

Welcome to our November edition of the FWPA R&D newsletter.

This month our stories include studies into rotary veneering of plantation-grown spotted gum, technologies to weld wood and ways harvesting operations may be managed in real time.

I hope you enjoy reading about some of the latest research that may help grow our important industry.

Ric Sinclair  
Managing Director, FWPA

## FOREST GROWING

### Reducing bushfire risk: public perceptions

Bushfire management is an emotive and controversial issue in Australia, generating sustained conflict over both preparatory strategies and bushfire response. CRC for Forestry explored public perceptions about this complex issue, with the aim of gaining a better understanding of how people view fuel management.

A postal survey was conducted in the Australian Capital Territory and the surrounding region of New South Wales, seeking views on three fuel management strategies used specifically to reduce bushfire risk to life and property: prescribed burning, livestock grazing and vegetation thinning.

The results indicate an overall strong support for fuel management strategies, with a large majority of respondents describing fuel management as an essential and acceptable activity and 87% of respondents saying it was 'highly unacceptable' not to undertake any fuel management. Only a small proportion of respondents found one or more of the fuel management strategies unacceptable (8.3% for prescribed burning, 6.8% for livestock grazing and 7.5% for vegetation thinning).

[Click here for report.](#)

Image Credit: CRC for Forestry



### Peatland fires and carbon emissions

Forest fires are a persistent and growing problem around the world. While fire certainly produces some ecological benefits, those are arguably being outweighed by the increasing frequency, size and intensity of fires as the planet warms.

A recent Canadian Forest Service bulletin 'Peatland Fires and Carbon Emissions', noted that some fire researchers from Canada, the U.S. and Russia (where fire in those countries' boreal forests is a significant activity) have begun looking more closely into boreal peatlands.

Peatland ecosystems cover only 2-3% of the earth's land surface, but in the boreal they make up 20-30% of the forest region and average 20-30% of the area burned annually.

One of the key areas being investigated in the boreal peatlands is focused on developing a peat moisture code. By getting a better handle on peatlands moisture content, researchers will know the potential for burning, when it might occur and how deep it will burn. This will help preparation and mitigation efforts.

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Image Credit: EFFRO



### Web-based tool for land use decision making

Crown Research Institute Scion is working with key agricultural partners to develop a tool called MyLand, which will help farmers and growers make good long-term decisions about their land use. MyLand, which is at the working prototype stage, integrates many new technologies, research results and land resource information, and makes these available on a home computer.

A beta version of the software is now undergoing evaluation and user testing.

MyLand will enable land managers to weigh up long-term economic and environmental considerations as they look at different land use options. These could include combining hill country sheep farming with forest woodlots, or stream-side planting on dairy farms. The software project has received backing from several organisations keen to support farmers to explore sustainable land options, particularly in areas where soil erosion and water quality are causing problems.

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Image Credit: FIEA



### Rotary veneering of plantation-grown spotted gum

New processing technologies provide an opportunity for the development of roundwood and engineered wood products from young subtropical eucalypt plantations established in Queensland and New South Wales. Small spindleless veneer lathes are a promising technology to produce veneer sheets from relatively small diameter logs, as an alternative processing option to optimise the recovery and use of this plantation resource.

This CRC for Forestry report evaluates the wood and veneer properties of plantation-grown spotted gum and Dunn's white gum, grown at different stockings in thinning trials near Eilatungwan in north-east New South Wales and Kingaroy in south-east Queensland.

Overall gross recoveries of veneer, as a percentage of billet volume, ranged from 50% to 70%, and were significantly lower for both species at the drier Kingaroy sites. These veneer recoveries are two to three times higher than typical green off saw recoveries from small plantation hardwood logs of similar diameters.

[Click here for report](#)

Image Credit: CRC for Forestry



## NEW PRODUCT INNOVATIONS

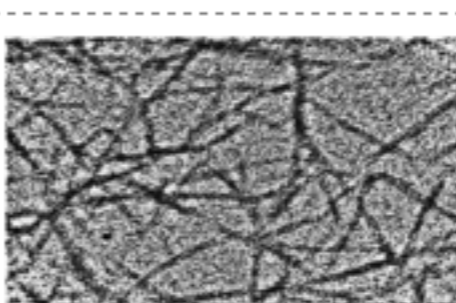
### Wood pulp extract stronger than carbon fibre or Kevlar

The Forest Products Laboratory of the US Forest Service has opened a US\$1.7 million pilot plant for the production of cellulose nanocrystals (CNC), also referred to as nano crystalline cellulose (NCC), from wood by-products materials such as wood chips and sawdust. Prepared properly, CNCs are stronger and stiffer than Kevlar or carbon fibres, so that putting CNC into composite materials results in high strength, low weight products. In addition, the cost of CNCs is less than 10% of Kevlar fibre or carbon fibre.

At present the yield for separating CNCs from wood pulp is about 30%. There are prospects for minor improvements, but the limiting factor is the ratio of crystalline to amorphous cellulose in the source material. A near-term goal for the cost of CNCs is US\$10 per kilogram, but large-scale production should reduce that figure to one or two dollars a kilo.

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Image Credit: Gizmag



## WOOD HARVESTING, TRANSPORT AND LOGISTICS

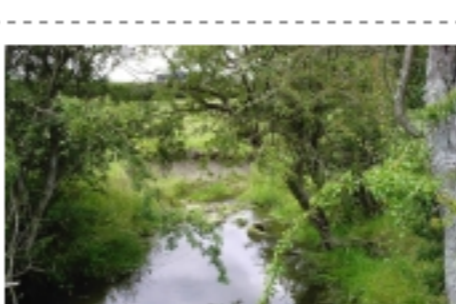
### Woody debris in headwater streams

Woody debris plays an important role in forested streams by transferring energy and nutrients from the forest to the stream, providing habitat for stream biota, and contributing to channel structure. Alterations to the quantity of woody debris input to a stream channel, such as through clear-fell, burn and sow (CBS) forestry, may therefore have implications for a stream's morphology and biological functioning.

This Australian study surveyed five old-growth (OG) and five CBS-affected (<7 years since logging) headwater streams flowing through wet eucalypt forest in southern Tasmania to determine if CBS forestry influenced the quantity and functional role of woody debris. CBS-affected streams had a significantly greater abundance and volume of woody debris situated within and above the stream channel than OG streams. This was a direct result of CBS operations which inputs large quantities of logging slash to the stream channel.

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Image Credit: Wikipedia



### Residues research: Australian logging operations

The CRC for Forestry has carried out research that assessed harvesting residues from Australian logging sites. This research examined how different harvesting methods affected the quality and quantity of logging-residue.

Sixteen sites across various Australian states were assessed. Harvesting methods investigated included cut-to-length (CTL) and full tree, and the species logged were *Eucalyptus globulus*, *Eucalyptus nitens* or *Pinus radiata*.

Results showed that more logging residue remained on-site after CTL harvesting than full tree. Full tree systems left very little slash on site due to all above ground biomass being extracted. While the species logged did not have much influence on the amount of residue being left, there was significant variation in the amount of residue left on each site. CTL systems clearly retained higher infield volumes of logging residue.

For more information contact [Mohammad Ghaffariyan](#) at or visit the [CRC for Forestry website](#)

Image Credit: FIEA



### Moisture content: optimising forest biomass logistics

Wood fuel quality attributes have to be considered by logistics planners if fuel procurement from forests and energy production at the plant are considered simultaneously. The single most important quality attribute is the moisture content (MC) of chips or raw material delivered to energy plants.

A joint study between the University of the Sunshine Coast, METLA, University of Eastern Finland and FORTUM developed a linear programming-based optimisation decision support tool to assess the impact of forest biomass moisture content on supply chain costs.

Results indicate that both the proportion and volume of the biomass material delivered to the plant are very sensitive to specifications on MC, range limits and the length of the storage (drying) period. Compared to a scenario with no storage, a reduction in volume harvested of up to 33% can be achieved to meet the monthly energy demand if proper drying methods, such as covering of biomass material, are implemented before chipping and delivering the biomass materials to the energy plant.

[Click here for source](#)

Image Credit: FIEA



### Managing harvesting operations in real time

There has been a big jump in both the quality and type of data that's now being made available to forestry managers and wood harvesting, transport and logistics companies. There has also been significant inroads in capturing inefficiencies within the systems over the last 12 months.

In Europe, the European Space Agency (ESA) is supporting a pioneering 3D forestry data initiative being led by Irish forestry technology start-up Treemetrics. The company's been developing a real-time forest intelligence (RTFI) service, with the goal of bringing live 3D forestry data to mobile devices and machinery across the globe.

Harvesting workflow is expected to be managed in near-real time, creating a fully integrated management system. The company's CEO, Enda Keane, CEO of Treemetrics, the company behind these breakthroughs, will be presenting at the [ForestTECH 2012](#) series that runs in both New Zealand and Australia later in the year.

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Image Credit: International Forest Industries



## WOOD PROCESSING AND MANUFACTURING

### Antimicrobial wood surfaces

The surface of a piece of wood is full of biochemical connectors. Researchers at the Swiss Federal Laboratories for Materials Science and Technology (Empa) are using biochemical connectors within wood to give it additional product features. Potential features could include: surfaces that are easy to stick to, anti-fungal coatings, or even self-adhesive wood chips that can be compacted into fibre boards that are 100% ecological - without any chemical additives whatsoever.

Head researcher Mark Schubert has been working on certain enzymes from fungi that have specialised in digesting wood. Laccase, for example, is produced by many white rot fungi and can modify the surface characteristics of wood: it converts some chemical sub-structures of lignin (a wood constituent) into radicals and to make the surface of the wood reactive.

The experiment proved two things: laccase functionalised wood surface so profoundly that useful quantities of a desired substance can be chemically attached to it. And applying a cheap mass-produced medicine to the wood provides antiseptic properties that can be useful for many different applications.

[Click here for source](#)

Image Credit: Empa



### Faster evaluation of alternative preservative timber treatments

The wood preservation and timber durability market demands that new preservatives and protection systems be bought into the market quickly, however, the laboratory tests and field tests, crucial in proving the reliable long-term performance of any new product, can take many years.

Results from recent research shows a significant reduction in the H3 decay test duration, from six or seven years down to two and three years depending on individual test designs.

Researchers developed a range of H3 (for external above ground use) decay test methods most likely to cause accelerated decay. Test designs include increasing the proportion of water-trapping surfaces in test samples, using pre-inoculated (with different wood rot causing fungi) untreated separator fillets and spacers, and by using a combination of the Accelerated Field Simulator facility and field exposure.

FWPA Project Ref. FIB041-0708

[Click here for report](#)

Image Credit: FIBPA



## OTHER INFORMATION

### Most bio-fuels are not green

Bio-fuels may not be all they have cracked up to be. A new study entitled 'Harmonisation and extension of the bio-energy inventories and assessment' sheds new light on how environmentally friendly different types of bio-fuels actually are.

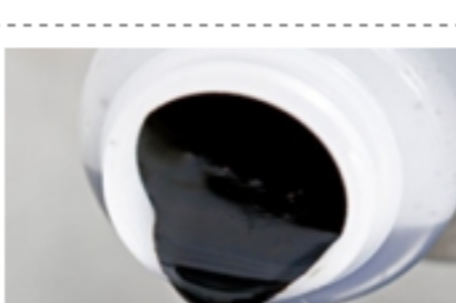
The Swiss Federal Laboratories for Materials Science and Technology (Empa), in conjunction with the Institute Agroscope Reckenholz-Tänikon and the Paul Scherrer Institute, has produced a major update to the first-of-its-kind report compiled in 2007 - made more relevant for the present with new energy plants, manufacturing processes and updated assessment methods.

This report now shows only a few bio-fuels are overall more environmentally friendly than petrol.

Bio-fuels from deforested areas usually emit more greenhouse gases than fossil fuels. This also applies to indirect land usage changes if existing agricultural land is used for the first time for bio-fuel production and, as a consequence, forested areas have to be cleared in order to maintain the existing foodstuff or animal feed production.

[Click here for source](#) or [here for report](#)

Image Credit: Forestry Expo



### Tourism innovation in the forestry sector

A new University of Trento study focused on how innovation has spread within forestry-based tourism and recreation activities. They compared the level of innovation in the forestry sector (particularly adventure parks, educational farms, and cultural attractions) between the Auckland region in New Zealand and Trentino in Italy.

Results of face-to-face interviews of New Zealand and Italian entrepreneurs indicated the level of innovation in the forestry sector, the elements of weakness and strength of the innovation process, and the potential of the transferability of novelties into each of the two contexts.

Entrepreneurs in New Zealand have been able to better exploit the demand for environmental services offering a wider variety of innovative recreational activities. However, the implementation of new environmental regulations gear innovations towards more environmentally sustainable solutions.

[Click here for report](#)

Image Credit: FIEA

