

Conference Proceedings – Speaker Transcript

To burn or not to burn: Koala habitat regeneration trial Tyagarah, northern NSW

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[Link to slides](#)

I've been working with Dr Jo Green in northeast NSW and we've been working on a regeneration trial. This has been a partnership between Brunswick Valley Land Care and the Koala Connections project and it's being managed through Tweed and Byron Shire councils. We've also been lucky enough to receive funding through the Australian government and the Dahl Trust. To set the scene here we are in north east NSW, the beautiful Byron Bay (slide 2). What the Koala Connections project's been doing is trying to link up the existing vegetation along the coastal strip with the vegetation that's occurring in the adjacent ranges. As you can see (slide 2) the flood plain's fairly cleared and has a range of agricultural uses currently. What we've been doing with Koala Connections is planting corridors of koala feed trees, mainly on private property, trying to connect up existing patches of koala habitat. This also has benefits for a whole range of other species but our focus has really been koalas. As we zoom down into the site (slide 2) you can see a fairly major impediment into the landscape is the Pacific Highway, it's essentially a big wall between the coastal vegetation and that which is in the ranges. So a lot of the sites that we've been focussing on are near to highway under or over passes. This site here has quite a big underpass, under the highway here so we're trying to do plantings either side of these to get them to connect up (slide 2).

We've mainly been doing this restoration through tree planting and what this trial was trying to do is come up with a different way of restoring koala habitat without having to plant trees, because it's very labour intensive and expensive. We fenced off a 450 metre section of paddock that was currently being grazed and was mixed exotic species, and we applied all these coloured squares (treatments) to the paddock. Each one of them representing a treatment type, so we did five treatments and the idea was that we're trying to get the existing bushland that adjoins that paddock area to regrow in the paddock. The two vegetation types we are most interested in were the swamp mahogany and the forest red gum as these are the primary koala food trees (slide 2). But all of these plants, all of the polygons here make up Coastal Floodplain Forests that are listed as an endangered ecological community. So the five treatments that we applied to the paddock area were fire, bare soil, spraying, rotary hoeing and control plots. The controls were essentially excluded in grazing from the site. Today I'd like to share two of these with you, being fire and bare soil.

For the fire treatment, we did pile burns (slide 3). The purpose of these burns was to try and remove the ground layer competition, to try and remove the mulch layer or the biomass on the soil surface and to provide some bare soil for germination of these koala food trees. The addition of the fire treatment was also having smoke water or smoke on the site. The risks that we identified in doing this were; one that it was adjoining koala habitat so we had to do searches for koalas in the forest prior to burning on

those sites in case the smoke or fire stressed them. We also had the Pacific Highway nearby so we had potential smoke hazards there, and we also had a railway corridor.

There was quite a few constraints in achieving these fire treatments (slide 4), we had total fire bans during part of the time we were trying to burn which was in a spring burn before our normal summer wet season. We could also have only 30 cm high pile burns. We had to have a person per pile while it was alight. We also had to have a hose and pump available at each burning pile as we did it. There was a lot of constraints, the wind had to be less than 10 kilometres an hour. What that meant was that we were there early in the morning waiting to see what the wind conditions would do, some days we'd get a burn in other days we wouldn't and this went on for quite a while.

Eventually after a lot of back and forth we got 20 of the 30 plots burnt that we wanted to burn. This is what it looks like straight after a burn, after two months and then inundation and this is after four months. We're currently about six months through the trial and you can see the fire treatments weren't 100 % effective in that they didn't kill everything in the ground layer but in these bare patches that are left there we had germinants of both forest red gums and the broad leaf paper barks. So we have had some success in those fire plots.

The next treatment I'd like to talk to you about is the bare soil treatment (slide 5). This treatment had a lot of the same aims as the fire treatment to create bare soil on the ground for germination. The risks were compaction or erosion but it was a very flat site with a lot of surrounding grass so they weren't too great, and there were very few constraints except for getting machinery on to the site. The results of the bare soil plots, they were really effective, we got 100 % removal of vegetation on the ground layer. Here's the site after two months with some weed regrowth and after four months. Now it's looks like it's grown back as grass but what's actually there is a diverse array of native sedges and we've had really good success of a whole range of species including forest red gum, the broad leaf paperbarks, swamp box, wattles, cheese trees, a whole range of things have come up in those sites.

To summarise, fire and bare soil have been our most effective treatments to date (slide 6). Bare soil was considerably easier to implement than fire and to date has had more successful results. What we'd like to do now is modify or fire treatment and do an autumn or early winter burn instead of a summer burn. This is going to take away a lot of the constraints with the fire treatment and we're also going to try spraying out the grasses before burning to make sure that we get an effective kill on the ground layer, even if we don't get enough temperature in the fire.

Questions from the audience

Q - In regards to your removal of soil what depth did you go to?

JM - We went just deep enough to remove the roots of the pasture grasses that were there, so probably about 50 millimeters maximum. One of the things that happened in those bare soil treatments was then also the removal of some of the soil seed bank probably in that top layer related to those grasses. We placed all the soil from the plots adjacent to them so we're sort of seeing a bit of what's come up in there. In general fairly, as shallow as we could go. An additional thing that happened in doing that scraping that we weren't predicting is that it created little dams, each one of those sites and when we got a rain event the bare soil plots would fill up with water and hold water for longer than the other plots would. Then when they dried down it killed out the ground layer competition that was there and

as a result we've had a lot of tree germinant come up in those bare soil areas that occurred under, after a wetting event.

Q - Do you have any explanation as to why the rotary hoeing plot was such low success compared to the simple bare soil?

JM - Well the rotary hoeing plot and the spraying plot both had biomass retained on their site, so they both had a mulch layer that existed after the treatment was supplied. Although it, we did it directly post grazing so there might have only been less than 50 millimeters of grass height when we sprayed it and when we did the rotary hoeing. That seemed to be enough to knock out most of the germinants. The soil seed banks is presumably still there, they're right there next to the other plots but we just haven't had any germinants occur in there. We're only six months into the trial at the moment and we're hoping to come up with something that's replicable on a larger scale in these sort of paddock areas. We might see after, perhaps after another six months as that mulch layer breaks down and turns into humus and top soil that we might get germination events in the rotary hoeing or in the other spray plot areas.

Q - Given the relatively short viability of eucalypt seed in the soil have you considered actually casting locally sourced seed in your plots?

JM - We did and I didn't mention it because of the limited time, but we did actually add seed to a third of our plots which was both forest red gum and Swamp Mahogany (*E. Robusta*) seeds. To date we haven't seen any difference in the plots that had seeds added to the ones that didn't. What we found is under the red gum trees they are adjacent and overhanging the site, there's red gums germinating under the swamp box trees, the swamp box, same with the wattles and the other species. So there seems to be a fairly close link with the parent, the source tree which could make it harder in those large paddock area with no trees left in it. We haven't had any *Eucalyptus robusta* germinate on the site but we also haven't had a seeding event since we started our trials, so it'll be interesting to see after the next seeding event whether we get germination of that species in the adjacent plots.

Q - Justin just to follow up on you scalping comment there. We've sampled probably a hundred sites right across Victoria and three sites out in Western Sydney now, every single site, and these are from you know half a hectare up to 16 hectares. We've had trees and shrubs turn up in every single one of those to the point where we just then thin or leave as we desire. But at the ground layer in those images I showed earlier were pretty much a result of seed additions. So from our experience it is relatively simple to get tree canopies established just by opening up the ground layer, scalping and taking away that competition, the ground layer is a bit trickier and it probably requires seed addition. But it certainly backs up your finding and as I said, we found that right through Victoria and now out in the Cumberland Plains

JM - We've found the same with planning koala food trees as well and doing a whole range of forest based plantings and restoration works. It's pretty easy to establish canopy and it's really hard to establish a diverse ground layer and mid-storey of what would have been on those sites it certainly takes a lot longer and possibly doing things like seed addition or even planting some nursery grown stock to provide seed source for the site. Yeah we found the same.