What type of forest do you want?

It’s all in the thinning

malwa

What type of forest do you want to see grow?

There has always been a lot of debate about the knotty issue of the best way to look after forest. The capacity of a forest to serve as a climate and environmental asset is attracting particular attention right now. The forests of Sweden are no longer a purely Swedish issue, as they are currently viewed from a European perspective with regard to the environment and sustainability.

If we bring the debate down a little closer to the land itself, there is much – and increasingly clear – evidence to suggest that we are thinning too harshly. As a result, final felling volumes are deviating negatively from the expected levels.

Thinning has to do with the future, the environment, growth and the type of forest you want. This little brochure presents our programme – or perhaps our cry from the heart – that centres on using our knowledge, technology and experience to contribute to more storm-resistant stands that are richer in timber, backed by minimal impact on the soil.

Be clear about your wishes and needs the next time you are to thin your forest.

Magnus Wallin
Founder & co-owner

Hans Lindberg
CEO

Malwa Forest AB

Are we thinning incorrectly and too harshly

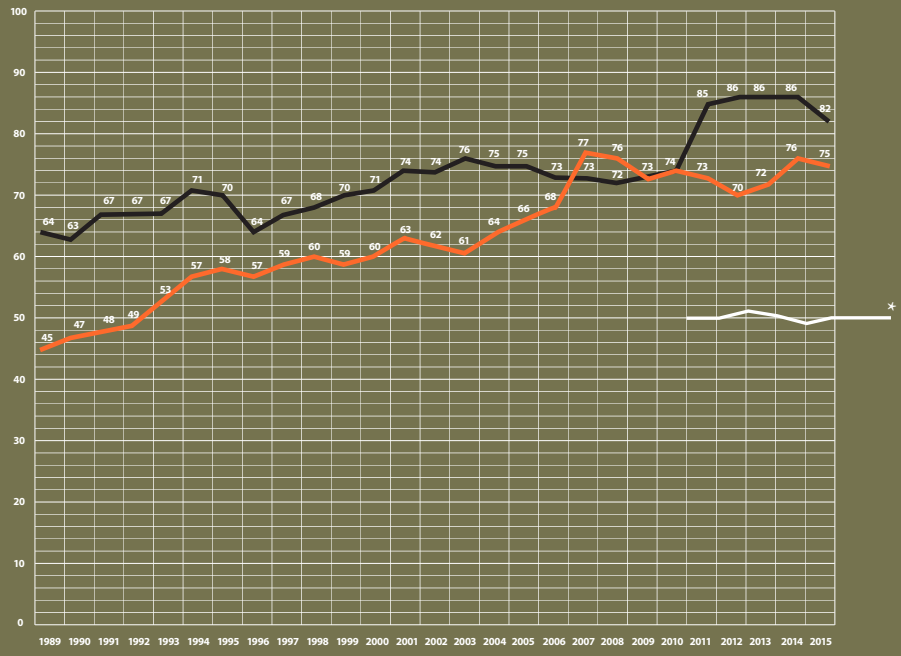
Unfortunately, all evidence suggest this is so. In just thirty years, the extraction level from first thinning operations in Götaland has more than doubled, at the same time as the final felling volumes have decreased sharply.

Compared to an expected level of 405 cubic metres per stocked hectare, the average for Götaland reached just 289 cubic metres*.
The deviations from the calculated final felling volumes in Central and Northern Sweden are lower, but still large enough to give rise to concerns and discussions.

When we calculate volumes on the basis of Malwa thinning, an increase of 50% on the final felling is not unrealistic.

** Swedish Forest Agency report (2019/4)*
and Skogsforum/Fredrik Reuter and Torbjörn Johnsen 2019.

Thinning extraction level, Götaland 1989–2015
(m3f/ha)



= Götaland, first thinning

= Götaland, subsequent thinning

** Estimated extraction level, Malwa thinning*

Data source: SLU, The Swedish National Forest Inventory

"298 cubic metres from final felling should be more than 400"

Thinning – Here is where we agree

The objective of thinning is to create and establish conditions for strong growth and thus a valuable stand.

Trees that are suboptimal, damaged, suppressed or too densely packed are removed. This allows space to grow for other trees with more promising prospects. Trees with the best opportunities for growth – known as "main stems" – are prioritised.

We also agree that it is appropriate to perform a first thinning when the stand has reached a height of 12–15 metres, while the second thinning should be carried out when the stand is 18–20 metres tall. The growth rate is quite high in that there is normally a gap of just 8–10 years between the first and second thinning, so it is important to monitor the forest closely.

Thinning – Here is where we do not agree

We believe that it is wrong to come barging in with large machines that require at least 4-metre-wide strip roads (thinning racks) in sensitive young forest. But this is the procedure for most mechanical thinning in Sweden. Irrespective of whether it is a first or second thinning.

Instead, we recommend stand-operative thinning using machines that are just two metres wide and do not require strip roads in the conventional sense. Smaller machines have the capacity to cross back and forth between trees in standing forest.

Why is 4+20 thinning still happening?

One reason – and perhaps the only one – that the proponents put forward is "cost-efficiency". Simply put, this method makes it easier to extract higher volumes in less time, thus achieving a healthier bottom line for the thinning. This is often true, admittedly, but at what cost?

The big forest machines, up to 20 tonnes, were originally developed for final felling and require strip roads at least four metres wide to make their way through the forest that is to be thinned. The working reach of the cranes is around 10 metres, which means that new strip roads have to be established at 20-metre intervals. This means that in an area of 100 x 100 metres, for example, it is necessary to cut 4–5 strip roads, often 4.5 metres wide and 100 metres long.

It's a simple calculation: -4.5 x 100 = 450 square metres, times five. In other words, there is 20–25% of the land that can no longer be used for forest production.*

As early as on the first thinning, this network of strip roads and base roads is planned for the entire cycle period of the stand. This sounds quite rational, but in reality it is more the case of the size of the machine defining operations, and this has hardly anything to do with the conditions and circumstances of the forest itself.

** The paragraph regulating the surface area of strip roads was excised from the Swedish Forestry Act (Skogsvårdslagen – SVL) 1994. At the same time, the following sentence was written: In order to minimise loss of growth, the strip road area should be between 10 and 20% (Håkansson & Steffen).*

Big difference between 4-metre strip roads and Malwa thinning with harvester corridors between the trees

If you choose thinning using large machines that demand strip roads at least four metres wide, with roads being cut at 20-metre intervals, you can expect 950–1,150 stems* from an original total of 2,000 plants to remain after the first thinning.

The area will often be unevenly thinned between the strip roads – and sometimes not thinned at all – because large numbers of stems disappear when the roads are established (known as "strip road losses"), and it is not permitted to exceed 35% thinning level on the first thinning.

If you choose Malwa thinning, on the other hand, you can be sure of a more attractive result with uniform thinning across the entire area. It is quite simple. Three metres between thinned trees is the optimal distance, and a Malwa machine is just two metres wide. This means that there is always room for Malwa machines in thinning, without strip roads and other "road losses". Instead, the machines can use harvester corridors or cross back and forth between trees in standing forest.

Small diameter logs instead of pulpwood
More and more sawmills are now starting to saw stems in smaller dimensions. This generates more income than pulpwood. Malwa harvesters are cost-efficient when working with these dimensions as well.

** For useful information about the number of stems after thinning, see, for example: www.skogskunskap.se.*

What Petter Marklid has to say**:

> *"Where the terrain does not constitute an obstacle, there are no strip road losses. In 90% of cases, harvester corridors and considerate strip roads can be used that do not adversely affect the growth of the stand. The strip roads for Malwa forwarders – i.e. for transporting the timber out to the road – are also just three metres wide and can be spaced at 20-metre intervals. The harvester prepares plans based on incursions or harvester corridors so that the forwarder can reach and pick all wood from its strip roads.*
>
> *If you return to a Malwa-thinned stand a few years later, it is usually difficult to pick out the strip roads as they tend to blend into the environment, and it is impossible to make out the harvester corridors."*

You can count on Malwa thinning to allow 100 more trees per hectare to develop into valuable timber. At least!

** *Petter Marklid Entreprenad, Unnaryd.*

It's time to question 4-metre strip roads and strip road networks

Strip roads that are (at least) four metres wide are required for conventional thinning using big machines. If you had said this to earlier generations, they would have been shocked and refused to believe it was true.

The development of large machines and the associated processes has primarily been driven by the major forestry companies and, as a result, the machine manufacturers. Not with a view to improving thinning techniques or providing a better service, but simply to cut production costs. To fell more cheaply, in other words. Very little of the development has had to do with what the individual forest owners think or want, or with the conditions of the forest itself.

A Malwa machine is just two metres wide and therefore has no need of traditional strip roads, networks or corridors. Malwa machines can cross back and forth between the trees in standing forest (harvester corridors), causing little or no damage to the land.

In 2017, the Skogforsk research agency carried out a rut depth test, which revealed that a fully loaded Malwa machine with a trailer was unbeatable, creating much shallower ruts than forwarders in the 14–15 tonne class *(See pages 16–17).*

Right:

26-Year-old pine stand in Brunflo, Jämtland; Malwa thinning, autumn 2020. Thinning contractor: Lövsta Logging, Fredrik Toutin. Landowner: Håkan Jacobsson.

"The photo was taken by a drone. You can't see any strip roads, just a tractor path running diagonally across the land. Fredrik Toutin from Lövsta Logging did a fantastic job in his Malwa 560C, winding his way between the trees in his versatile machine. You cannot see any signs of damage to the land or to the remaining stems, and the operation saved a great many main stems. I've also inspected the area after the storms we've had, and I couldn't find a single tree blown over."

... and high time to quash a myth about second thinning

You will sometimes hear the following, especially from the big forestry companies and their representatives, as an argument for 4+20 thinning:

> *"If small machines are used for the first thinning, this can cause problems for the second thinning. It is often necessary to bring in conventional machines and broaden the strip roads."*

Reading between the lines, this argument is claiming that the small machines are not dimensioned to handle the second thinning, working with thicker, longer and heavier stems. While this may once have been true, the statement is both uninformed and inaccurate when it comes to Malwa machines.

A Malwa harvester with a LogMax 928 harvester head has a 42 cm cut capacity and works just fine in second thinnings, too.

Second thinning. Median stem, 0.15 FuB.

Storm-safe forests. Do they exist?

While you can never make them completely safe, there is plenty you can to do make stands more storm-resistant. The way clearing and thinning are carried out have an effect on resistance to strong winds. Most people are in agreement thus far, but then the schools of thought start to diverge.

Our conviction and experience indicates that the type of stand-operative thinning that can be performed with Malwa machines is the optimal solution. These machines can criss-cross back and forth between trees in standing forest. The result? More stems left standing.

We are of the opinion that conventional strip roads and networks do nothing to protect stands against storm damage. Experience from a number of contractors, including Torbjörn Nilsson, Husby Gård, suggests that the majority of windfalls are to be found right next to or just a few metres from strip roads.

"In 2019, I took my Malwa machine to the Municipality of Östhammar to help out after storm Alfrida, which uprooted a lot of trees as it passed through. Most of the windfalls were alongside the strip roads."

Torbjörn Nilsson, Husby gård
Malwa contractor in Vendel/Örbyhus
20 km or so north of Uppsala.

Proper land care

Land care is taken as read for the majority of contractors, irrespective of whether they are running a large or small machine. No matter how skilful an operator of a large machine may be, however, we believe that the machines they are operating in forests to be thinned are far too big.

From the perspective of the load applied to the ground, there is a huge difference between forestry machines that weigh 20 tonnes and Malwa machines that weigh just a quarter of that. There is simply no comparison, and it's also a little unfair on operators of large machines.

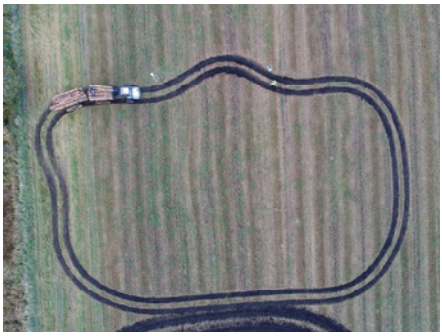
In 2017, the Skogforsk research agency carried out a rut depth test comparing a fully loaded Malwa forwarder with a trailer with heavier machines, represented in this case by 8- and 10-wheeler Ponsse Buffalo machines and an "OnTrack", caterpillar track machine that was under development (See the report on pages 16–17). In researcher-speak, the result was presented as follows: "The Malwa generated significantly shallower ruts."

Behind the scenes, we can reveal that in addition to the ten planned drives across a test surface, the Malwa was driven an additional five times without causing noticeable damage to the land. The big machines had to abandon their tests prematurely because the ruts they were making were far too deep.

Land care guarantee?
The "land care guarantee" promised occasionally, and usually by the major operators, is a rather ambiguous concept which, briefly put, centres on repairing damage caused by the machine operations. In addition, it comprises a number of measures intended to minimise damage as far as possible, but it has nothing to do with operating without causing any damage at all, which the term itself seems to imply. The forest owner is also charged a fee per cubic metre, with the money being placed in a fund for repairing damage.

So from the perspective of marketing law, the use of the word "guarantee" in this context is rather dubious.

Rut test depth on a field outside Tierp, performed by Skogsforsk in 2017.



*"In the rut depth tests, the Malwa forwarder and trailer performed extremely well, creating significantly shallower ruts than the Ponsse Buffalo in all four trials. This applied both as calculated per crossing, and when the comparison was made based on transport work performed."**

** Skogforsk work report (972-2018)*
Evaluation of the Malwa machines system for early thinning.

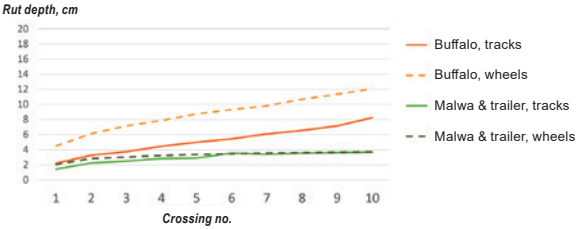


Figure 17. *Rut formation after driving with and without tracks, unladen on a straight track (average of L and R ruts).*

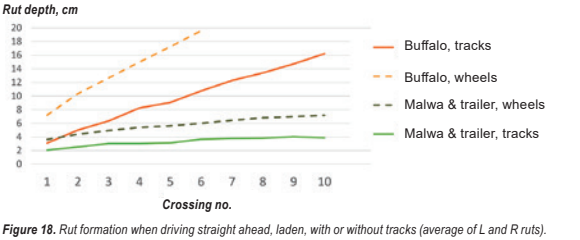


Figure 18. *Rut formation when driving straight ahead, laden, with or without tracks (average of L and R ruts). The test for the Ponsse Buffalo (wheels) was abandoned after 6 crossings.*

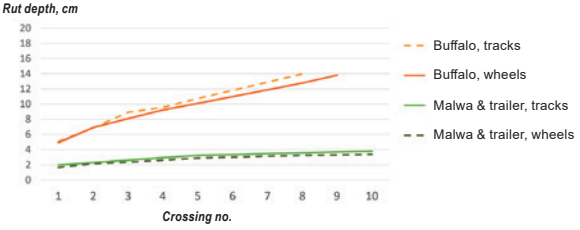


Figure 19. *Rut formation (average of L and R ruts) when the machines were driven unladen on a slalom track.*

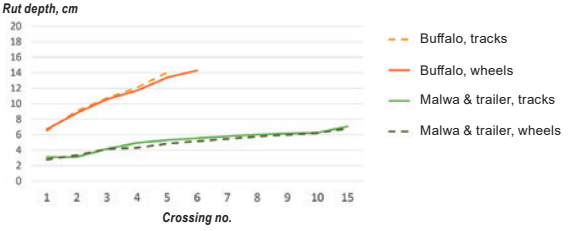


Figure 20. *Rut formation (average of L and R ruts) when the machines were driven laden on a slalom track. The test was abandoned after five and six crossings for the Buffalo machine, while it was expanded to 15 crossings for the Malwa.*

Carbon dioxide and carbon sink? This is how it breaks down

Biomass, in the form of pines and deciduous trees, for example, uses carbon dioxide to grow and develop. The term "carbon sink" is simply used to describe the capacity of a growing tree to bind carbon dioxide – also known as "carbon sequestration" – thus reducing the amount of carbon dioxide in the atmosphere. We are talking huge volumes here; generally speaking, a forest cubic metre (m3f) in an average forest binds as much as 900 kg carbon dioxide, while a single large pine tree produces a carbon sink equivalent to 450–500 kg carbon dioxide*.

Trees that become timber store carbon for longer

Trees that grow tall become timber, thus continuing to bind carbon for many years when used as construction material, for instance. This is in contrast to smaller diameter logs, often from thinning, which are pulped and then used for hygiene products, for example, or paper, which has a shorter life cycle.

Looking at this from the perspective of thinning, it is simple to work out that the more trees that are allowed to grow into valuable timer in your forest, the bigger the carbon sink and thus the climate benefit.

Malwa thinning means 100 more trees remaining per hectare

Using Malwa machines allows more selective thinning, which means, on average, over 100 more trees per hectare than thinning using large machines, which demands strip roads at least four metres wide.

Work it out for yourself. This soon adds up to big numbers and can translate into as much as 50 tonnes of climate benefit per hectare.

– And that's not counting the value of 100 more trees growing into timber.

** How much CO2 do different species of tree bind? Skogsforum/Fredrik Reuter, 2019.*

Can you earn money from carbon sinks and growth?

Not directly as yet, but the idea has been aired and is being discussed at both national and international level. As early as in 2011, LKAB bought carbon dioxide credits from Sveaskog for the sum of SEK 300,000 kronor in an attempt to highlight the untapped potential of Swedish forests to generate climate benefit.

California and New Zealand already operate systems for trading emissions based on forest growth.

It is not unrealistic to imagine that a future carbon sink value based on growth could generate as much as an extra SEK 1,000 per forest cubic metre.

What do we know about the situation 50 years from now?

Ask yourself this question and think about it. The cycle period of a stand is often 60–80 years, and the further north we move, the longer the period. So, hand on heart, what do we know about the year 2050, 2070 or 2090?

Looking back, we can easily trace how opinions about forest protection and care methods have undergone numerous major changes over the years.* In particular, the mechanisation of forestry has introduced significant changes and improvements, primarily in the area of occupational health and safety. But the forest remains the same.

** Extra reading tip! Century by century – The forest history society www.skogshistoria.se/skogshistoria/arhundrade-for-arhundrade.*

The climate poses a challenge

Climate change, with a higher mean temperature and more precipitation, translates into faster growth, while extreme periods of heat and drought can put a damper on it. Downpours can produce floods, and hard winters increase the risk of storm damage. Insect attack is a curse. What's happening now is that demands are increasing for resistant ecosystems with high biological diversity, and for large areas to be set aside and protected for this purpose. New species of tree are also being added.

Forest product increasingly important as a raw material

We are increasingly confident that the forest and its products will remain as important – if not more so – than they are today. Raw material from the forest can be used not only as building material, but also for large-scale construction, paper, textiles and biofuel, as well as for a wide range of products we cannot even imagine at present. Research is intense and continuously opening up new opportunities. Looking to the future, sales and demand remain secure.

Self-operating machines

Ongoing mechanisation involving new types of tools and machinery, as well as automation in the form of self-operating machines for planting, thinning, felling and transport is set to continue, changing and facilitating conditions for forestry.

Thinning is all about the future

Today, appropriate clearing and thinning are the best way to lay the foundations and to create the conditions that allow your forest stand to develop to its full potential. The full reward will be reaped in 50 years. Until then, you will have to "make do" with the joy and pride in having a valuable stand.

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