ShortCuts

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FAST AND SMOOTH

USING COMPUTER GAME TECHNOLOGY

John Deere launched a new forwarder with boom tip control at Elmia Wood. In a number of studies, Skogforsk has shown that the new technology is easy to learn, increases production, and reduces the mental stress on the operator.

"This is a major step forward," says Björn Löfgren of Skogforsk, who has been promoting the technology since the 1980s. Yet this is just a first step in a broader development. The technology paves the way for partial automation of forwarding and, in the future, loading and unloading of timber may be completely automated.

Innovation!

Since the beginning of the year, Rickard Larsson, harvester operator at Södra Skog, has tested the machine with boom tip control for approximately 850 hours in a secret project.

"Above all, operating the machine is smoother, there is less strain, both on the body and mentally," says Rickard Larsson. "All you have to do is point the joystick to direct the movement of the grapple, and then the rest is handled automatically. It only took a few days to learn how to use it, after which I felt I never wanted to go back to the old technology."

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PHOTO: SVERKER JOHANSSON/BITZER

Rickard Larsson is satisfied after testing the new forwarder.

DEMO OF PROFITABLE STUMP GRINDING

Grinding stumps to a coarse fraction on the landing enables improvements of fuel quality through sieving and a better transport economy. In April, Skogforsk, the Finnish research institute VTT and Valbo Entreprenad AB demonstrated the system in Mackmyra.

Grinding on the landing increases transport payloads. At distances exceeding 70 km, total costs are reduced compared with transport of whole stumps to the heating plant. The result also shows that screening the chips reduces impurities.

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Tips from the coach. Order the folder "8 steps to a miracle" on skogforsk se.

SKOGFORSK AT ELMIA WOOD:

MIRACLE FOR THE ENVIRONMENT, THE WALLET… AND YOU

"It's not difficult to improve the day-to-day life of the operator," says Skogforsk instructor Anders Mörk. "But you have to plan the job carefully, make the settings your own, and get into a groove."

On the Skogforsk stand at Elmia Wood, around a hundred operators took part in a competition. The target was to unload and load a forwarder using the least possible fuel. The winner was Martin Svensson who used just 397 ml of fuel. The average fuel consumption – which was also the subject of a Skogforsk study – was 624 ml.

3 tips from the winner:

1. Good precision in one movement.
2. A lot of wood in the grapple.
3. Shortest possible crane cycle.

The winner: Martin Svensson

HEAD-UP DISPLAY at Elmia. The projection is pink; this was the colour that was most easily seen, as shown by Skogforsk's study of the technology from 2007. At that time, information presented on the windscreen included length, diameter, tree species, quality and product – and bucking was 5-8 percent faster. One interesting detail was that the test operators questioned whether this technology was needed because "We almost never look at the computer display when we're working". But in the study it was shown that they looked at the screen every tenth second.
"In the autumn, we hope to continue with tests in the forest, and we're discussing a development of the product with several machine manufacturers," says Esteban Arboix.

Illuminating. Esteban Arboix is developing Optea's head-up display (see VISION no. 1/2011), which he demonstrated this year at Elmia Wood.

THEME | **SMART TREE RETENTION**

Retention of trees as a conservation practice increases variety in forests, thereby improving the chances of preserving biodiversity. And in the future, when the retention sites have matured and grown into a forest landscape where conservation measures are still applied, the measures have even greater effect. Lena Gustafsson, Professor in Conservation Biology at SLU, is hopeful about the future.

Text | SVERKER JOHANSSON, bitzer@live.se | *Photo* SLU

RETENTION
IMPORTANT FOR BIODIVERSITY

"The old trees and the dead wood are increasing in the young forests, which is very positive, and naturally a result of the nature conservation measures we introduced 20 years ago," she declares.

"At the same, the vast majority of the forest landscape will soon comprise relatively young, commercial forests. These will be 0-70 years old, and the rest will comprise considerably older, protected forests. From an ecological perspective, it will be a very strange landscape, one we have never seen in Sweden before."

Retention continues

"This is why retention is very important for biodiversity," says Lena Gustafsson.

"Most of the species that can tolerate disturbance, but that need old or dead trees, will survive in the commercial forests. But the situation will be worse for the genuine old-forest species – our results and conclusions show that they need to be surrounded by at least some hectares of unaltered forest if the area is to serve as a 'lifeboat' for future forest generations. In Götaland, this applies to almost half of the clear-cut area – even if we know that the species are there, which is not certain!"

"So if the Swedish model means that we have to apply conservation measures in the locations where the species are found – yes, then we're facing a challenge when it comes to the old-forest species. They nearly always need rather large set-asides, whether voluntary or centrally-enforced."

Out in the cold

For many years, Lena Gustafsson was Swedish forestry's favourite ecologist. Here was a researcher who listened to both sides in the conservation debate and made constructive contributions in the discussions, and who was not afraid of applied research projects. But, in 2012, something happened. After an international research review, Lena Gustafsson announced that Swedish forestry was not top of the class, pointing out that retention of approximately 3-5 percent during logging was small in comparison with most other countries. The forestry sector's internal discussion was noticeably hostile. Lena Gustafsson could no longer be trusted.

"Things were a bit chilly for a while," admits Lena Gustafsson calmly. "Many people in the forestry industry were a bit surprised; they didn't have a situation analysis and thought they had come further in such a comparison. However, the relationship with the environmental movement improved, which was also happy to disseminate our results. But... these types of reactions are healthy for researchers who work close to practice. You shouldn't be a favourite in one camp all the time."

Explanations

"We were just stating facts, but there were explanations. Many other countries have a large proportion of natural forests that have never been clear-cut. The forests are state-owned… or forest companies pay for what they fell – and, in many cases, this makes it easier and cheaper to leave forest untouched."

But it was a review that also fostered hope, according to Lena Gustafsson:

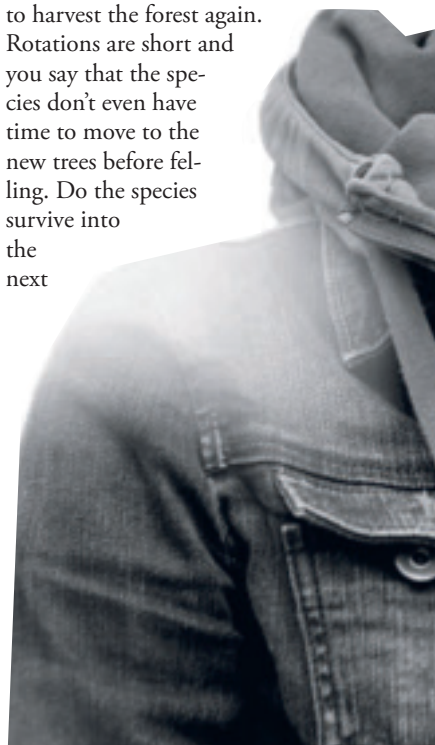
"In a very large proportion of the world's forests, forestry can be practised using various types of conservation measures. Only 11 percent is protected, and four percent is forested intensively."

And later?

We are talking about the future, about the next step. The researchers have looked at biodiversity in young and middle-aged forests (30-70 years). In these middle-aged forests, a number of red-listed lichens were found, a species group that is thought to be sensitive to forestry. But they did not grow so much on the new forest generation trees and were mostly found on the older residual trees and old logs, i.e. structures that had been left in the forest. This was shown, for example, in a survey carried out by SLU in Hälsingland.

"Most of the species don't seem to disperse to the young trees, but it's still encouraging to find species particularly on older deciduous trees and dead wood – these are the types of structures that are retained today," says Lena Gustafsson.

But, I say, now it's time to harvest the forest again. Rotations are short and you say that the species don't even have time to move to the new trees before felling. Do the species survive into the next



> “Nature conservation is like the moose issue – more information is not crucial. It’s more about people’s attitudes.”

rotation? Or is there a risk that thinned forests will turn into a street race that ends at the precipice of final felling?

According to Lena Gustafsson, this puts pressure on retention actions also in the middle-aged forests.

“The old retained deciduous trees look a bit scruffy in the eyes of the uninitiated. It is often unattractive trees that are removed in thinning. Also, there are often fine logs on the ground, and it’s important not to drive over them and destroy them. We should also work more with restoration of the middle-aged forests. There is great potential, using directed measures, to increase the proportion of deciduous trees and the amount of dead wood in these forests.”

Loss of species in the long term?

This type of young forest has also been studied in Uppland. Red-listed lichens were only found in five percent of the stands and the quantities were also much lower compared with Hälsingland.

“This may be because many of the Norrland forests have been clear-cut for the first time. In Uppland, the forest has been used more intensively and over a longer period. Earlier users have perhaps removed more of the ‘lifeboats’,” suggests Lena Gustafsson.

The dilemma?

So there is a lot to think about. Will the species continue to cling on to the same old residual trees – and how long will they manage to do so?

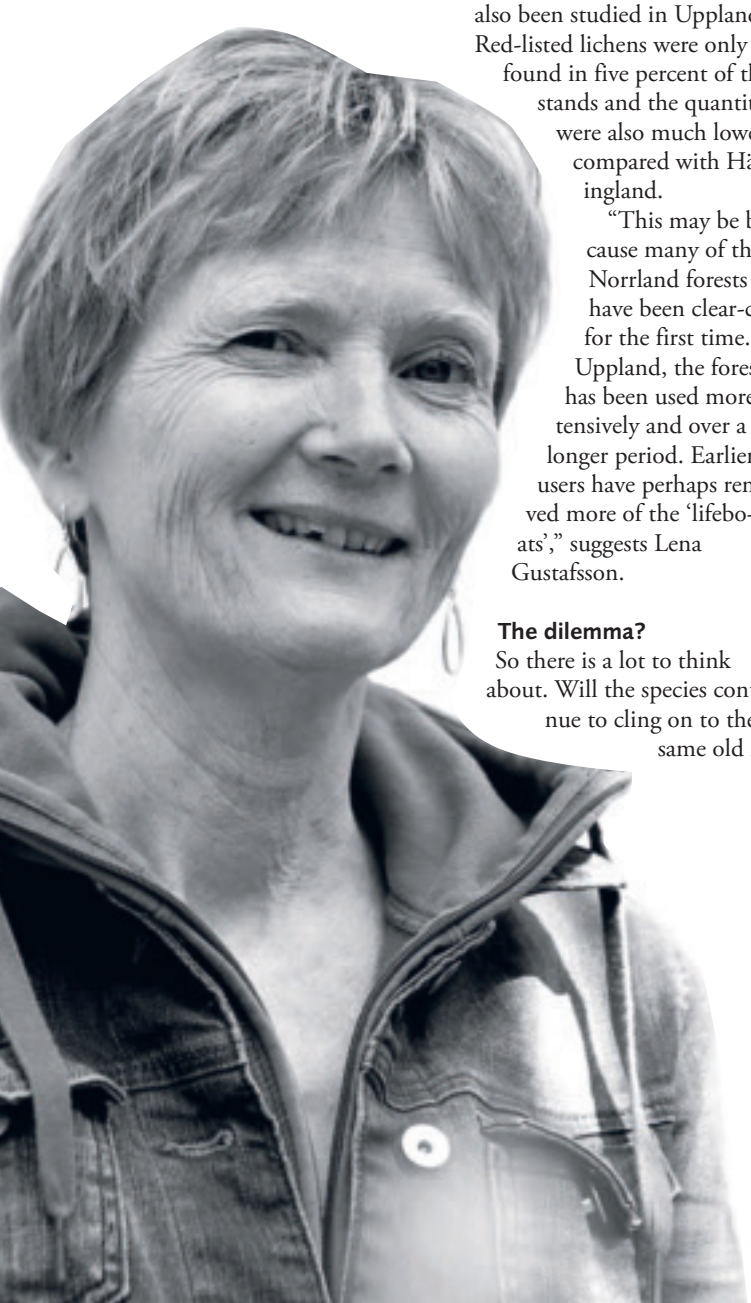
“Soon we’ll know more,” says Lena Gustafsson. “We tend to learn when we are faced with the practical problems. It’s now, when the stands that contain the first retention structures are to be thinned, that the question arises. But we now have more knowledge behind us. In the programme SMART TREE RETENTION, which is now entering its final phase, we’re working with knowledge syntheses that will be useful in these issues.”

“If we regularly create gaps, high stumps and other dead wood, encourage deciduous trees, leave some dense forest unthinned, and reduce the proportion of pre-commercial thinning in this type of ‘poor’ forest, then I think this will help to provide shelter and food for many species.”

Like the issue of the moose

Lena Gustafsson points out that nature conservation is rather like the moose issue, where the balance between hunting and forestry has been discussed passionately for over 150 years.

“More information is always good, but not crucial,” she says. “It’s more about people’s wills and attitudes. Do we want to help all species in the forest landscape survive? Yes, we can do that. We already know enough today to manage this together.”



LENA GUSTAFSSON is Professor in Conservation Biology at SLU Department of Ecology, and is head of the Division of Conservation Biology. She works on biological diversity in the forest, and the effects and cost-effectiveness of nature conservation.

SMART HÄNSYN

THIS IS SMART TREE RETENTION

The research programme aims to give answers to how retention approaches can be designed to efficiently promote biodiversity, while also examining the aesthetics, i.e. how attractive the retention is to people in the forest. Researchers also analyse how the actions of various stakeholders affect the practice of retention. Furthermore, the researchers aim to show what future forests, containing the effects of the retention measures, will be like.

In more concrete terms, issues studied in around ten projects include: how retention practices can be adapted to regional conditions, how retained structures are to be managed, and if retained trees facilitate re-establishment of species. The research programme also studies cost-effectiveness and looks at the situation internationally and makes comparisons. From a social science perspective, the researchers consider the attitudes of stakeholders, and how the communication of the goals of retention works in practice. The programme has a multidisciplinary approach that involves social scientists, ecologists and remote sensing analysts.

The research programme is coordinated by SLU, and is a collaboration with Skogforsk and Umeå University. The programme is funded by the Research Council Formas, which has provided SEK 20 million over four years. A panel of practitioners, with representatives from bodies such as SCA Skog, the Swedish Forestry Agency, Sveaskog, Södra Skogsägarna (forest owners' association) and WWF are linked to the project. International experts are regularly invited to meetings.

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THEME | **SMART TREE RETENTION**

THEY REJECT FELLING STUMPS

PREDATORS, POLLINATERS & PARASITES

Prefer high stumps

Not just beetles, but also various *Hymeroptera* species, including the important pollinators, thrive on high stumps and dead trees. They move in when the beetles move out.

Text | KRISTINA SUNDBAUM | *Photo* SVEN TEGELMO, Skogforsk

"The holes abandoned by beetles in high stumps and dead trees form important nesting sites for bees, digger wasps, and wasps in young forest. Some species may be completely dependent on these types of retention trees," says Per Westerfelt, who is carrying out a doctoral project at Skogforsk.

The insects that Per Westerfelt is studying are solitary, saproxylic stinging wasps like the lemon bee (*Hylaeus*) and field digger wasps (such as *Passaloecus*). They use old beetle holes to lay eggs and to develop larvae. However, although these *Hymeroptera* species, not least pollinating bees, are important for various ecosystem functions, there is currently very little knowledge about how they are affected by tree retention.

According to Per Westerfelt, there is possibly a misconception that trees do not need to be left in order to preserve organisms that thrive in open forest landscapes, such as bees and wasps.

"When we leave dead wood and high stumps, we're creating structures in young forest that are important or absolutely vital for the survival of the approximately 180 species of bees, digger wasps and wasps that use holes in wood," says Per Westerfelt. "Previously, fires and storms created such wood, but in modern forestry we must create these types of sites through retention measures."

Reject felling stumps

In one of the studies, Per Westerfelt is investigating the degree to which holes in high stumps, dead trees and logs are used by the stinging wasps compared with the holes in felling stumps. The results are clear.

"Many stinging wasps completely ignored the felling stumps, and only chose holes in high stumps and dead trees," says Per Westerfelt.

Why were the holes in ordinary stumps not suitable?

Insects on this page: Above, leaf-cutter bee (*Megachile lapponica*) and, below, the stinger wasp (*Trypoxylon*).

> Many stinging wasps completely ignored the felling stumps, and only chose holes in high stumps and dead trees

"I can imagine that they prefer the higher holes because the conditions are more favourable, for example in terms of humidity and temperature. A nest high up is also better protected against ground-living animals that may eat the larvae or destroy the nests. Furthermore, the felling stumps are often overgrown with mosses, lichen and brushwood."

Retention is important

The high stumps left as a conservation measure seem to be vital for certain stinging wasps that are looking for holes in which to build nests in young forests. In forthcoming studies, Per Westerfelt will be examining which type of dead tree is preferred by the stinging wasps – spruce, birch, aspen or oak – and will analyse the importance of edge zones in creating a favourable habitat.

"It's important to get confirmation that retention really does provide benefit. We have a responsibility to preserve diversity, and leaving retention trees and clumps in final felling seems to be very important," says Per Westerfelt.

The project Bees and wasps in young forests: management implications is part of the research programme, Smart Retention.

"Many stinging wasps completely ignored the felling stumps, and only chose holes in high stumps and dead trees."

Per Westerfelt, in the middle of a doctoral project at Skogforsk.

ASPEN

A LIFEBOAT FOR LICHEN

Text | SVERKER JOHANSSON, bitzer@live.se | *Photo* | FREDRIK JOHANSSON & ULRIKA NORDIN

Retained aspen trees serve as 'lifeboats' for the lichen species of the old forest. They do not disappear when the trees around the aspen are felled, despite their habitat changing dramatically. Furthermore, the aspens quickly attract more lichen species when they are retained on the clear-cut.

"The aspen is a pioneer tree, so it's perhaps not so strange that it is a suitable habitat for light-tolerant lichens," says Johanna Lundström, who carried out the study. However, we had thought that more lichens from the old forest would disappear."

Johanna Lundström has studied the aspens that were left as retention trees after felling in Jämtland and Medelpad. In the shorter perspective (0-4 years after felling), she and her colleagues found a total of approximately 130 lichens on these retention trees.

PHOTO: SVERKER JOHANSSON/BITZER

Johanna Lundström researching into the lichens of the aspen.

Lichen flora favoured

In the longer perspective, the lichens appear to benefit from the retention. After 10-16 years, when the retained aspen is surrounded by young forest, the total number of lichen species is approximately 180. Many species from the old forest remain, and new, more light-demanding species have arrived.

From the tree crowns?

But how can the aspen so quickly attract so many more lichen species? The researchers do not know for sure, but they have theories:

"When the aspens are isolated, the environment on the stems becomes more heterogeneous. The difference between the north and south side becomes bigger, and many of the trees start to lean," explains Johanna Lundström. "More variation on the stems enables more species to find suitable habitats."

"The new species may have spread from other trees in the adjacent forest, or they may have spread downwards from the crown of the aspen. We don't know so much about the species that live higher up on aspens standing in closed forest in this area," continues Johanna Lundström. "Many lichens are also dispersed by wind, and a free standing aspen may be easier to colonize."

What other advice can you give?

"Aspens are needed in forests of different ages in order to benefit the entire lichen flora," says Johanna Lundström. "Consequently, aspens must be allowed to regenerate on the site. Leave a vegetation-free buffer zone around the aspens on the clear-cuts."

"What have we here?"
Field worker Fredrik Jonsson checks out the lichen species.

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