Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

SLU Partnerskap Alnarp

SLUTREDOVISNING **2024-01-18**

Projekttitel

SLU Partnerskap Alnarps projekt nr: SLU PA 1456 skog

Projekttitel på svenska enligt projektansökan: Etablering och mätning av gallringsförsök i björk i Sverige

Projekttitel på engelska enligt projektansökan: Establishment and measurement of birch thinning trials in Sweden

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Projektpartners: Sveaskog Förvaltnings AB, Institution för sydsvensk skogsvetenskap, Trees For Me

Projektsammanfattning

Projektet är initierat inom ramen för kompetenscentret Trees For Me och är ett samarbete med Sveaskog samt ingår i doktorandarbetet för Babatunde Ola Dosumu. Med finansiering från partnern Sveaskog och Partnerskap Alnarp har vi etablerat en serie försök i gallring av planterad björk. Skogstypen gäller planterad björk på tidigare skogsmark som nu har nått ålder och beståndsutveckling för förstagallring. Försöken är en långsiktig investering i att testa olika gallringsstrategier och utvärdera såväl för enskilda träd som på beståndsnivå under hela omloppstiden. Ytterligare kommer det bli möjligt att utvärdera ekonomin i planterad björk med olika gallringsstrategier. Vi har etablerat fyra upprepningar av försöken, med totalt 6 olika behandlingar i varje. Alla lokalerna ligger i Småland med Sveaskog som markägare.

Summary in English

This project was initiated as part of the Excellence Center Trees For Me and a collaboration with the Swedish state forest company Sveaskog and within the PhD project of Babatunde Ola Dosumu. With the funding from partners and Partnerskap Alnarp we have established a series of experiments in thinnings in planted birch. The forest type is planted Silver birch on former spruce sites which now have reached the age and volume for first commercial thinning. The experiments will be a long term investment in testing different tinning strategies and the result on growth of individual trees and on stand level for the full stand rotation. In addition it is possible to evaluate the financial revenue from planted birch with different management strategies. We have established four replicates of the experiment, with in total six different treatments. All sites are situated in Småland and the forest land is owned by Sveaskog.

Projektbeskrivning

Abstract

Thinning is an investment with proven benefits for valuable timber production. However, only few research has been carried out to assess the impact of different thinning strategies on the development of planted birch in Sweden. In this study, we have established thinning experiment on four sites in southern Sweden with the aim to follow the long term development of the stands. Thinning was carried out down to a certain basal area. The knowledge obtained from this experiment will serve as a guide for the management of planted birch stands.

Background

Thinning is essential in the management of forests for several reasons (Wallentin, 2007). Primarily, thinning is an investment that maximizes the growth and economic value of future crop trees. The thinning process also provides fuelwood, pulpwood and biomass, which gives some economy in the short term. Although the positive effects of thinning for producing valuable timber is well studied (Ruiz-Peinado et al., 2017; Nilsson et al., 2010; Wallentin, 2007). However, thinning of birch species in Sweden has been majorly focused on its utilization as pulpwood (Kilpeläinen et al. 2011). This is partly because the birch species are naturally occurring in planted spruce and pine stands (Hynynen et al., 2010). Thus, little or no management is applied in favour of birch species.

Given the uncertainties and risks associated with climate change, tree species diversification is important in boreal forests (Seidl et al., 2014). Birch is a well-adapted species that constitutes 12% of the total volume of Swedish forests (Nilsson et al. 2021) despite the minimal investment and management preference given to the species compared to conifers. In Latvia and Finland, birch is actively managed for the production of veneer and quality timber (Liziniewicz et al., 2022). Thus, the potential of birch species in the boreal forest of Sweden needs to be assessed through several thinning experiments such as we plan to engage in this study.

Efforts have been made to improve birch yield and wood quality in Sweden through breeding. Liziniewicz et al., (2022) reported increased productivity and better economy from genetically improved birch material. However, improvement in birch planting material should be complemented with good stand management practices. With focused thinning and other management activities i.e., pruning, we will be able to improve knowledge on the best management options for growing high quality birch stands and improving yield.

These thinning experiments is useful for other researchers within the “Trees for Me” network, as the harvest obtained from first commercial will be utilized in PhD studies ongoing at Lulea University of Technology.

Aim

-To investigate the best thinning strategies for optimal growth and stand development.

-To investigate the influence of stand management on the production of high quality birch timber.

Method

The establishment of the experiment was carried out spring and summer 2023. The measurements and markings in the stand was primarily done by the staff from the Experimental unit and decisions about experimental layout and design by all project members. The thinnings was then carried out by Sveaskog and their entrepreneurs.

Trial Sites

Thinning trials have now been established on four sites in southern Sweden (see fig. 1). The selection criteria for these sites are:

- -Even aged planted birch stands with little or no ingrowth of other species. (We allow the stands to have been pre-commercially thinned with removal of ingrowth)
- -Sites that have reached the phase for first commercial thinning, with stem density between 1000 – 3000 stemsha^{-1}.
- -Mean diameter was at least 7 cm.

Experimental Design

On all sites, 6 treatment plots were laid out, each measuring 0.1 hectare (see fig. 2). The block and treatment plot layout followed guidelines for experimental layout by SLU, "Fältarbetsinstruktion för skogsfakultetens beståndsbehandlings-försök". Each treatment plot had an additional buffer zone of 3 – 4 meters. In addition, strip roads with 4 m width was created within each plot. The strip roads influenced the shape of the plot, making them more of rectangles than squares. Within a block, the treatment plots were similar in terms of site factors, regeneration origin and management history.

In addition, two criteria's for small variation should be met in order to accept the plots belonging to the same block, which is measured by:

i) The treatment plots was calipered according to the instruction (page 10) and the variation (variationsvidden) in basal area between plots within the block is calculated according to the instructions.

ii) In blocks with high proportion of naturally regenerated birch, the proportion of stems of downy birch (glasbjörk/downy birch) is also calculated, so that the difference between treatment plots are not more than 10-20 %.

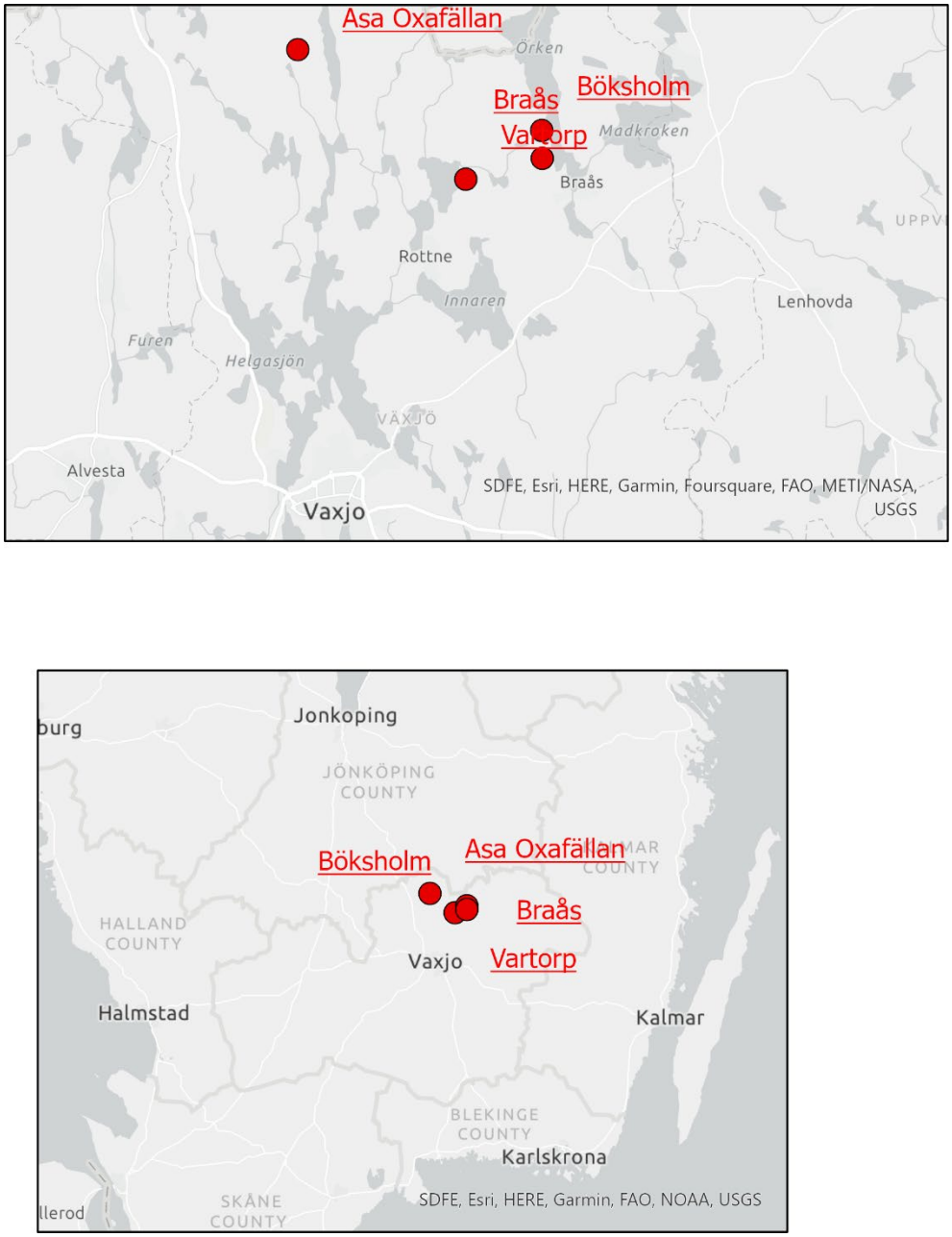

Figure 1. The experimental sites, in Småland, north of Växjö.

Thinning Treatments

Thinning treatments were randomly assigned to plots within a block. Light, intermediate, heavy or no thinning treatments was applied. The six (6) thinning treatments are:

A. Heavy thinning to density of the final stand. Current stand basal area is 6m^2/ha.

B. Intermediate selective thinning from below. A second selective thinning is to be carried out. Current stand basal area is 9 m^2/ha.

C. Intermediate corridor/systematic thinning, thinning ratio = 1. A second selective thinning is to be carried out. Current stand basal area is 9 m^2/ha. Figure 3.

D. Delayed intermediate selective thinning from below (this is a similar treatment as **B,** but is yet to be created so we can study the effect of delaying thinning operations on birch development). Plot will be thinned to basal area of 9 m^2/ha. A second selective thinning will also be carried out.

E. Light intensity selective thinning from below. Two additional selective thinnings will be carried out. Current stand basal area is 12 m^2/ha.

F. Control, no thinning.

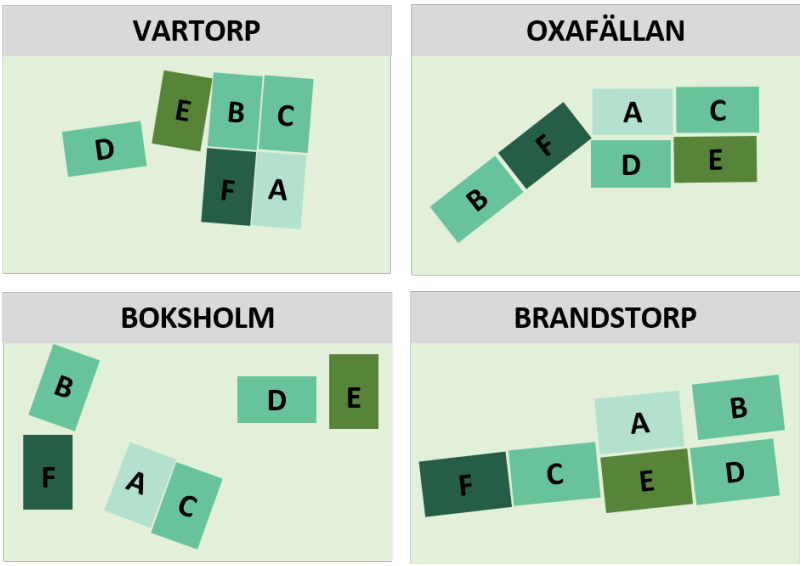

Figure 2. Experimental Layout on all sites, detailed maps see appendix 1.

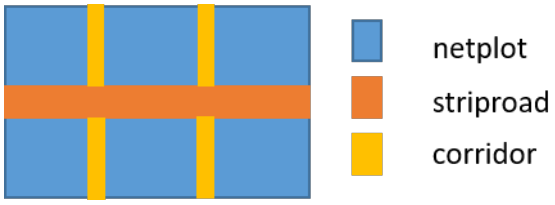

Figure 3. Design of the schematic thinning.

Results and Discussion

The experiments have been included in the data base for long term experiments at SLU "Silvaboreal". The unique ID to get information about all four sites on silvaboreal is to open the webpage www.Silvaboreal.com and search for the numbers:

- 25782 (Vartorp),
- 25778 (Oxafällan)
- 25846 (Böksholm)
- 25783 (Brandstorp).

Since this is a long term experiment, the effect of the various thinning treatments can only be properly assessed after some growing seasons. However, preliminary results will be obtained and reported in 2026 at the latest.

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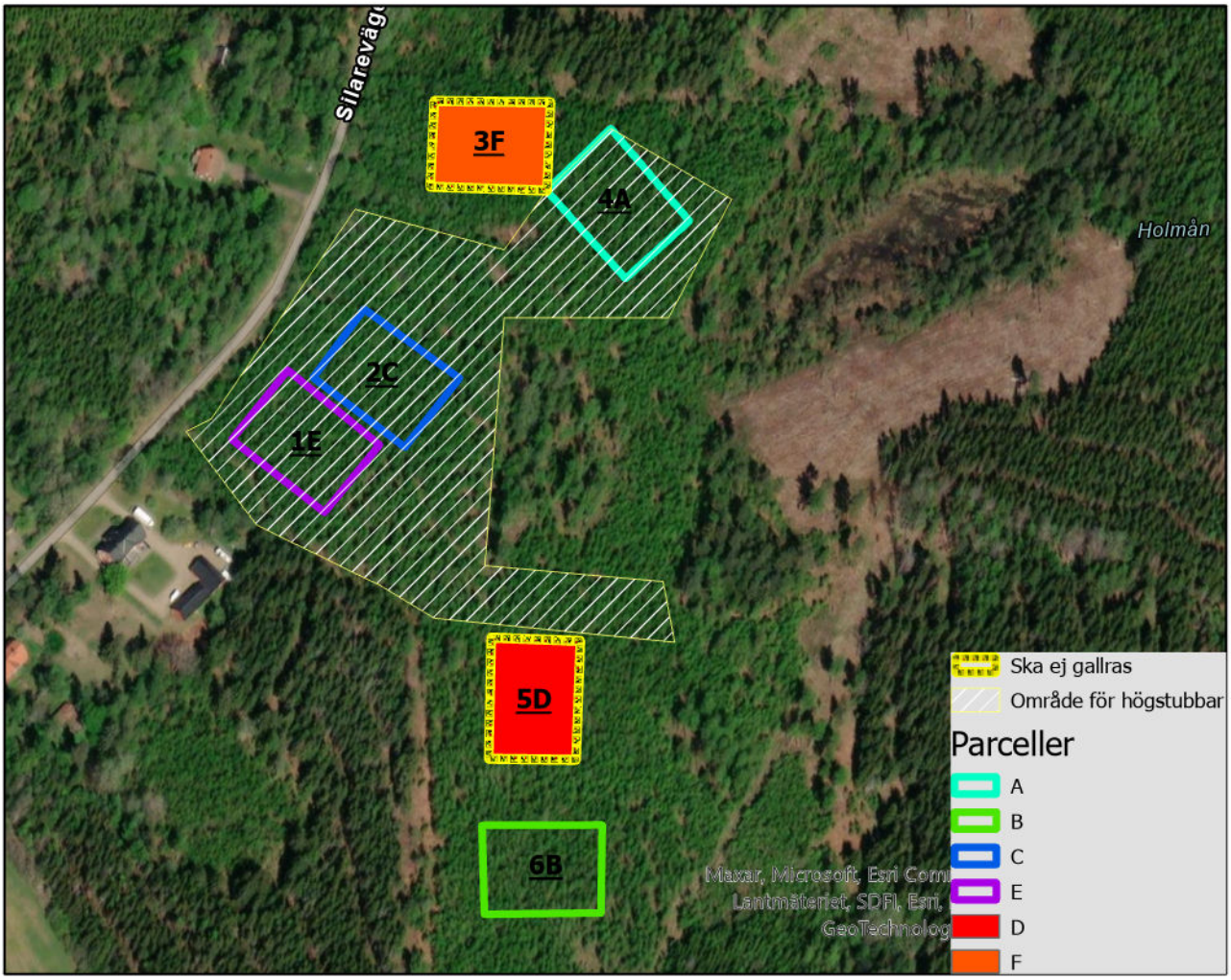
OBS, ingen gallring av röd/orange ytor med gul bård. Dessa är snitslade med gulröd snitsel i bestånden.

Inom parcellerna gallras bara stämplade träd.

Stickvägar är markerade inom markerade parceller, med gul snitselknut in mot stickvägen. Ev. röd snitsel markerar bara vägledning för mätningar.

110 högstubbar bör vara möjligt att skapa på varje av de 4 lokalerna, inom kartans vitstreckade områden. Dvs träd som ska fällas utanför sickväg. Högstubbarna bör vara 70-80 cm höga.



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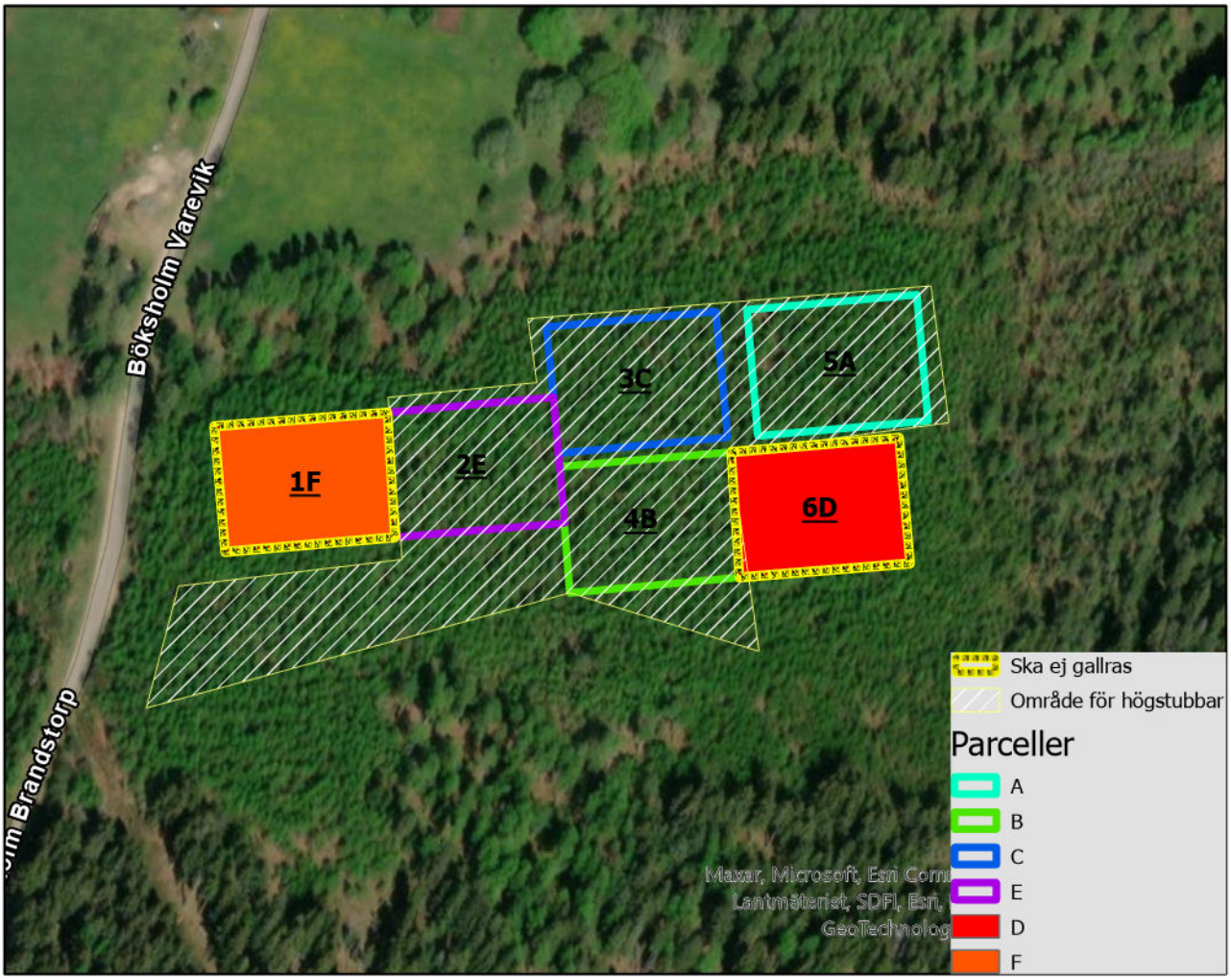

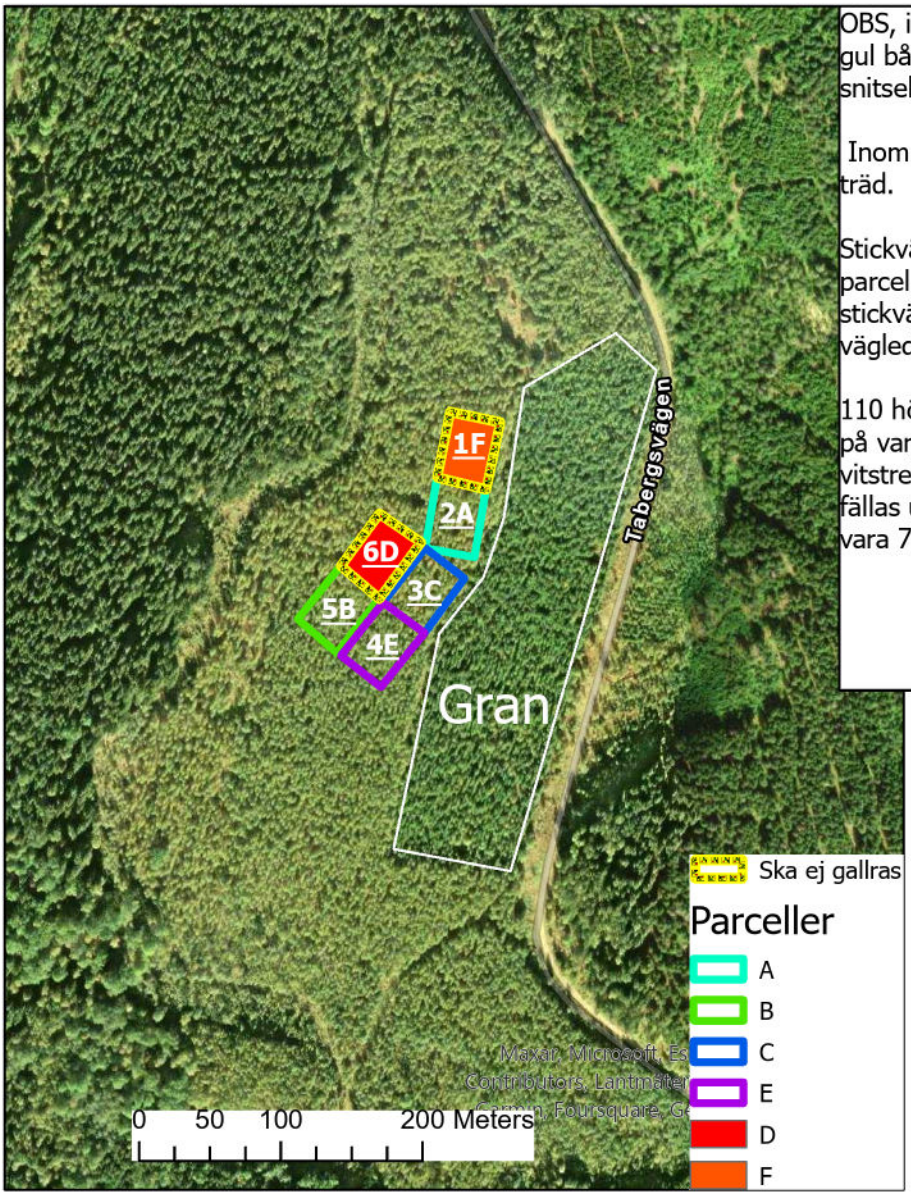

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