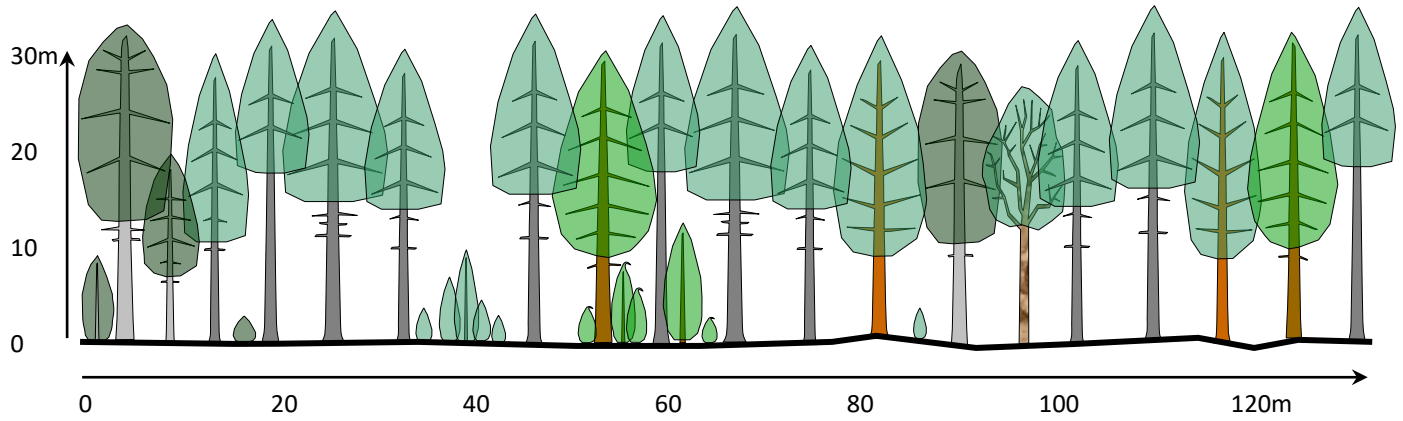
FDT 1.1.5 SS and shade tolerant conifers (XCST)

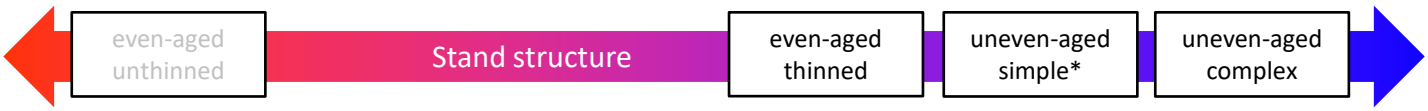


1. Structure and dynamics:

Mixed stands of SS and one or several XCST species, likely to include WH, firs, WRC and others. Stands may be even-aged and single storied, or develop into a complex structure. Species may be mixed intimately, in small or large groups, or in patches. Supplemented by minor species of category A.

Species distribution: SS 60 – 80% XCST 20 – 40% minor species: < 10%

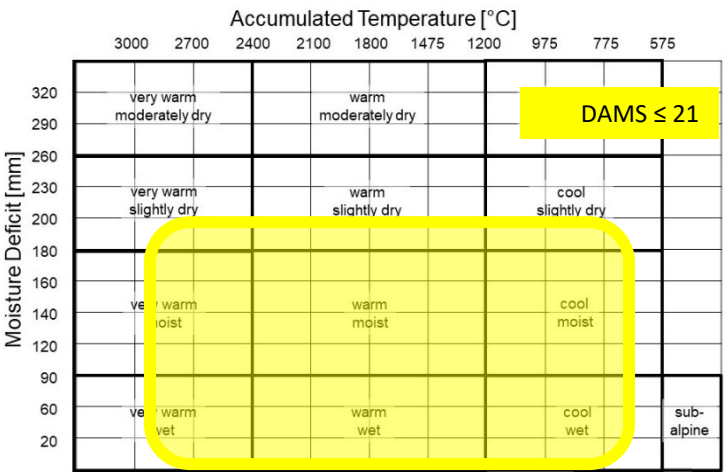
Management is likely to be by clearfelling and restocking at variable scale, or by LIMA / CCF.

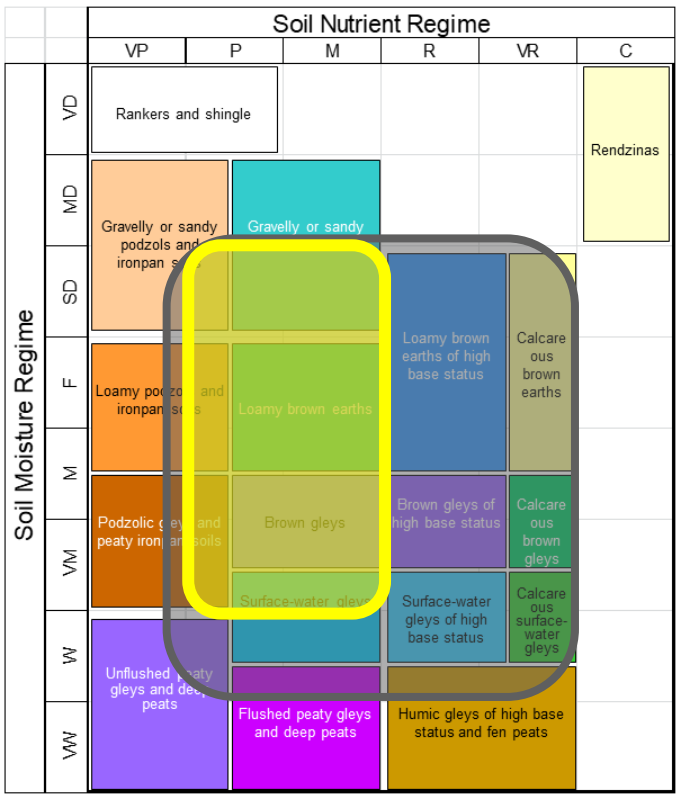


2. Ecological suitability:

Represents no NVC type but provides niches for elements of W4, W11, W17, W10 and W15.

Appropriate on freely draining to wet sites of medium fertility with loamy soil texture where SS achieves GYC > 12.





3. Management objectives:

Economic: SS – sawlogs, target DBH > 40cm in 60 – 100yrs
XCST – sawlogs, target DBH > 40cm in 60 – 100yrs

Environmental and social: Increased habitat diversity, stand stability and maintenance of soil quality compared to pure stands. The mixed-species and potentially diverse age structure of the stand is likely to be attractive and popular for amenity and recreation. Offers opportunities to introduce emerging species.

4. General management principles for the FDT

This FDT is appropriate on a wide variety of sites where objectives require the presence of a shade tolerant secondary species. Mixtures are generally compatible (CS = 1 or 2 depending on XCST) with the fast growth rate of SS being compensated by the greater shade tolerance of XCST. Management of young stands should be similar to FDT 1.1.2 and must aim to secure XCST if there is profuse natural regeneration of SS, possibly requiring (repeated) respacing. All species involved will respond well to thinning throughout their lifetime, however thinning must not be unduly delayed in order to achieve good tree stability. Thinning regimes should generally start at around 10 – 12m top height and use crown thinning as long as necessary to develop good individual tree quality and stability. LIMA / CCF methods should be the preferable option for final harvesting / restocking on sites conducive to natural regeneration as many XCST may struggle to establish under open ground conditions. Any planted XCST will need to be secured if natural regeneration of SS is profuse.

5. Timeline

stage	H_{100} [m]	intervention
Establishment		• Planting of 2000 – 3000 trees/ha or natural regeneration • XCST may be planted as beat-up or to supplement natural regeneration
Young stand	< 3	• Protection against animals / plants as necessary. • Respacing if N > 3000 trees/ha at 1 – 2m tree height. Reduce N to 1500 – 2500 trees/ha; in areas of difficult access, along exposed edges and on sites of high wind damage risk reduce N to 800 – 1000 trees/ha. • Clearing of any damage caused by felling / extraction of overstorey trees. • Steering of SS / XCST proportion in natural regeneration, promotion of minor species as required.
Thicket stage	3 – 10	• Generally no interventions, except for: • Release 300 – 400 FC tree candidates/ha in areas of difficult access or high wind hazard if respacing in the previous stage has been missed.
Pole stage	10 – 12	• First selective crown thinning, mainly removing dominant / co-dominant trees with visible defects, coarse branching or poor shape. • Selection of 150 – 250 FC trees/ha (SS + XCST).
Pole to small timber stage	12 – 20	• Continue crown thinning at height growth intervals of 3m, focussing on the competition status of FC trees.
Timber stage		• Monitor species composition, stand density, stability and health, and thin accordingly. Apply crown thinning as long as necessary for the benefits of FC trees, otherwise thinning type may gradually change to low. • Plan for final harvesting when FC trees approach target DBH. • Decide on LIMA / CCF methods to be used and assess potential for natural regeneration – improve conditions if necessary.
Final harvesting and regeneration stage		• Carry out harvesting operations according to agreed method. • In shelterwood scenarios, reduce BA to 35 – 40m^2/ha initially and then further once regeneration has established. Lower BA values will benefit natural regeneration of SS, higher ones XCST. • Design strip systems with regard to prevailing wind direction and climatic requirements of XCST / SS regeneration; keep strip width < 50m. • Monitor light level, ground vegetation, occurrence and growth rate of regeneration, supplement by planting if necessary, or restock.