system³. It involves the selective removal of trees; typically, damaged,

¹ <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stand-tending/ct0726.pdf>

² Definition developed by the Provincial Thinning Steering Committee Terms of Reference 2024.

³ [Silvicultural Systems Handbook for British Columbia](#)

diseased, or low vigor—from immature stands⁴ prior to density dependent mortality occurring to meet a timber flow and/or value objective.

Thinning is often applied within even-aged stands but can also be used to restore complex stand structures and accelerate forest succession with a broad goal of preparing stands for uneven-aged silvicultural systems rather than clearcuts.

Thinning interventions prepare the stands to meet future objectives: timber production and quality, maintenance of wildlife habitat, provision of resistance to disease or wildfire, or maintenance of visual quality, to name a few. The timing and type of next stand entry is dependent on these objectives and should be part of the description of the expected stand development pathway.

This guidance provides a general framework for where the practice may be desirable. The focus of the practice guidance in Appendix 1 is on using traditional commercial thinning of even-aged stands to manage timber production and quality. Appendix 5 provides guidance on including thinning in wildfire risk reduction activities. Additional guidance for other objectives will be released as it is developed.

Thinning that removes fibre from the site is an intermediate harvest and a primary forest activity⁵ that requires:

- **information-sharing and consultation with First Nations,**
- **harvest authorization (including Forest Operations Map),**
- **stand-level wildlife tree retention⁶ (unless an alternative result or strategy is approved in a Forest Stewardship Plan (FSP), Forest Operations Plan (FOP) or the requirement is exempted), and**
- **retention stocking standards in an approved forest stewardship plan, woodlot licence plan, forest landscape plan, or forest operations plan.**

This guidance does not replace or preclude legal requirements or other sources of guidance for other forest values that have been previously issued by the Ministry.

Role of thinning in forest management

Thinning continues to be included in strategic priorities for British Columbia: e.g., forest policy modernization and the Old Growth Strategic Review recommendations to locate a working forest within previously harvested landscapes (3), and to use innovative practices (12).

This guidance aligns with Goal 2 – Stewardship for Healthy Ecosystems in the report From Review to Action ⁷(2024):

- actively managing our stands can aid in landscape resilience, and

⁴ CT is meant to reallocate resources to crop trees through providing additional growing space. As stands age, crown recession reduces the live crown ratio, limiting the tree's ability to fully utilize the additional growing space. The intent is to apply commercial thinning at least 15 years before culmination age, which for interior species equates to < 45 years old for pine dominated stands and < 65 years old for Douglas-fir or spruce dominated stands.

⁵ Definitions are within the Forest Planning and Practices Regulation and the Woodlot Licence Planning and Practices Regulation.

⁶ Forest Planning and Practices Regulation S.66 Wildlife tree retention, S.12.5 (exemption from S 66 for FSP)), S. 4.51 (exemption from FOP).

⁷ https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/old-growth-forests/from_review_to_action.pdf

- providing a stable and sustainable flow of natural resources that support our community health and reliable economies.

Management objectives and thinning goals

The objectives, goals, or desired outcomes of thinning (Figure 1) do not follow a hierarchy; they are not ordered because elements may appear in more than one outcome. In British Columbia, the objectives for the site and stand within the landscape context should guide how to achieve the outcomes.

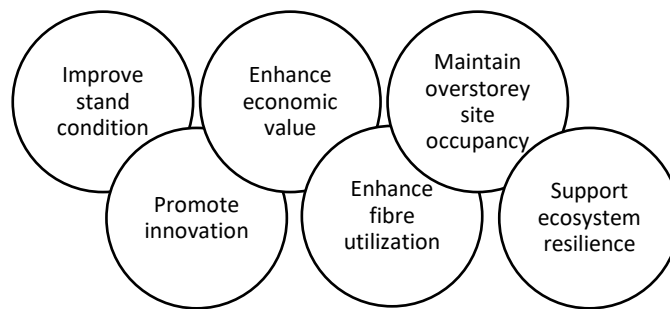


Figure 1. Desired outcomes of thinning.

Improve stand condition

Stand condition may be improved when:

- dead, dying, or diseased trees are removed
- windfirm and healthy trees are retained
- competition for light, nutrients, and water is reduced
- ecologically suitable, higher-value species are retained

Example:

Even-aged lodgepole pine stand: The goal of thinning is to remove pine with forks, broken tops, and gall rust. These health factors contribute to loss of both sawlog volume and wood quality over the long term. Thinning to remove these trees also reduces competition for sunlight, water, and nutrients now and into the future.

Support forested ecosystem resilience⁸

Thinning may support or promote forested ecosystem resilience when:

- competition for light, water, and nutrients is reduced
- surface, ladder, and/or crown fuels are reduced, which may reduce wildfire risk
- a component of broadleaf and/or shrub species is maintained
- a diversity of ecologically suitable species is retained
- soil disturbance is minimized

Example:

⁸ Resilience is the ability of the ecosystem to tolerate disturbance and recover.

Restoration thinning from below of interior Douglas-fir: The objective is to reduce inter-tree competition, reduce ladder and crown fuels, and improve individual tree vigour to concentrate volume production on the remaining stems and reduce susceptibility to Douglas-fir bark beetle.

Promote innovation

Thinning promotes innovation when:

- new markets for fibre are created
- better systems and processes for data capture are identified
- changing customer demands for wood products are met
- operational efficiency, stand values, and other outcomes are continually improving

Example:

Operational trials, with small machinery, that keep trails < 4 m wide, in a 32-year-old lodgepole pine stand: The goal is to thin the trees from below and determine the productivity of the equipment and the economic thresholds of the young stand.

Enhance economic value

Thinning may enhance economic value when:

- a supply of fibre for new markets is created (e.g., biofuel)
- existing facilities have a low value fibre option
- direct and indirect employment opportunities in communities increase
- the component of sawlogs and relative piece size in a stand increase
- the risk of wildfire and the cost to fight it is reduced, which maintains timber values
- the component of higher-value species and/or products for final harvest increases
- forest age class is better balanced and improves timber flow at the forest level

Example:

Mixed white pine, western redcedar, Douglas-fir even-aged stand: The prescription is to remove the declining white pine to capture its value while retaining the cedar and Douglas-fir, which will release and continue to grow to a higher-grade and valued tree than the white pine.

Enhance fibre utilization

Fibre utilization is enhanced when:

- future density-dependent mortality is harvested and directed to many supply chains (especially at 7.5-cm utilization)
- site resources are concentrated into the remaining stems post thinning, which results in an economic piece size target being achieved at a young age and waste being reduced in the next harvest

Example:

Western hemlock and amabilis fir stand juvenile spaced to a density of 1200 stems per hectare (sph) at age 12: The goal is to commercially thin at 30 years of age. In addition to the utilization of the sawlog and pulpwood, the biomass is used in a community heating project.

Maintain overstorey site occupancy

Sufficient overstorey for site occupancy is retained when:

- trails or gaps in stocking are kept as narrow as possible
- trees with sufficient live crown to meet the expected goal are retained
- stand windfirmness is maintained through block design and stable height-to-diameter ratios
- the prescribed post-thinning residual⁹ stocking density, developed to meet the management objective and support the desired stand development pathway, is achieved

Example:

A mixed species stand is thinned from below to create space between the stems, using small equipment on 4.5-m wide trails: The goal is to retain trees that have 35% live crown and within 5 years have expanded their crowns and grown into the gaps in the canopy. This will capture the stand's growing potential and allow the trees to continue to put on volume for the next harvest entry.

Professional reliance

Professional reliance¹⁰ is the practice of accepting and relying upon the decisions and advice of professionals who accept responsibility and can be held accountable for the decisions they make and the advice they give.

As a professional developing a thinning prescription or retention targets, it is important to consider the range of forest values and interests on the landscape you are managing and balance them within the legislative framework and this guidance. The professional quality rationale provides a means of documenting and supporting decisions and justifying where the professional forester determines it is necessary to diverge from standards. See the Standards of Ethical & Professional Conduct direction in Professional Quality Rationales¹¹ for additional information.

Practice guidance – applicable to all types of thinning

Specific practice guidance will be incorporated into this guidance document as it is being developed. Currently,

- Appendix 1 contains additional practice guidance specific to traditional commercial thinning prescriptions with the goal of reducing the time to achieve a target diameter or piece size, and producing a higher-quality log sooner, while maintaining social and ecosystem objectives.
- Appendix 5 contains additional guidance when planning and carrying out fuel treatments for wildfire risk reduction that utilize thinning to improve effectiveness of fire suppression efforts.

⁹ In this document, residual trees are those that remain post thinning and are the future crop trees.

¹⁰ <https://www.fpb.ca/practice-resources/standards-practice-guidelines/professional-discretion/>

¹¹ Professional Quality Rationales, Association of BC Forest Professionals (June 2025) [2025-06-Practice-Guidance-Ethical-Prof-Conduct-Pro-Quality-Rationales.pdf](#)

Forest professionals who are interested in thinning should start with the thinning objectives/goals section of this guidance and incorporate the following:

Prescription and rationale development

For a prescription to provide good outcomes for the remaining stand, quality data that represent the area covered under the prescription are required. Timber cruising data can be valuable for preparing a prescription but may need to be supplemented with additional data for variable stands or complex prescriptions.

The following are the best management practices when developing thinning prescriptions:

- Cruise or measure pre-thinning attributes for all stems ≥ 7.5 -cm diameter at breast height (dbh), including top heights, diameters, height to live crown, and basal areas, by species. These data go beyond the Cruising Manual standard and will be used to develop the prescription and verify the percent basal area removal. Running a cruise compilation at 10-cm dbh to a 5-cm top with 5-cm classes will help project the portion of undersized and pulp volume available when thinning from below.
- Assess modelled volume impact (see Appendix 2): This is the result of growth and yield modelling, with outputs by utilization levels, thinning basal area removal, species, initial density, site index, and thinning age. This helps determine the stand types that may benefit from thinning. For context, if the modelled volume impact is 0.70, that thinning has the potential to reduce the cumulative harvest volume by 30% in the near- to mid-term. Early thinning likely has the most impact because it will take a substantial amount of time for the site to be re-occupied if a significant portion of it is harvested in the first thinning. When thinning for a specific objective, follow the threshold provided for that value or by a qualified professional. Thinning may be prescribed where the cumulative harvest volume is reduced by $> 10\%$ when the intervention is required to meet the prescribed condition within a stand development pathway.

For the purposes of this guidance, the age of the stand is considered the age of the trees in the co-dominant crown position.

- Consider the post-thinning response of the stand to wind. See the Windthrow Management Manual for Coastal British Columbia ¹² for more information. Generally, there are windthrow or snow press concerns in stands with height-to-diameter ratios > 100 in the dominant/co-dominant crown position.
- Consider forest health and disturbance agents likely before, during, and after thinning operations. Many insects and diseases flourish in damaged trees and can spread to adjacent forested areas. Appendix 4 summarizes the impacts thinning may have on disturbance agents.
- Follow legislation, higher-level plans, operations and tactical plans, such as forest landscape plans and forest stewardship plans: These should guide the management of all values.
- Develop retention stocking standards for the situations or circumstances in which you expect to thin, consistent with the requirements summarized in Appendix 1, 3 or 5,

¹² <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/bc-timber-sales/ems-sfm-certification/business-area/chinook/tch-tsg-windthrow-manual.pdf>. Refer to the updated windthrow management handbook (expected 2026) when published.

depending on the types of stands and the objectives of the thinning. The prescription should consider both current non-timber values and maintenance and recruitment of future values, such as retaining and buffering unique features or species within the stand (e.g., retaining deciduous trees for fisher, cavity nesters).

- Consider stand-tending history, such as brushing, juvenile spacing, first thinning, or fertilization investments. These may affect the timing of thinning to take advantage of previous stand interventions or to help schedule future ones. Detailed opening activity reports from the RESULTS database can be provided by making a request to local District staff or from the Intensive Silviculture Specialist via email at ThinningSupport@gov.bc.ca.
- Develop a site level plan with the prescription, including pre-thinning, cutting instructions and post-thinning targets. The *Stand Management Prescription Guidebook*¹³ (1999) remains a good source of information for forest professionals when developing thinning prescriptions.
- Document and rationalize professional decisions, including those related to stand condition, modelled volume impacts, and prescription development that may be inconsistent with this guidance (see Professional Reliance Section).

Operations

The following are the key operational best management practices that provide short-term fibre supplies while maintaining other forest ecosystem values:

- Thin from below by prioritizing the removal of dead, damaged, diseased and suppressed trees from within the thinning zone.
- Specify the target basal area removal to meet the specific goal. Access trails and the thinning zone contribute to this basal area removal. Be mindful that 50% basal area removal is a heavy thinning, and susceptibility of the stand to unexpected losses should be carefully evaluated.
- Minimize skid trail width: keep to 5 m or less where possible. Trails should occupy $\leq 25\%$ of the block and contribute to the total basal area removal and retention thresholds. Skid trails should include a dogleg/change of direction at 50-150m intervals to disrupt sightlines and maintain wildlife security cover.
- Minimize impacts on the soil, roots, and below-ground ecosystem. Consider using chains, rubber tires, brush mats, or shutting down operations during wet weather. Retained trees and shrubs should be no farther than 10 m apart to maintain soil carbon pathways.
- Consider the continuity and distribution of surface fuels that are left on-site. Management of slash may be required as part of a wildfire hazard reduction objective or your proximity to a value at risk. Appendix 5 contains specific guidance and the updated Fire Hazard Assessment and Abatement¹⁴ procedures should be followed.
- Retain trees with enough live crown to meet the expected goal. The amount should be specified in the prescription. Consider the balance between maintaining lifted crown for wood quality or wildfire risk reduction and retaining enough crown to respond to additional

¹³ https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/land-based-investment/stand_management_prescription_guidebook.pdf

¹⁴ [Wildfire hazard assessment and abatement - Province of British Columbia](#)

light while balancing the risk of windthrow. For many thinning goals, target thinning in stands where the retained trees will have between 30 and 50% live crown.

- Leave broadleaves or rare species standing when they are not being utilized. Consider stratifying/excluding mappable patches from the obligation area.
- Avoid operations in designated wildlife habitats during the seasons that they are being used. (E.g. coastal deer ungulate winter ranges from October 31-April 1).
- See FPInnovations' *Operational Manual for Commercial Thinning in British Columbia* (2021)¹⁵: it provides a good source of additional information.

Post-thinning data

The professional must collect enough post-thinning data to confirm that:

- the principles were followed (e.g., pre-thinning basal area, species, and condition),
- the retention stocking standard was achieved (e.g., post-thinning basal area or density and species), and
- the thinning harvest activity and updated forest cover label was reported to the Minister, consistent with the RESULTS Information Submission Specification (RISS) data procedures for your client type.¹⁶

Supervision during operations and the site visit post thinning will provide the information needed for reporting the thinning harvest activity, wildlife tree retention, and retention stocking standards to a new opening.

Report RESULTS denudation activity for the thinning, consistent with the silvicultural system used. When commercial thinning in immature stands for a timber objective as a logging, intermediate cut, commercial thin variation, removal phase, indicated by the following attribute codes:

- base activity code DN,
- silvicultural system code IMCUT,
- cut phase code REMOV,
- variant code CTN, and
- disturbance code L (logged).

Using the methodology in the Silviculture Surveys Procedures Manual¹⁷, survey 12–24 months after thinning to update the inventory and silviculture (e.g., crop) forest cover and the anticipated timing of the next harvest entry. When any harvest retains at least 5 m²/ha of basal area, the amount retained and tree cover pattern must be reported in the forest cover update. It is suggested that the measured site index be reported with the silviculture label. Stratify any areas that have not maintained the retention stocking standard and develop a plan to manage that portion of the block.

Use the Free Growing Milestone field and comments in RESULTS to make the declaration if the stand conforms to the retention stocking standard for at least 12 months after the completion of

¹⁵ <https://library.fpinnovations.ca/link/fpipub8497>

¹⁶ Available at [RESULTS business and policy documentation - Province of British Columbia](#).

¹⁷ The Silvicultural Surveys Procedures Manual was updated in 2026 to include a detailed commercial thinning survey procedure. Use the latest version of the manual and the survey method applicable to the resulting stand. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/silviculture/silviculture-surveys/2026_silv_survey_procedures_manual-final.pdf

thinning to be exempt from the requirement of establishing a free growing stand on the site, consistent with the regulation that is guiding the stand management.

Schedule ongoing monitoring to assess the achievement of the target stand condition, the damage agents that have appeared, the need for timing fertilization treatments, and the timing of the next harvest entry. Monitoring will provide insights into successes or challenges that can be used in subsequent thinning prescriptions.

Monitoring outcomes of this guidance

At a high-level, monitoring of thinning can be divided into compliance (implementation) and effectiveness monitoring. This involves tracking and assessing whether policy, practices, and guidance specific to thinning is meeting the intended outcomes. Monitoring will provide insights into successes or challenges that can be used in subsequent thinning prescriptions.

The intent is that a regular office- and field-based monitoring program will be carried out by the Ministry of Forests, led by the Office of the Chief Forester Division, to evaluate prescriptions and practices being used. Results of the monitoring program will be provided directly to forest professionals to acknowledge success and identify areas for improvement.

The intent is that guidance will be updated where monitoring suggests that practices are not achieving the desired outcomes.

APPENDIX 1. Practice guidance when commercial thinning for a timber objective

Commercial Thinning is a silvicultural intervention that is part of a broader silvicultural system². It involves the selective removal of trees—typically, damaged, diseased, or low vigor—from immature stands prior to density-dependent mortality occurring to meet a timber flow and/or value objective. It is a sustainable and innovative approach to:

- enhance health, vigor, growth, and quality of the remaining trees ensuring diameter uniformity and lowering operational costs at final harvest,
- generate volume and revenue prior to final harvest, and/or
- provide flexibility in the timing and quantity of fiber flow.

Commercial Thinning (CT) is usually applied to young, even-aged stands on medium or higher productivity sites at lower to mid elevations, and in proximity to processing facilities. At a landscape level, CT should not significantly impact mid-term timber supply. CT does not lead to regeneration obligations.

CT is meant to reallocate resources to crop trees by providing additional growing space. As stands age, crown recession reduces the live crown ratio, limiting the tree's ability to fully utilize the additional growing space. The intent is to apply commercial thinning at least 15 years before culmination age, which generally for productive interior species equates to ≤ 45 years old for pine dominated stands and ≤ 65 years old for Douglas-fir or spruce dominated stands. Appendix 2 contains modelled age at culmination of mean annual increment for the site index and density combinations modelled.

Practice Guidance – objective specific additions

Follow the guidance in the section Practice Guidance – generally, starting on page 7 of the main document.

Additional guidance, specific to commercial thinning immature stands are included below.

- Pre-harvest tree data must be collected or cruised to a utilization standard of ≥ 7.5 cm dbh.
- Reduce the cumulative harvest volume by no more than 10% in the near- to mid-term (modelled volume impact ≥ 0.90).
 - Thinning may be prescribed in situations where the modelled impact to cumulative harvest is $> 10\%$ to meet the prescribed condition within a stand development pathway, with a detailed rationale.
- Apply thinning from below (see Operations)
- Remove up to 50% of the stand basal area. Target removal of 35-40% of pre-thinning basal area of stems ≥ 7.5 cm dbh, to keep the site occupied with growing stock.
 - Expect losses from windthrow and snow-press if prescribing 40-50% removal. That reduction in basal area is a heavy thinning, and contingency plans should be developed.
- Trees that contribute to the post-thinning average crop residual basal area must comply with the attributes defined in the FS660 Silviculture Survey Reference Card tables (Layer 1

and Layers 2-4) “Free Growing Damage Criteria for Layered, Interior DFP, and CEDR Stands”. *Exception:* Layer 1 lodgepole pine (Pli) forking damage – a fork is acceptable in the lower 2/3 of the stem, when there is at least 5m between forks or other unacceptable damage agents.

- Stocking standards that describe characteristics of trees that are not consistent with the FS660 or exception above, require a detailed rationale for how those characteristics will contribute to the timber objective.

Example retention stocking standard for a timber objective

A complete stocking standard includes both the text descriptions and table with quantities. See Appendix 3 for how to develop a retention stocking standard. The information in the following tables is based on growth and yield modelling completed for the Ministry of Forests (Appendix 2).

Commercial Thinning

The following standard may apply to stands that have been thinned from below with the goal of reducing the time to achieve a target diameter or piece size, and producing a higher-quality log sooner, while maintaining social and ecosystem objectives.

The standard may apply to even-aged stands or existing managed stands with < 50% live crown on trees in the dominant and co-dominant crown positions.

Trees that contribute to the post-thinning average crop residual basal area must be:

- identified as preferred, acceptable, and ecologically suitable in the even-aged stocking standards for the BEC site series in this forest stewardship plan (FSP), woodlot licence plan (WLP), forest landscape plan (FLP), or forest operations plan (FOP), or
- a conifer species with > 30% of the total merchantable volume on the area of a standard unit, based on a timber cruise, or
- specifically reserved to address a result or strategy in the FSP, WLP, FLP, or FOP.

Trees that contribute to the post-thinning average crop residual basal area must comply with the attributes defined in the FS660 Silviculture Survey Reference Card tables (Layer 1 and Layers 2-4) “Free Growing Damage Criteria for Layered, Interior DFP, and CEDR Stands”. **Exception: Layer 1 lodgepole pine (Pli) forking damage – a fork is acceptable in the lower 2/3 of the stem, when there is at least 5m between forks and/or other unacceptable damage agents.**

Thinning must not remove > 50% of the pre-harvest basal area (≥ 7.5 cm dbh); both the access trails and thinning zone contribute to this basal area removal. The target basal area removal is 40%.

The post-thinning residual crop basal area ($\text{m}^2/\text{ha} \geq 7.5$ cm dbh) must be within or greater than the post-thinning average residual basal area per hectare range identified in Table A1.2 for the associated leading species post-thinning, age, and top height.

No area > 1 ha may have a post-thinning residual crop basal area less than the minimum basal area per hectare identified in Table A1.1 for the associated leading species and top height. A maximum of 10% of the standard unit can be in this category.

Access trails or strips contribute to the quantity of the stand removed and must not occupy > 25% of the thinned area (excluding reserves and permanent access structures). Access trails should be kept as narrow as possible.

Compliance will be assessed using the Commercial Thinning Survey Procedures from the latest version of the Silviculture Survey Procedures Manual. The residual crop basal area includes contributions from both the access trails and thinning zones. Variable-radius plot size (prism size/basal area factor) is determined by the walk-through, and the prism should capture 4–9 trees from plot centre.

If the retention stocking standard is met at 12 months following harvest completion, the standard unit is exempt from the requirements to produce a free growing stand, consistent with Forest Planning and Practices Regulation section 44(3)(h) and 44(4) or Woodlot Licence Planning and Practices Regulation section 34(2)(d) and 34(3).

If the retention stocking standard is not met 12 months following harvest completion, a site-level plan must be developed or amended to delineate where the licensee shall hold a free growing obligation, and appropriate standards must be applied to those areas (e.g., even-aged standards, or single-entry dispersed retention standards assessed with a survey methodology that recognizes the contribution of both the overstorey and understorey to site occupancy).

Table A1.1. Residual basal area quantities post thinning, by leading species, age, and top height

Leading species of stand post thinning, and age ¹⁸	Post-thinning stands average top height ¹⁹ (m)	Standard unit post-thinning average residual crop basal area (m ² /ha > 7.5 cm dbh)	No areas > 1 ha below this minimum post-thinning residual crop basal area, to a maximum of 10% of the standard unit (m ² /ha > 7.5 cm dbh)
Western hemlock (Hw) or amabilis fir (Ba)	10–15	14–22	10
	16	15–24	12
	17	16–26	14
	18	17–28	15
	19	18–28	17
	20	20–30	18
	21	21–31	19
	22	22–32	20
	23	24–33	20
	24	25–34	21
	25	26–34	23
	26	27–37	24
	27	28–36	25
	28	29–38	26
	29	30–39	27

¹⁸ The growth and yield modelling that informed the values in this table was completed with a maximum thinning age of 65 years. The professional should consider whether the stand growth is comparable to the modelled scenarios.

¹⁹ The top height tree is the largest dbh tree of a given species that is healthy and has an intact top in a 5.64-m fixed radius plot. Top height is commonly used to determine the site index of a stand.

Leading species of stand post thinning, and age ¹⁸	Post-thinning stands average top height ¹⁹ (m)	Standard unit post-thinning average residual crop basal area (m ² /ha > 7.5 cm dbh)	No areas > 1 ha below this minimum post-thinning residual crop basal area, to a maximum of 10% of the standard unit (m ² /ha > 7.5 cm dbh)
Coastal Douglas-fir (Fdc) or Sitka spruce (Ss)	30	32–39	28
	31	32–40	30
	32	33–40	30
	33	35–41	31
	34	36–42	32
	35–37	38–45	34
	10–15	10–18	10
	16	13–20	11
	17	14–21	12
	18	16–22	13
	19	17–24	14
	20	18–25	15
	21	20–26	16
	22	20–28	17
	23	22–29	18
	24	23–30	19
	25	24–30	20
	26	26–31	21
	27	27–32	22
	28	28–33	23
	29	30–34	25
	30	30–35	26
	31	31–36	27
	32	32–38	28
	33	34–39	29
	34	36–40	30
	35–37	36–41	30
Lodgepole pine (Pli)	10–15	14–20	12
	16	15–22	14
	17	16–24	15
	18	16–26	15
	19	18–26	15
	20	19–28	16
	21	20–28	17
	22	21–30	18
	23	22–30	19
	24	24–31	20
	25–28	25–32	22
Interior spruce (Sx) or subalpine fir (BI)	10–15	12–18	10
	16	14–19	13
	17	16–20	14
	18	17–22	15
	19	18–23	16

Leading species of stand post thinning, and age ¹⁸	Post-thinning stands average top height ¹⁹ (m)	Standard unit post-thinning average residual crop basal area (m ² /ha > 7.5 cm dbh)	No areas > 1 ha below this minimum post-thinning residual crop basal area, to a maximum of 10% of the standard unit (m ² /ha > 7.5 cm dbh)
	20	19–24	17
	21	20–26	17
	22	22–27	18
	23	23–28	19
	24	24–30	20
	25	25–30	21
	26–28	26–32	22
Interior Douglas-fir (Fdi)	10–15	10–16	10
	16	11–17	10
	17	12–19	11
	18	14–20	12
	19	15–21	13
	20	16–23	14
	21	17–24	14
	22	18–25	15
	23	20–26	16
	24	21–27	17
	25	23–29	18
	26–28	24–32	20

APPENDIX 2. Stand-level modelling to support thinning decisions

To support this guidance, stand-level modelling was conducted based on current practices where timber is removed on 5-m wide trails, measured bole to bole, every 20 m (Figure A2.1). The 15-m wide strips between the trails are thinned from below to enhance the volume and value of the residual or post-thinning crop trees at the time of final harvest. With thinning from below, the lower crown classes are removed to favour the most vigorous trees in the stand. Trees thinned from below can also include quality thinning, where any size of dead, damaged, and diseased trees are removed to utilize tree mortality losses while improving the health, resilience, and growth of the remaining trees.

The modelled stands are based on mechanized thinning from below. Other thinning approaches and patterns with narrower access trails, including multiple thinning entries, may be appropriate and will yield different results than those presented here.

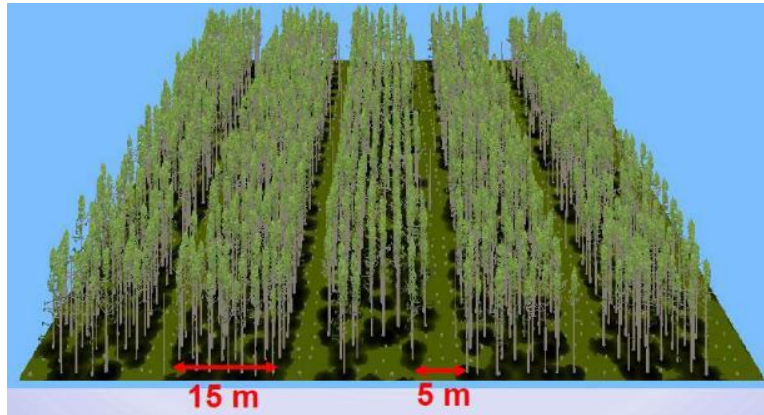


Figure A2.1. The type of thinning modelled in the Tree and Stand Simulator is based on current practices in British Columbia.

Stand-level modelling

To provide operational guidance, the Tree and Stand Simulator (TASS) model was used to predict silvicultural treatment response by modelling individual tree crown dynamics and their relationship to bole growth and wood quality. The focus on crown dynamics makes TASS particularly well-suited for predicting response to treatments such as fertilization and thinning.

In the stand-level analysis, the following versions of TASS were used to simulate the response to thinning:

- TASS v.2.07.76 for western hemlock (Hw) and coastal Douglas-fir (Fdc)
- TASS v3.01.015W for interior lodgepole pine (Pli) and white spruce (Sw)
- TASS v2.07.75WS for interior Douglas-fir (Fdi)

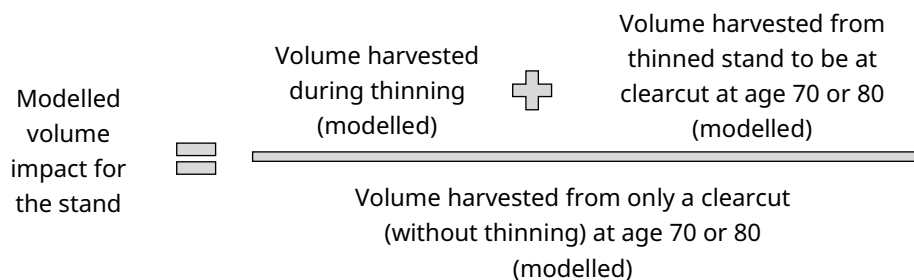
TASS simulations assume the stand contains 100% single species, planted stems at an initial density, no natural ingress, evenly distributed stems, and no damage to remaining stems from thinning operations. Standard operational adjustment factors were used (OAF1 = 15%, OAF2 = 5%).

Table A2.1 lists the parameters used in the TASS analysis to determine if stands met treatment suitability criteria.

Table A2.1 Parameters used in the TASS analysis

Criteria	Coastal species	Interior species
Single species stand	Fdc, Hwc	Pli, Sw, Fdi
Site index	18–40 m at 2-m intervals	16–26 m at 2-m intervals
Initial planting densities	800–3600 sph at 200 sph intervals	1000–2600 sph at 200 sph intervals
Thinning intensity (basal area removal)	0 (control), 25, 40, 50, and 60%	0 (control), 25, 40, 50, and 60%
Thinning ages	25–45 years at 5-year intervals	25–65 years at 5-year intervals
Clearcut harvest ages	50–120 at 5-year intervals	50–120 years at 5-year intervals
Utilization limits	7.5, 12.5, and 17.5 cm dbh	7.5, 12.5, and 17.5 cm dbh

From the TASS simulations, modelled volume impacts were calculated, comparing a clearcut final harvest volume at 70 (coast) or 80 (interior) years of age with the cumulative volume removed from the thinning plus the final harvest. A modelled volume impact of 0.9 equates to the cumulative thinning, and final harvest volume is 90% of the volume that the model calculates from growing the



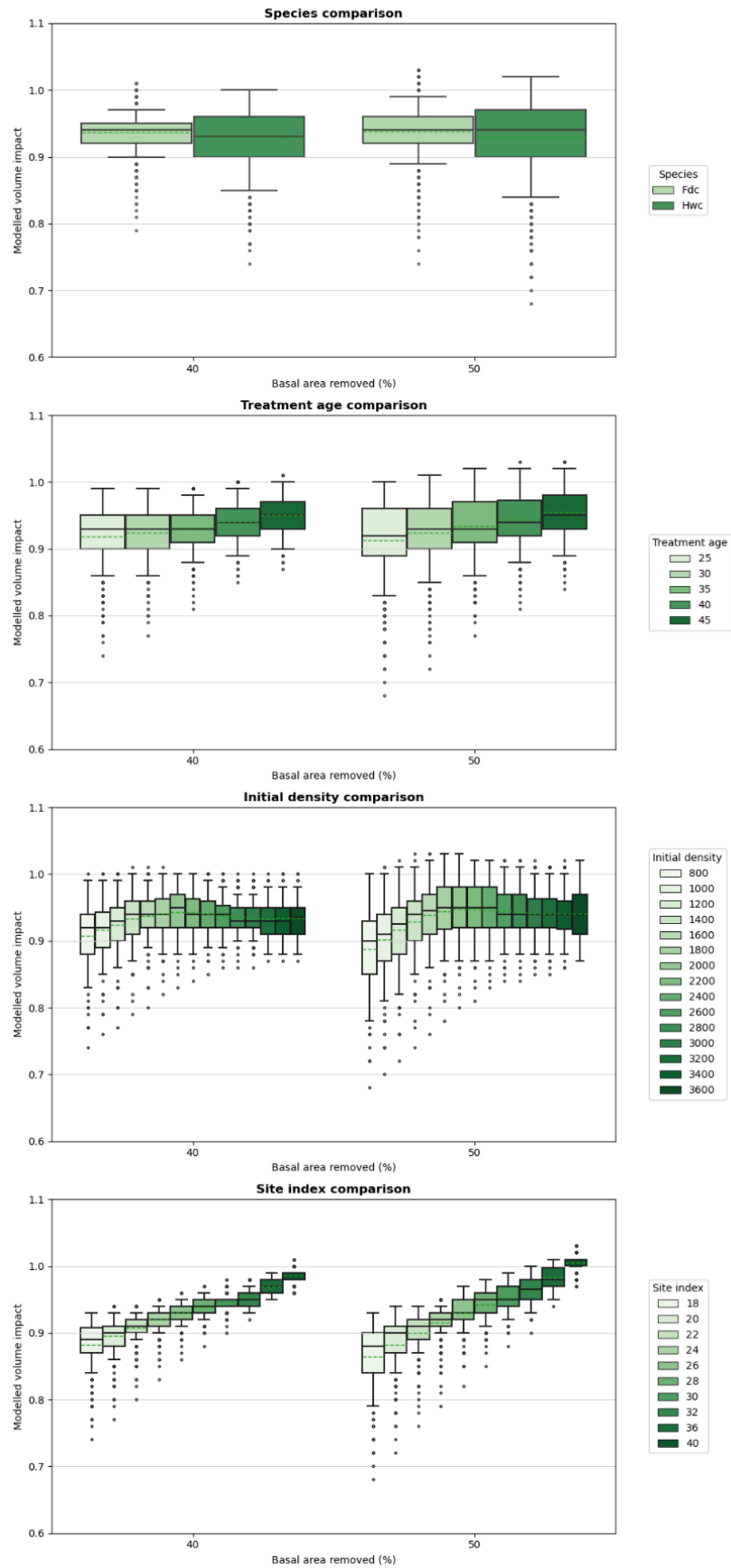
stand to the final felling.

This modelling does not account for a value differential in products, the contribution of natural ingress, or stand management by brushing or juvenile spacing. It is also suspected that the TASS II may underestimate the volumes available when thinning from below in interior Douglas-fir.

It is important for the forest professional to balance the growth and yield of individual stems and the stand. The modelled volume impacts are presented as information for forest professionals who are developing prescriptions and rationales, and the decision-makers who are evaluating submissions.

The following presents, for Coastal and Interior forests modelled species, the utilization > 7.5 cm dbh, 40% basal area removal, with basal area for the stand top height pre- and post-thinning, and the modelled volume impact for that scenario. Also presented are the pre- and post-thinning stems per hectare.

Modelled volume impacts across removal options
Leading species: coastal Douglas-fir (Fdc) and western hemlock (Hw)



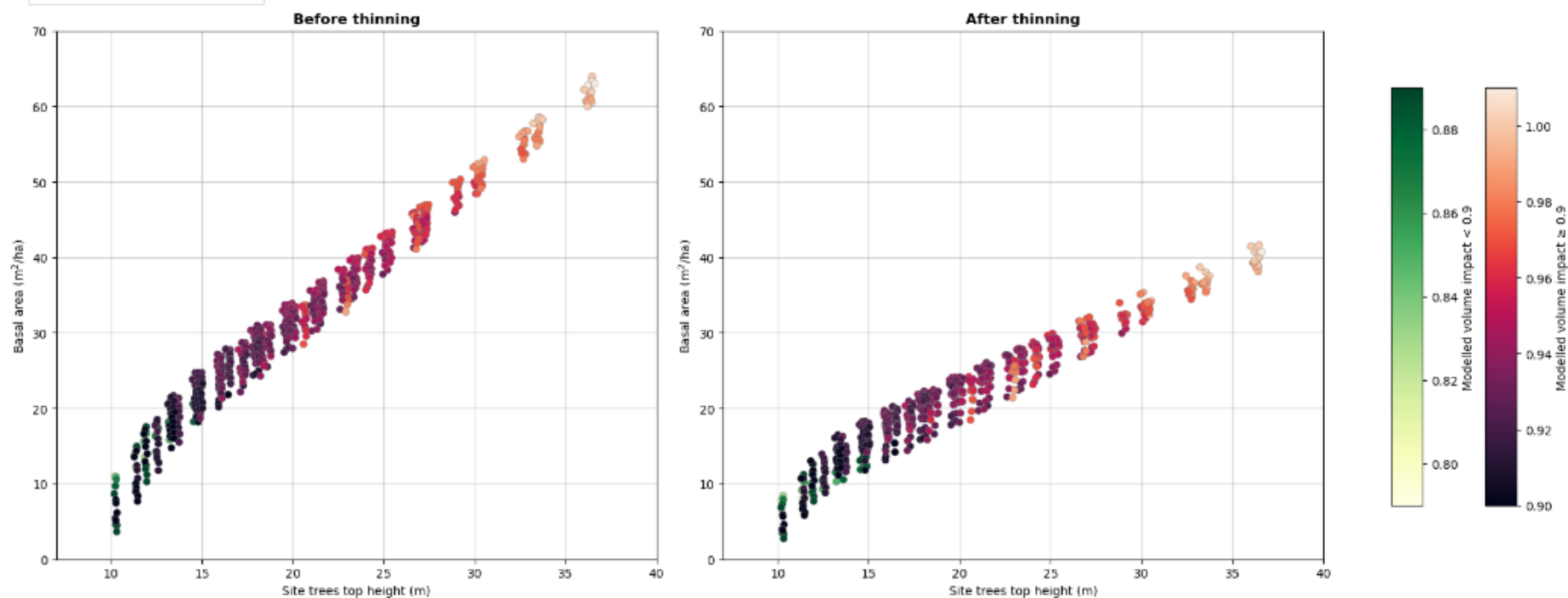
Treatment considerations:

- Site index range: 18-40
- Initial stems/ha: 800-3600
- Treatment ages: 25-45

Effects of commercial thinning on modelled volume impact

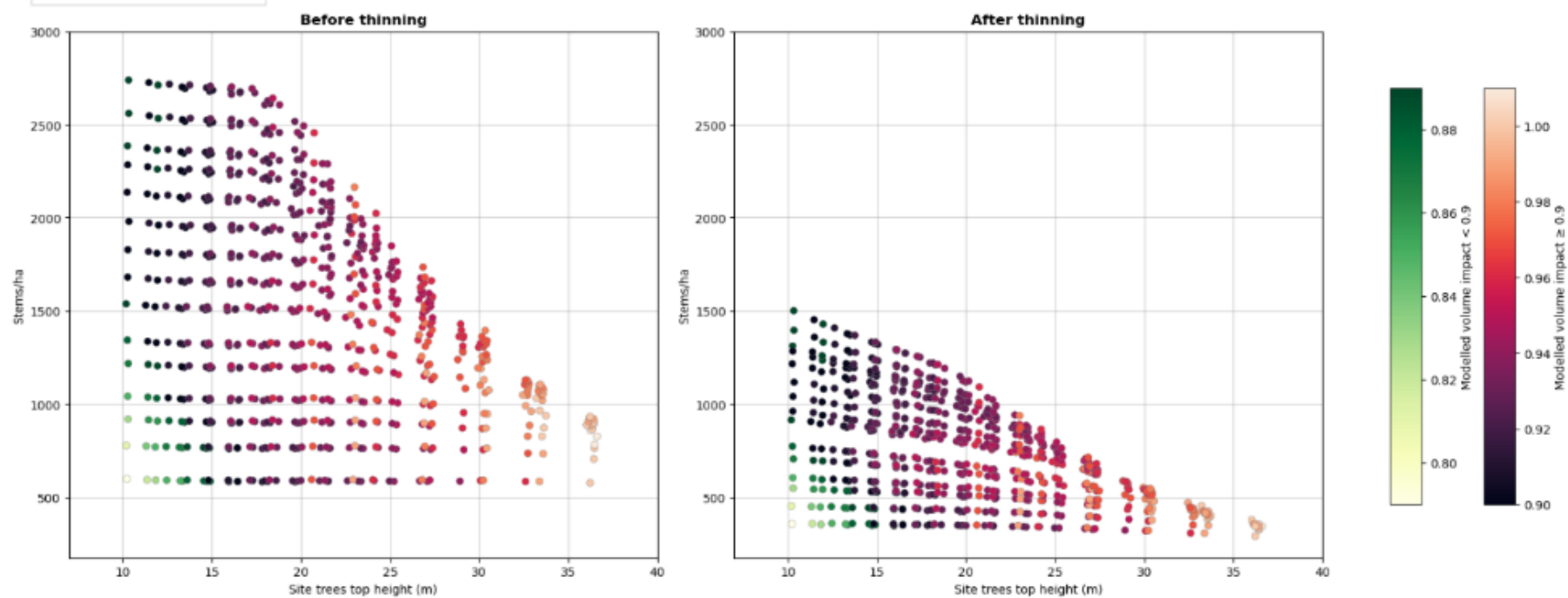
Leading species: coastal Douglas-fir (Fdc)

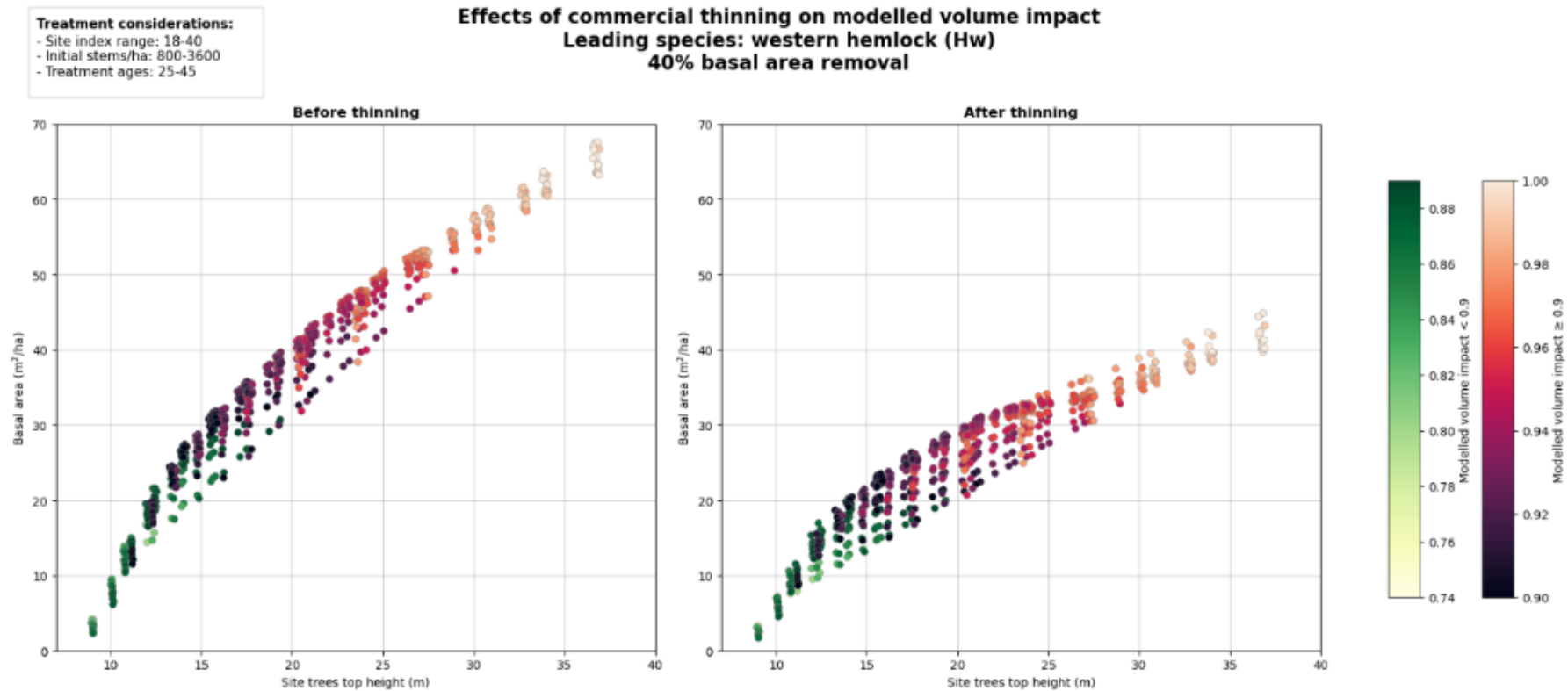
40% basal area removal



Treatment considerations:
 - Site index range: 18-40
 - Initial stems/ha: 800-3600
 - Treatment ages: 25-45

Effects of commercial thinning on modelled volume impact
Leading species: coastal Douglas-fir (Fdc)
40% basal area removal

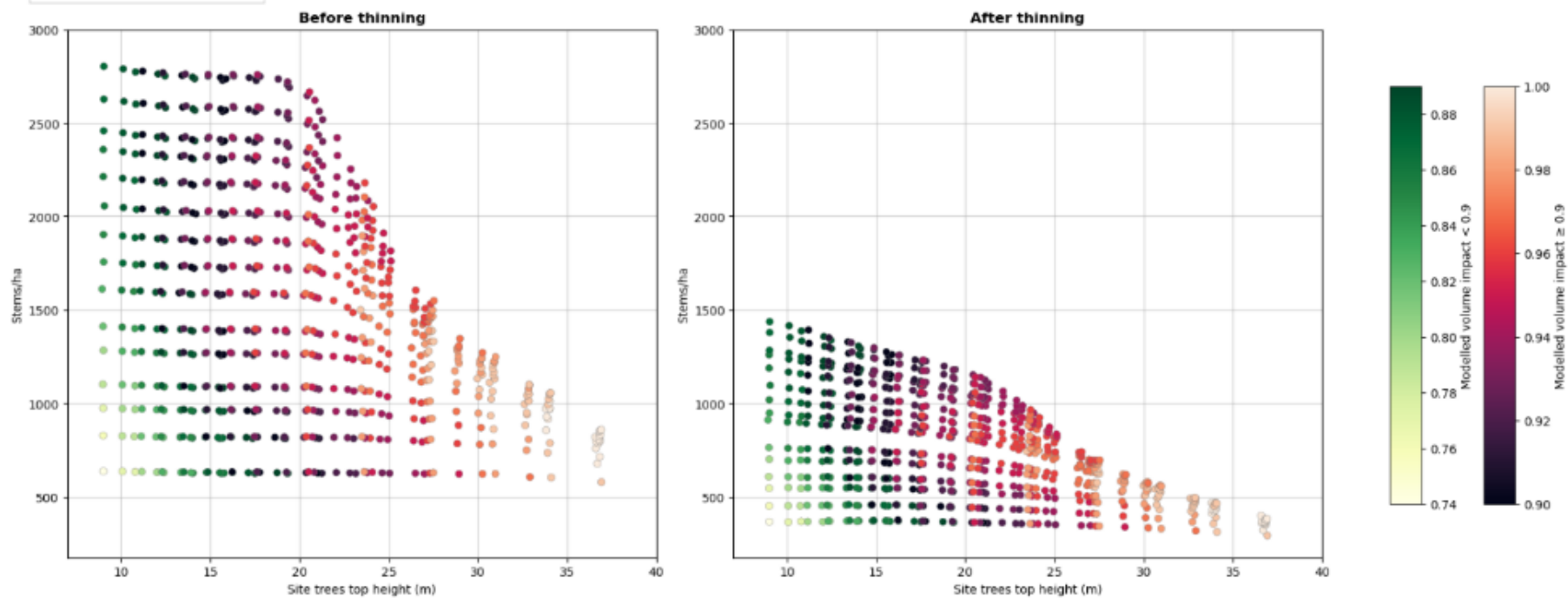




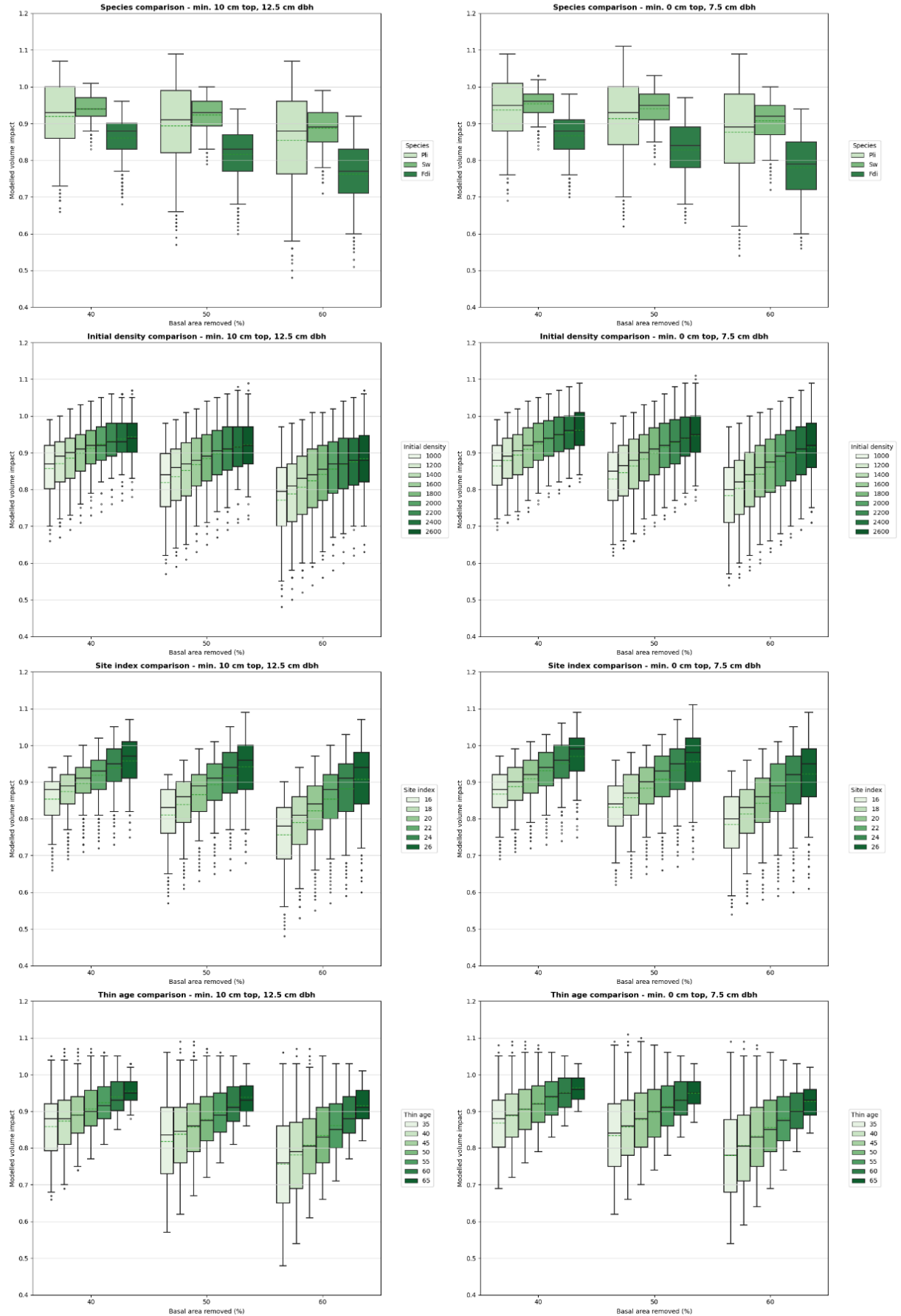
Treatment considerations:

- Site index range: 18-40
- Initial stems/ha: 800-3600
- Treatment ages: 25-45

Effects of commercial thinning on modelled volume impact
Leading species: western hemlock (Hw)
40% basal area removal



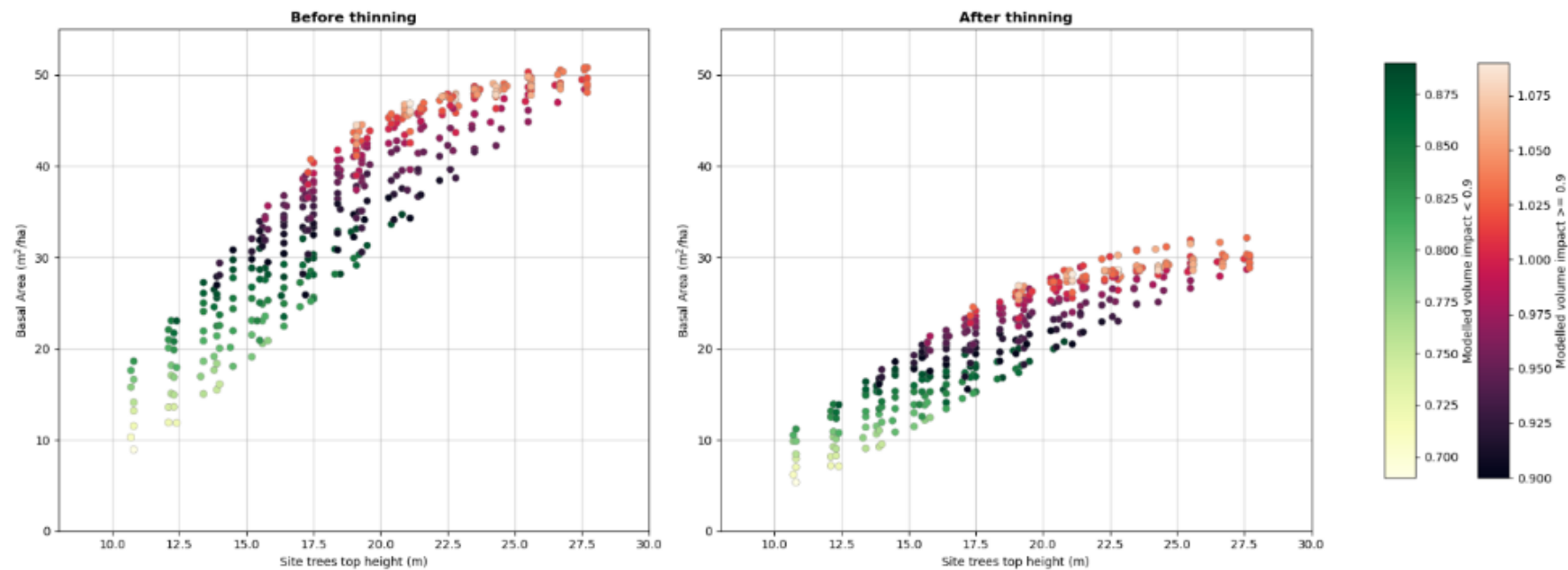
Modelled volume impacts across removal options
Leading species: interior lodgepole pine (Pli), white spruce (Sw), and interior Douglas-Fir (Fdi)



Treatment considerations:

- Site index range: 16-26
- Initial stems/ha: 1000-2600
- Treatment ages: 35-65

Effects of commercial thinning on modelled volume impact
Leading species: lodgepole pine (Pli)
Min. 0 cm top, 7.5 cm dbh
40% basal area removal



Treatment considerations:

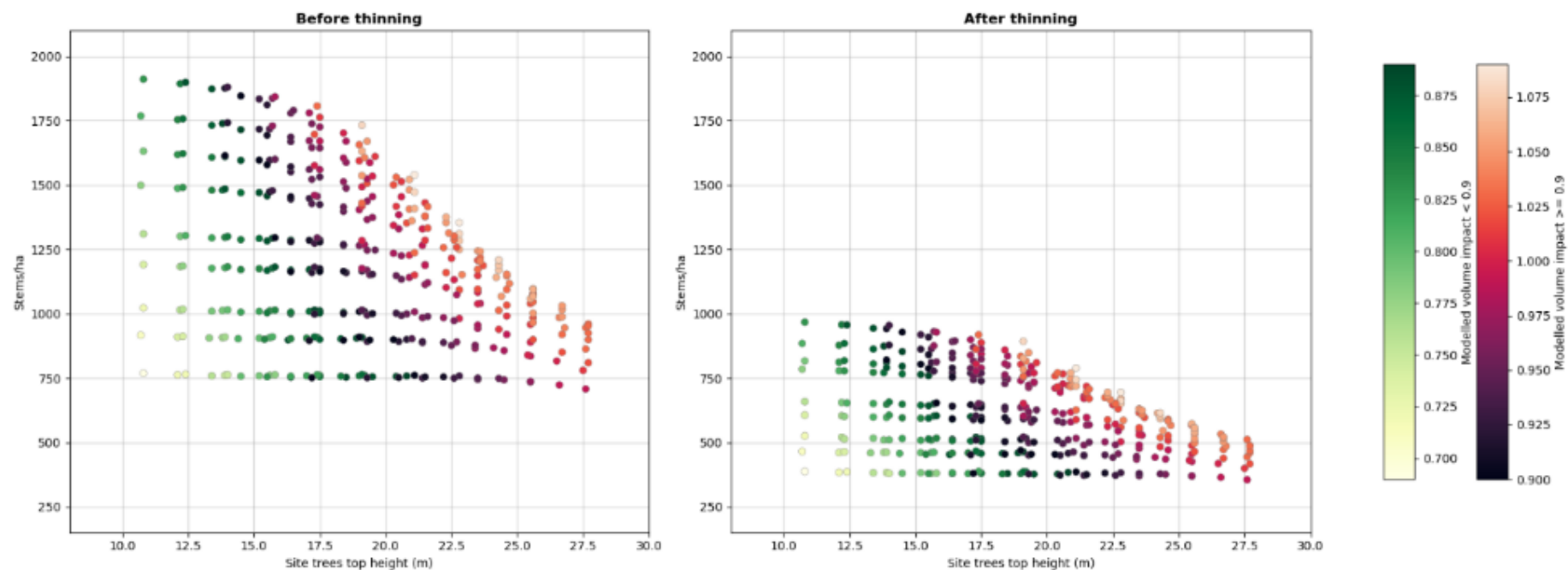
- Site index range: 16-26
- Initial stems/ha: 1000-2600
- Treatment ages: 35-65

Effects of commercial thinning on modelled volume impact

Leading species: lodgepole pine (Pli)

Min. 0 cm top, 7.5 cm dbh

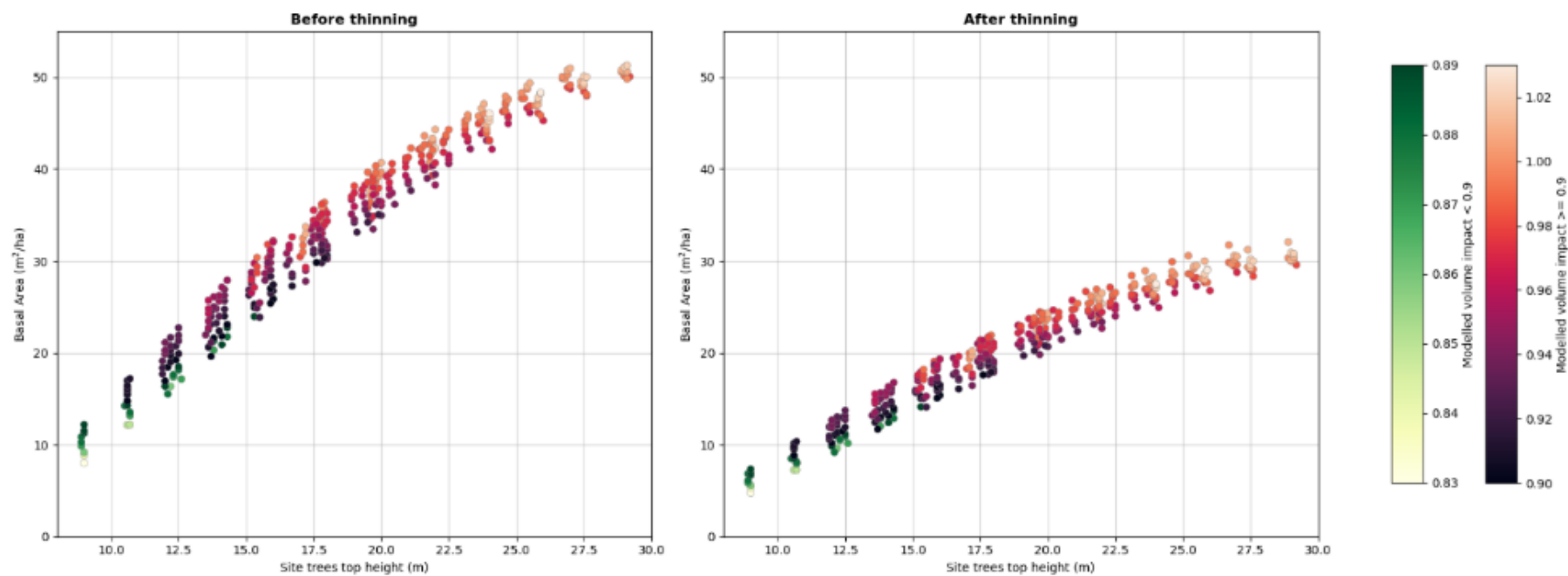
40% basal area removal



Treatment considerations:

- Site index range: 16-26
- Initial stems/ha: 1000-2600
- Treatment ages: 35-65

Effects of commercial thinning on modelled volume impact
Leading species: white spruce (Sw)
Min. 0 cm top, 7.5 cm dbh
40% basal area removal



Treatment considerations:

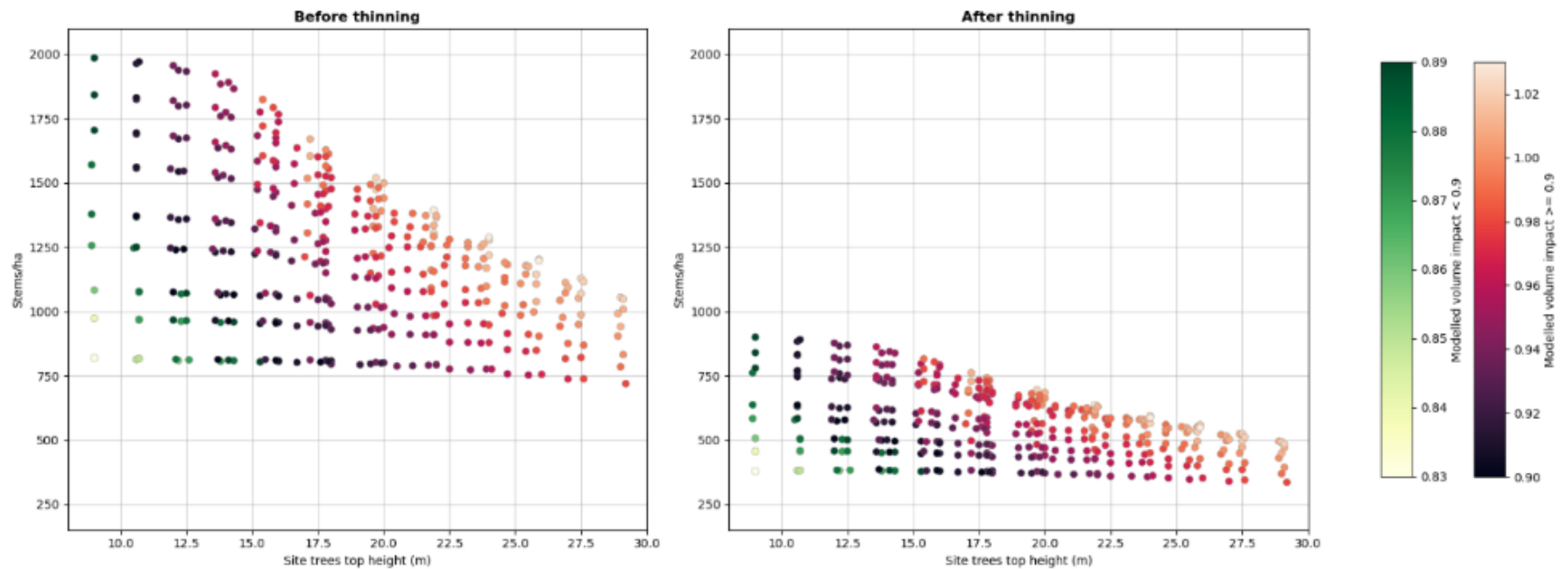
- Site index range: 16-26
- Initial stems/ha: 1000-2600
- Treatment ages: 35-65

Effects of commercial thinning on modelled volume impact

Leading species: white spruce (Sw)

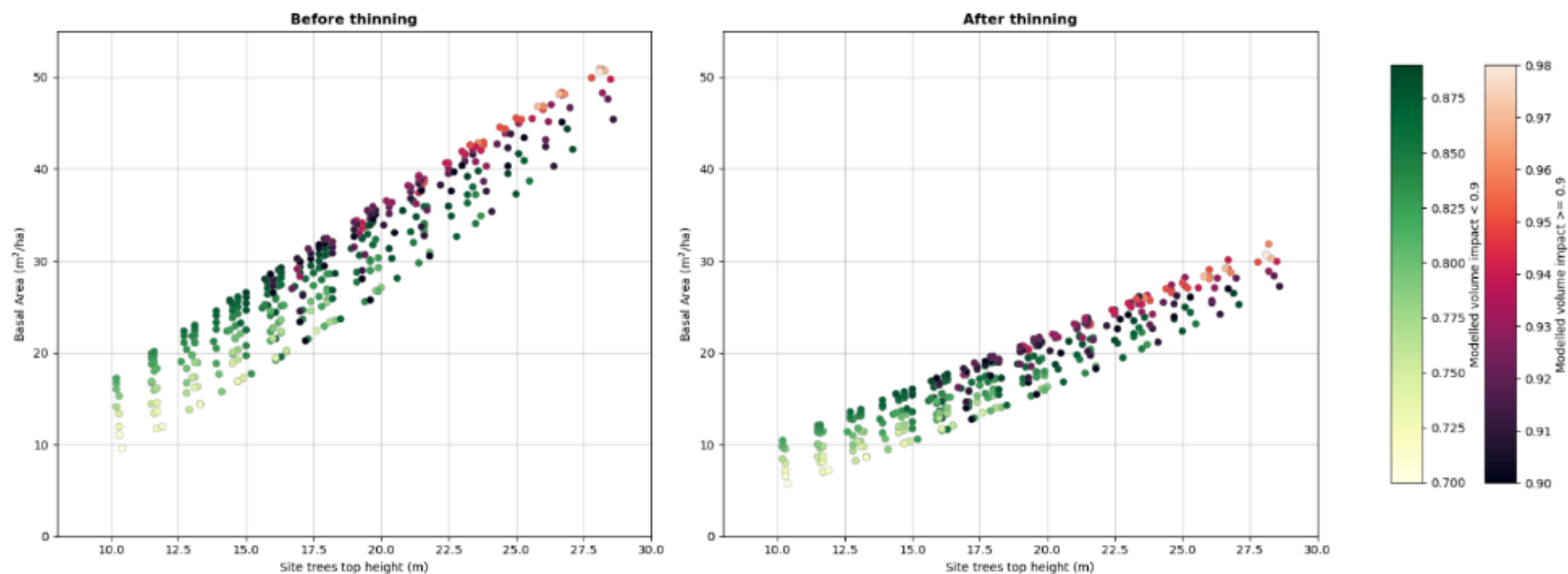
Min. 0 cm top, 7.5 cm dbh

40% basal area removal



Treatment considerations:
 - Site index range: 16-26
 - Initial stems/ha: 1000-2600
 - Treatment ages: 35-65

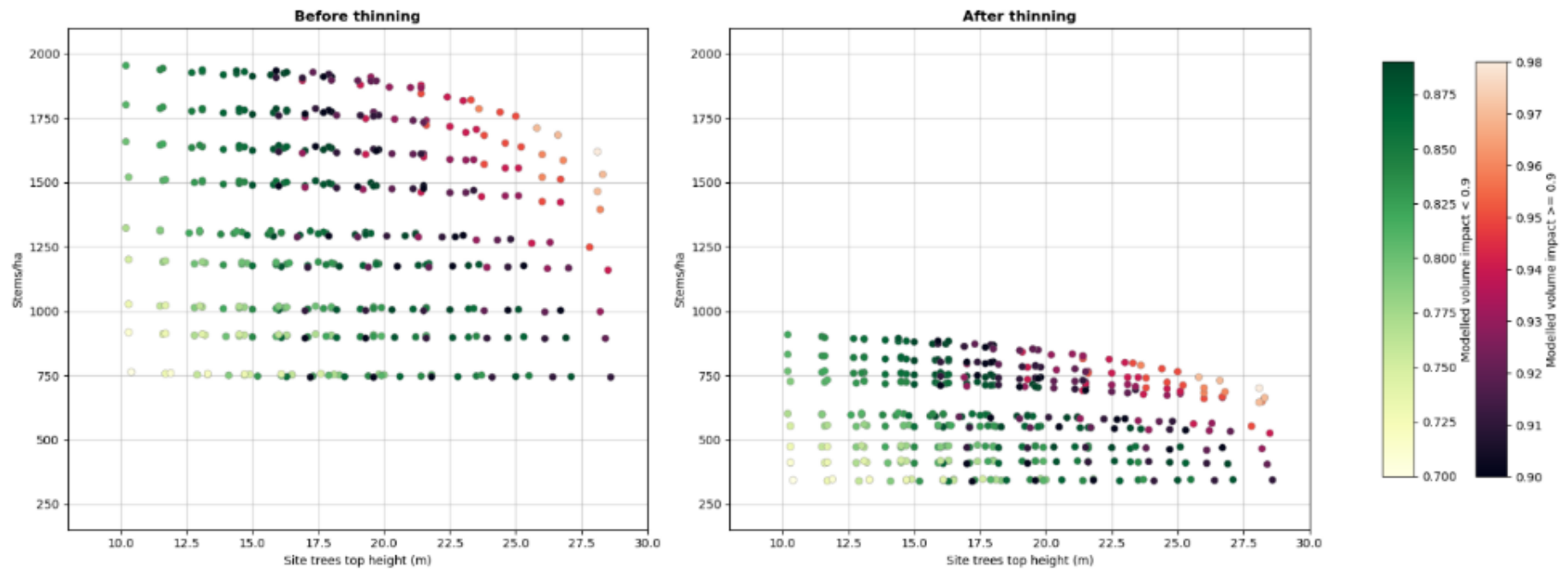
Effects of commercial thinning on modelled volume impact
Leading species: interior Douglas-fir (Fdi)
Min. 0 cm top, 7.5 cm dbh
40% basal area removal



Treatment considerations:

- Site index range: 16-26
- Initial stems/ha: 1000-2600
- Treatment ages: 35-65

Effects of commercial thinning on modelled volume impact
Leading species: interior Douglas-fir (Fdi)
Min. 0 cm top, 7.5 cm dbh
40% basal area removal



Modelled age of culmination of mean annual increment (cmai)

The tables on the next 2 pages are for control stands (without thinning), with age of the culmination of mean annual increment reported to the closest 5-year increment.

Coastal western hemlock (Hwc) modelled age at culmination of mean annual increment (cmai)

Initial density (stems/ha)	Site index (m)					
	18	22	26	30	34	40
800	140	115	90	90	75	60
1000	135	110	85	70	75	60
1200	125	100	85	70	70	60
1400	125	100	85	70	70	60
1600	120	100	85	70	60	60
1800	115	100	85	70	60	60
2000	100	100	85	70	60	60
2200	110	95	85	70	60	60
2400-3600	100	95	85	70	60	60

Coastal Douglas-fir (Fdc) modelled age at culmination of mean annual increment (cmai)

Initial density (stems/ha)	Site index (m)					
	18	22	26	30	34	40
800	105	90	75	75	70	60
1000	100	90	75	75	60	60
1200	85	90	70	70	65	55
1400	80	85	70	70	65	55
1600	80	85	70	70	65	55
1800	75	85	70	70	65	55
2000	75	85	70	70	65	55
2200	75	85	70	70	65	55
2400-3600	75	85	70	70	65	55

Lodgepole Pine (Pli) modelled age at culmination of mean annual increment (cmai)

Initial density (stems/ha)	Site index (m)					
	16	18	20	22	24	26
1000	100	85	80	65	60	55
1200	100	85	75	65	60	55
1400	95	85	75	65	55	50
1600	95	80	70	60	55	50
1800	90	75	70	60	55	50
2000	90	75	70	60	50	45
2200	85	75	65	55	50	45
2400	85	75	65	55	50	45
2600	85	75	65	55	45	45

Interior white spruce (Sw) modelled age at culmination of mean annual increment (cmai)

Initial density (stems/ha)	Site index (m)					
	16	18	20	22	24	26
1000	120	105	95	85	80	70
1200	115	105	95	85	75	70
1400	115	105	90	85	75	70
1600	115	100	90	85	75	70
1800	115	105	95	85	75	70
2000	110	100	85	80	75	65
2200	115	100	90	80	75	70
2400	110	100	85	80	70	65
2600	115	100	90	80	70	65

Interior Douglas-fir (Fdi) modelled age at culmination of mean annual increment (cmai)

Initial density (stems/ha)	Site index (m)					
	16	18	20	22	24	26
1000	150	140	140	130	135	125
1200	145	135	130	130	125	115
1400	140	135	125	125	120	115
1600	135	130	120	125	115	115
1800	130	135	125	120	115	110
2000	135	130	125	125	115	110
2200	135	130	120	125	115	110
2400	135	130	125	120	115	105
2600	130	135	120	120	115	105

APPENDIX 3. Retention stocking standards – generally

Intermediate cutting and commercial thinning are silviculture interventions under the broader term of partial cutting that removes individual trees or small groups of trees. It may be a single intervention or one of several used to create a desired future stand condition.

Intermediate cutting and commercial thinning differ from uneven-aged or multi-entry management, because they leave a fully occupied stand, so there is no intention of managing for regeneration. As a result, intermediate cut and commercial thins are exempt from the requirement to establish a free growing stand if the stand meets specified conditions 1 year post harvest. Those specified conditions are the retention stocking standards.

Retention stocking standards must relate to specific situations or circumstances as outlined in the Forest Planning and Practices Regulation (FPPR) 44 (4) and FPPR section 16 (4), or Woodlot Licence Planning and Practices Regulation section 34(2)(d) and 34(3) and the related Schedule 1 Factors. These forest stewardship plan requirements carry forward under the forest landscape planning framework (FPPR 4.14 stocking standards in an FOP).

Retention stocking standards vary depending on the desired future stand condition associated with the objective. For example, stocking standards for a timber objective would differ from those for a wildlife objective or an old-growth recruitment objective.

Elements of a stocking standard

A stocking standard for intermediate cutting and commercial thinning is a measure of post-harvest attributes, including the species, characteristics, quantity, and distribution of retained trees. The standards ensure that areas remain adequately stocked and will lead to the achievement of the specified objective. The definition of “adequately stocked” depends on the specific objective.

The following are required elements in retention stocking standards and some examples of a related metric:

- Situations or circumstances where the retention stocking standard will be applied: For even-aged stands, this is usually the BEC site series. Other examples of where the stocking standard could apply include: even-aged stands, existing managed stands with < 50% live crown on trees in the dominant and co-dominant crown positions, the maximum number of hectares per calendar year of thinning that will be completed by each holder of the forest stewardship plan, or stands < 80 years old with a site index of at least 24, or within 0-500m of the leading edge of a wildland urban interface polygon.
- Species: Species that are ecologically suitable, commercially valuable, and/or meet the specific objectives must be included.
- Characteristics: The characteristics of the retained trees (e.g., form, taper, forest health) must be described in a measurable way. Terms like “exhibiting good form and vigour” are not appropriate. The standards must outline how these characteristics align with, or relate to, the stand-level objectives. For stands where the objective is timber production, these characteristics are described in the FS 660 Silviculture Survey Reference Card table “Free-Growing Damage Criteria for Layered, Interior DFP, and CEDR Stands”.
- Quantity: The quantity of trees to be retained is commonly expressed in terms of a basal area (m²/ha) range and/or the number of trees per hectare, categorized by size classes.

- **Distribution:** The distribution of retained trees must be indicated. This can be expressed as a minimum inter-tree distance, the number of trails/gaps, or the maximum size of a mappable gap or opening below which regeneration is not required.
- **Assessment:** The achievement of the retention stocking standard is assessed using a silviculture survey. The assessment method outlined in the Silviculture Survey Procedures Manual may be followed. If another method is developed or used, it must accompany the stocking standard.
- **Free growing:** If the retention stocking standard for the intermediate cut or commercial thin is maintained for 12 months after the completion of harvest, there is no free growing obligation for the standard unit. If the standard is not maintained, a strategy to amend and assign a new standard or treatment plan will be needed.

APPENDIX 4. Thinning impacts on forest damage agents

Thinning operations, including the cutting of access trails, may increase the presence and severity of certain insects, diseases, and abiotic factors. Many insects and diseases, such as those listed in Table 4.1, flourish in damaged trees and can spread to adjacent forested areas. Where thinning is proposed, maintaining the health of the residual stand is an important objective. To meet that objective, it is suggested that forest health be considered in the survey used to develop the prescription, prior to thinning activities, to determine the intensity and distribution of damage agents (e.g., insects, disease, and potential abiotic factors).

Table 4.1. Thinning impacts on forest disturbance agents

Disturbance agent	Post-thinning impact	Notes and mitigation options
Wind	Variable	Residual trees in the dominant/co-dominant canopy position, with a height-to-diameter ratio of < 100, are most resistant. Multiple, low-intensity thinning entries may be needed in high-hazard stands where a 40% basal area removal would destabilize the stand. If windthrow occurs after thinning, re-evaluate the windthrow hazard of the remaining trees before deciding to salvage, clearcut, or leave them on-site.
Snow press; stem bending or breakage	Variable	Residual trees in the dominant/co-dominant canopy position, with a height-to-diameter ratio of < 100, are most resistant.
Stem damage and decay	Increase	The timing of operations is important when the residual stand includes high-pathogen-susceptible species, such as thin-barked broadleaves, <i>Abies</i> (true firs), hemlock, Sitka spruce, and young western redcedar. The amount of wounding and size of the injury are greater in spring and early summer. Sites that are of greatest concern as entry points for stem decay pathogens and loss of volume and quality include top damage, stem scarring, decay, and resin-soaked wounds.
Drought	Variable	In high-hazard drought areas, higher wind speeds within thinned stands increase evapotranspiration and reduce tree vigour. Thinned stands may capture snow and moderate its melting rate, leaving the water on-site for longer during the spring.

Root diseases	Increase	Thinning increases the number of cut stumps, which can be colonized by root disease fungi, and dead roots can spread infection. Reviewing the site's risk for pathogens and conducting a pre-treatment site survey for root disease is recommended. The recommended procedures in <i>Managing Root Disease in British Columbia</i> (2018) should be followed, and root disease centres should be stratified out of the thinning area. <i>Armillaria, Coniferiporia, Tomentosus</i>: Thinning should not occur on stands < 20 years of age.
Hard pine stem rusts	Increase	Thinning of stands will result in new microclimatic conditions, changes in the crown structure of leave trees, and changes in inoculum levels of the diseases present. Removing diseased trees will reduce the response of the pathogens.
Dwarf mistletoes	Increase	Thinning the stand may stimulate seed production on previously shaded infections. Removing trees with stem or branch infections will lessen the impact.

APPENDIX 5. Practice guidance when thinning to support improved responder safety and effectiveness, stand and landscape resiliency to wildland fire

This guidance is presented to assist in the development of prescriptions that support planned fuel treatments for wildfire risk reduction (WRR) that utilize thinning to improve the effectiveness of fire suppression efforts while:

- Enhancing responder safety by providing access and defensible locations.
- Reducing potential fire intensity through reduction of surface and ladder fuels and fire access to the crowns.

Thinning can be used as a silvicultural intervention with the objective of:

1. Fuel reduction to address wildfire risk within the wildland urban interface (WUI) or where specific fuel reduction plans are in place. Thinning is a planned intervention within a specified stand development pathway.
2. Improved stand condition and enhanced fibre utilization with a secondary objective of reducing the risk of fire in the creation of a more resilient landscape.

Practitioners must be familiar with (or consult with those who are) and align practices with the current versions of the following BC Wildfire Service (BCWS) documents available on the [Tools for Fuel Management](#)²⁰ website:

- Forest Professionals BC Wildland Fire and Fuel Management Guidelines.
- Fuel Management Practices.
- Best Management Practices by Fire Weather Zone (FWZ).
- Fuel Management Survey Data Collection Standard.
- Chief Forester's Guidance on Coarse Woody Debris Management – Wildfire.
- Fuel Management Prescription Template Guidance.
- A Guide to Fire Hazard Assessment and Abatement in British Columbia.

This guidance provides supplemental information to the Fuel Management Practices sections related to thinning of a stand.

Terminology

Thinning is the cutting of individual trees from a stand to maintain or improve the health of remaining trees by providing space and resources for growth.

Commercial Thinning is a silvicultural intervention that is part of a broader silvicultural system². It involves the selective removal of trees—typically, damaged, diseased, or low vigor—from immature stands prior to density dependent mortality occurring to meet a timber flow and/or value objective.

²⁰ <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-fuel-management/fuel-management>

When thinning, commercial or otherwise, the standard unit maintains adequate overstorey stocking for the site to be considered occupied to meet the objective and thus reforestation is not required.

Fire intensity (head fire intensity) The rate of heat energy release per unit time per unit length of head of the fire. Flame size and fire rank are its main visual cues. Head fire intensity is a major determinant of certain fire effects and difficulty of control. Numerically, it is equal to the product of the net heat of combustion, quantity of fuel consumed in the flaming front, and linear rate of spread. Fire intensity levels below 2,000 kilowatts per metre (kW/m) are the recommended safe working levels for ground suppression activities.²¹

Fire severity is the amount of organic matter consumed through flaming and smouldering combustion. Burn severity also considers the resulting ecosystem impacts from the combustion.

Fuel treatments (treatments) include activities related to modifying combustible materials from the ground, surface, ladder and forest canopy. Thinning and subsequent fire hazard abatement are considered one type of fuel treatment. Figure A5.1 includes the common modified fuel attributes.

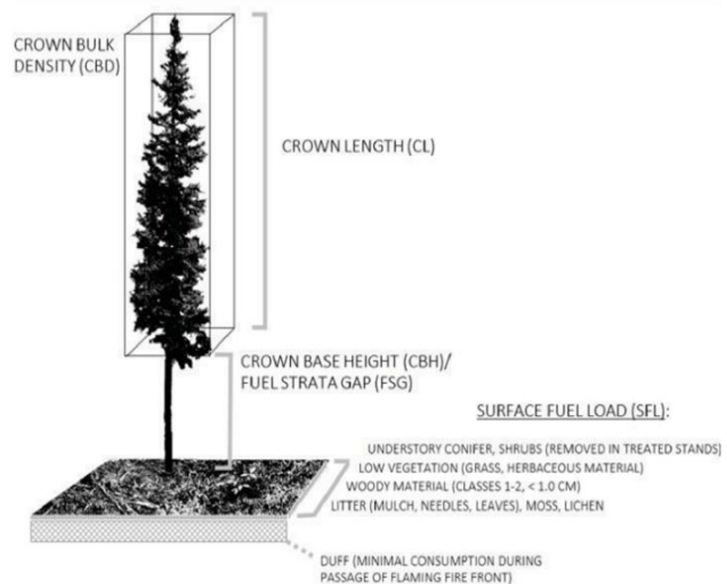


Figure A5.1: Diagram of prioritized stand attributes that are modified during fuel treatments. From Beverly et al. (2020)

Fundamental Concepts

1. Thinning is not a universal solution for wildfire risk reduction.

Thinning alone is insufficient to achieve WRR objectives; prescriptions should integrate surface fuel treatment and follow-up hazard abatement.

2. Fire behaviour is dynamic.

Fuel treatments, including thinning, are not designed to stop fire but to modify fire behaviour and create suppression opportunities.

Treatments must consider impacts to all fire behaviour outputs, not just fire intensity/rank.

- Surface fire is typically the main driver of fire behaviour.
- Most crown fires are dual layer fires that depend on energy from the surface layer to move into the canopy.

²¹ [CIFFC Canadian Wildland Fire Management Glossary](#)

3. WUI vs. Landscape Objectives while complimentary are not the same.

WUI treatments focus on minimizing fire transmission to communities.

Landscape-level treatments aim to reduce risk and allow beneficial fire use.

- Reference: [PSTA 2017 Update](#), [USFS risk-based treatment guidance](#).

Align treatments with existing Wildland Urban Interface (WUI) WRR plans and landscape-level strategies.

- Reference: [WUI WRR Plan Development Guidance](#)

4. A cautioned, adaptive management approach is expected to be applied in BC.

Currently there are limited data to support the efficacy of thinning as a wildfire risk reduction treatment in BC.

Thinning must achieve both the silvicultural objective and wildfire risk reduction objective. That is, if thinning produces a high surface fine fuel load or exposes ladder fuel content, while achieving the silviculture objective, then a more significant fire hazard might exist post treatment, thus not meeting both objectives.

Collaboration, site-specific prescriptions, ongoing monitoring, and a whole-of-society approach are essential.

The BC Wildfire Service completes monitoring and reporting on how fuel treatments are impacting fire behaviour or decreasing wildfire risk - post wildfire rehab crews may assess whether previous WRR or thinning treatments affected fire behaviour, burn severity, erosion risk/soil stability, etc. allowing direct feedback for future prescriptions²².

5. Involvement of professionals with local fire behaviour expertise and collaboration with BCWS representatives is essential.

Only qualified professionals should develop prescriptions/ WRR site plans.

- Reference: [FPBC competency standards](#) and [Fuel Management Prescription Template Guidance](#).

Early collaboration with BCWS representatives:

- Ensures treatment objectives align with fire behaviour realities: Wildfire experts bring critical insight into local fire regimes, fuel dynamics, and suppression tactics, helping design treatments that meaningfully reduce risk rather than unintentionally increasing it.
- Improves strategic placement and design: Early input from wildfire experts supports informed treatment layout—prioritizing areas that offer the greatest suppression opportunities or that interrupt likely fire pathways to values at risk.
- Reduces costly revisions and enhances implementation success: Involving wildfire experts from the start helps avoid technical oversights, ensures compliance with evolving best practices, and fosters smoother integration with regional fire management plans.

²² Wildfire fuel treatment interaction reports are available on the following website: [Fuel management references and literature - Province of British Columbia](#)

Prioritized principles for effective wildfire risk reduction

To minimize post-treatment hazards, WRR treatments, including thinning, should follow this order:

1. Reduce surface fuels

- Consider the risk and abate the hazard associated with of the logging slash, grass, herbs, moss, and litter.

Why this matters: Lowering the amount of the surface fuel layer is critical for wildfire resilience: it lowers heat energy, flame length, and crown fire initiation risk. This is most effective when combined with prescribed or pile burning, reducing wildfire severity by 62–72% compared to untreated areas²³.

2. Remove ladder fuels

- Consider the risk and remove hazard associated with small or thin-barked trees, shrubs, and live or lichen-laden branches.

Why this matters: Increasing canopy base height and fuel strata gap reduces the potential of a surface fire transitioning to a crown fire.

3. Reduce overhead hazards

- Consider the risk and abate the hazard associated with snags or unstable trees on the site. Stand-level biodiversity or habitat requirements may require a special management zone delineation and modifying the prescription.

Why this matters: Removing unstable trees enhances safety and effectiveness of wildfire suppression and reduces the amount of future ladder fuels resulting from windthrow.

4. Reduce canopy fuels

- Consider the risk of stand density, horizontal and vertical distribution of trees, and fire resilience of the species of the stand.

Why this matters: Thinning the stand lowers crown bulk density and horizontal continuity of canopy fuels. Modifying the canopy fuels without first reducing risk from the other layers will not achieve the objective.

Benefits

When properly prescribed and implemented, thinning can:

- Align with WRR objectives while reducing treatment costs.
- Modify stand attributes (species composition, structure, density, spatial distribution).
- Retain fire-resistant species, such as thick-barked conifers with lifted crowns or healthy broadleaf trees.
- Improve operational safety and wildfire suppression efficiency.
- Reduce surface and ladder fuels, especially when paired with prescribed burning or other follow-up pruning treatments.

²³ A [meta-analysis](#) was conducted on the conifer forests of western USA.

Retaining live crown cover helps:

- Moderate microclimate, reducing fuel drying through shade and wind buffering.
- Suppress understory growth, limiting accumulation of flammable fuels (site-dependent).

Cautions and Risks

Species composition, canopy cover, and site moisture regime influence fuel flammability. Poorly implemented thinning can:

- Temporarily increase surface fuel loading from converting live woody material to unused fibre.
- Accelerate fuel drying due to increased sunlight and wind exposure.
- Increase fire spread rates under high wind conditions.
- Promote flammable vegetation and epicormic growth.
- Heighten susceptibility to pests, blowdown, and mechanical damage.

The wildland urban interface is particularly vulnerable due to elevated human ignition risk.

Practice Guidance – objective specific additions

Apply the Practice Guidance- general in the Thinning Guidance for BC when managing thinning for wildfire risk reduction in the WUI and across the landscape, unless superseded below:

- Follow tactical plans (e.g., Community Wildfire Resiliency Plan (CWRP), Wildland Urban Interface Wildfire Risk Reduction Plan (WUI WRR)) and [Provincial Strategic Threat Analysis](#) maps; apply guiding principles where plans are absent.
- Block placement and design should consider:
 - Values at risk and wind direction.
 - Anchoring to fire-resilient features.
 - Accessibility for fire response.
 - Potential for using prescribed fire.
- Stratify blocks into treatment units; apply zoned approach, varying treatment intensities where full hazard reduction is impractical across a large area.
- Retain non-timber values (e.g., wildlife habitat, unique species) by leaving 10–20% unthinned patches and buffering them against future losses.
- Collect data per BCWS fuel management prescription template and associated guidance²⁴:
 - Live crown %, crown height, basal area, species composition.
 - Windthrow risk, disturbance agents, stand history.
- Apply Fire Weather Zone BMPs:
 - Maintain canopy cover in the Coastal, Boreal, Interior Subalpine, Interior Wet and Central Plateau Fire Weather zones.
 - Retain widely spaced fire-resistant species in the Interior Dry zone.
- Plan for post-treatment fuel management (e.g., prescribed fire, piling)

²⁴ https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2025_fuel_management_prescription_guidance_march03.docx

- Use adaptive management:
 - Interpret guidance for site-specific conditions.
 - Avoid rigid application; integrate monitoring and local knowledge.
- Thinning for Wildfire Risk Reduction (WRR) must adhere to the prioritized principles outlined earlier. The fire hazard created from the thinning must be abated prior to a transfer of liability/obligations to another party.
- Thinning zone: Conduct thinning between access trails to maintain overstorey shade, preserve surface humidity, and enable commercial utilization during future maintenance treatments.
- Thin from below (see Operations). This approach increases canopy base height and fuel strata gaps, reducing crown fire potential, retaining larger fire-resistant trees, and maintaining canopy cover while lowering crown bulk density.
- Maintain overstorey site occupancy: Target the removal of up to 50% of initial basal area in the dominant/co-dominant crown position, retaining amounts consistent with timber objectives (see Appendix 1). This reduces crown bulk density while preserving shade, which mitigates wind penetration into the stand, surface fuel drying, and understory vegetation response.

Exception: In the Interior Dry Fire Weather Zones (NDT4), maintain 20–60% crown closure with inter-canopy spacing of 1.5–3 m dripline-to-dripline (approx. 250-500 sph at 5–7 m inter-tree spacing >12.5cm dbh). Multiple entries may be required to achieve the desired levels of fuel to achieve the resilient future stand condition. The photo below is an example of this.



- Retention priorities: Favour healthy broadleaf and conifer species that self-prune or exhibit larger diameters and higher fire resistance (e.g., ponderosa pine, western larch, Douglas-fir or lodgepole pine), particularly when converting to an open canopy condition. Use the Climate Change Informed Species Selection Tool ([CCISS](#)) to determine if the tree species is

expected to maintain an environmental suitability rating of high or moderate (E1-E2) on the site.

- In Ungulate Winter Ranges to manage risk and maintain habitat values:
 - Maintain and promote clumped distributions of mature/old Douglas-fir (4–10+ trees with interlocking crowns).
 - Retain conifer thickets and other key microhabitats that provide cover and escape terrain (e.g., warm aspects, ridges, topographic breaks, rocky knolls).
- Debris management: Within 1.5 tree lengths of identified values and within the WUI, implement full-tree harvest or use machinery to rake and remove fine surface fuels, ladder fuels and coarse woody debris. On all areas, consider improved fibre utilization by removing tops and branches and/or rat tails > 2.5 cm top for biofuel use which helps to reduce surface fuels. Alternatively, plan for broadcast prescribed fire to mitigate the hazard. This reduces manual hazard abatement requirements.
- Surface fuel considerations: Apply Fire Hazard Assessment and Abatement (FHAA) guidance²⁵ for piled vs. dispersed fuels. Monitor continuity and distribution of residual surface fuels, especially on access trails. Fuels exceeding 5 m³ air volume (e.g., continuous fine fuels 1 m wide, 30 cm deep, 17 m long) meet the threshold to be considered a pile and require abatement within interface zones. (See photos below for examples of access trail fine fuels after machines have compacted a portion of it).



- Supervision during thinning and a post-treatment site visit provide essential information for reporting harvest activity and stocking standards for the new opening. The professional must collect sufficient post-thinning data to verify compliance with the fuel management prescription and regulatory requirements, including:
- Confirmation that prescription commitments were met (e.g., stand and stock tables showing pre- and post-thinning basal area, species composition, and condition).

²⁵ [Wildfire hazard assessment and abatement - Province of British Columbia](#)

- Documentation of thinning harvest activity, subsequent WRR treatments, and updated forest cover label for reporting to the Minister²⁶ through the RESULTS or Silva system.
- Schedule periodic monitoring to:
 - Confirm achievement of target stand conditions.
 - Identify emerging forest health concerns.
 - Plan maintenance treatments and future harvest entries.

Maintenance

Maintenance planning is critical to sustaining WRR treatment effectiveness. Figure A5.2 lists the attributes that contribute to fuel treatment longevity.

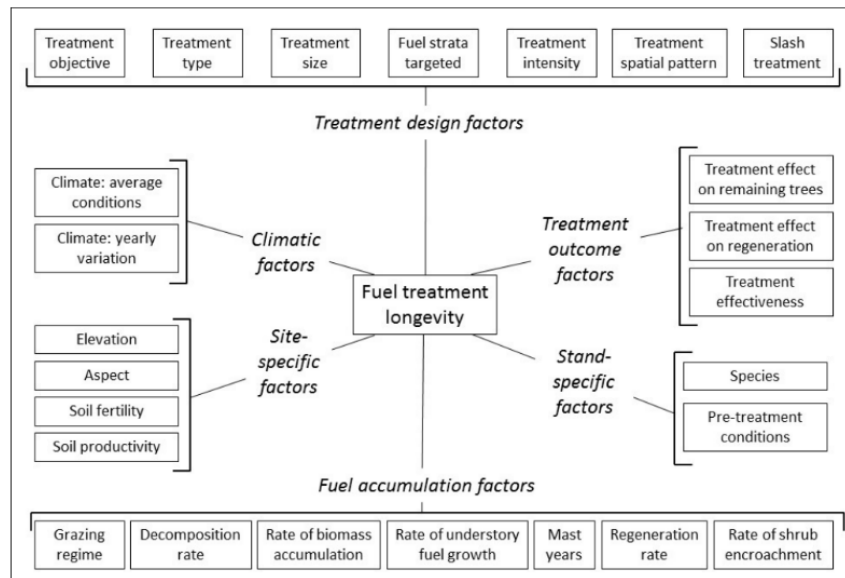


Figure A5.2: Factors that impact fuel treatment longevity and subsequent maintenance schedule. Graphic reference: [PAGReport35.pdf](#)

Well-designed maintenance regimes:

- Preserve treatment benefits by preventing fuel accumulation and vegetation regrowth.
- Mitigate unintended risks such as increased fuel drying or flammable vegetation growth.
- Maintain strategic fuel breaks for operational wildfire suppression.
- Support adaptive management through periodic reassessment under changing conditions.
- Protect investment value by ensuring long-term wildfire risk reduction.

²⁶ At the time of publication, the required form and manner of reporting was through the RESULTS silviculture database. Wildfire Risk Reduction requirements are within the RISS-government funded publication.

Example retention stocking standard

A complete stocking standard includes both the text descriptions and table with quantities. See Appendix 3 for how to develop a retention stocking standard.

The objective is to develop forest stands into the future that will alter fire behaviour from a crown fire to a moderate intensity surface fire. This transition will allow for fire suppression opportunities to contain or control a wildfire impacting the area.

The following standard may apply:

- to stands that have been thinned with the goal of improving responder safety and effectiveness and enhancing stand and landscape resiliency to wildland fire,
- within the identified wildland urban interface (WUI) area (2km zone), or
- within 5 km of the WUI or critical infrastructure on the prevailing wind side of the WUI.

Trees that contribute to the post-thinning average crop residual basal area must be:

- identified as preferred, acceptable, or ecologically suitable in the even-aged stocking standards for the BEC site series in a forest stewardship plan (FSP), woodlot licence plan (WLP), forest landscape plan (FLP), or forest operations plan (FOP), or
- a conifer species with > 30% of the total merchantable volume on the area of a standard unit, based on a timber cruise, or
- a broadleaf species that the Reference Guide to FDP Stocking Standards identifies as a productive, reliable and feasible regeneration option for the site series, or
- specifically reserved to address a result or strategy in the FSP, WLP, FLP, or FOP.

Trees that contribute to the post-thinning average crop residual basal area must comply with the stem wound decay, bark mining, deformation, dwarf mistletoe infection, defoliation, live crown vigour, and root disease attributes defined in the FS660 Silviculture Survey Reference Card table "Free Growing Damage Criteria for Layered, Interior DFP, and CEDR Stands".

Thinning must not remove > 50% of the pre-harvest basal area in the dominant and co-dominant crown position (≥ 7.5 cm dbh); both the access trails and thinning zone contribute to this basal area removal. The target basal area removal is 40%.

Within the Coastal, Boreal, Interior Subalpine, Interior Wet and Central Plateau Fire Weather Zone:

- The post-thinning residual crop basal area ($\text{m}^2/\text{ha} \geq 7.5$ cm dbh) must be within or greater than the post-thinning average residual basal area per hectare range identified in Thinning Guidance for BC Appendix 1 Table A1.1 for the associated leading species post-thinning, age, and top height.
- No area > 1 ha may have a post-thinning residual crop basal area less than the minimum basal area per hectare identified in Table A1a.2 for the associated leading species and top height. A maximum of 10% of the standard unit can be in this category.

Within the Interior Dry Fire Weather Zone:

- When the residual stand is dominated by trees with thick bark that is "corky" in nature (i.e. mature, surface fire-resistant trees) the minimum density is 250 sph Layer 1 (≥ 12.5 cm dbh), or

- When the residual stand is dominated by with trees having smooth or resinous bark (i.e. immature or broadleaf stems) the minimum density is 500 sph Layer 1 & 2 (≥ 7.5 dbh).

Access trails or strips contribute to the quantity of the stand removed and must not occupy > 25% of the thinned area (excluding reserves and permanent access structures). Access trails should be kept as narrow as possible.

A Guide to Fire Hazard Assessment and Abatement in British Columbia (2025) Section 2: The Defined Hazard Assessment and Abatement Strategy will be followed to assess and abate the hazard for the site.

Post-thinning average canopy base height will be >3m when thinning stands with a top height of >10m.

Compliance will be assessed using the Commercial Thinning Survey Procedures from the latest version of the *Silviculture Survey Procedures Manual*. The residual crop basal area includes contributions from both the access trails and thinning zones. Variable-radius plot size (prism size/basal area factor) is determined by the walk- through, and the prism should capture 4–9 trees from plot centre.

If the retention stocking standard is met 12 months following harvest completion, the standard unit is exempt from the requirements to produce a free growing stand, consistent with Forest Planning and Practices Regulation section 44(3)(h) and 44(4) or Woodlot Licence Planning and Practices Regulation section 34(2)(d) and 34(3).

If the stocking standard is not met 12 months following harvest completion, the site- level plan must be amended to delineate where the licensee shall hold a free growing obligation, and appropriate standards must be applied to those areas (e.g., even-aged standards, or single-entry dispersed retention standards assessed with a survey methodology that recognizes the contribution of both the overstorey and understorey to site occupancy).