LandWater & Wool
Shaping the future
another innovation
native vegetation and biodiversity
improving farm profits through biodiversity

Wool production & biodiversity
working together for
Case Study
Jon & Vicki Taylor

Fast facts

Location
18 km south of Uralla, New England Tablelands NSW, Macleay River Catchment

Property size
'The Hill' 650 ha
'East Oaks' 400 ha

Paddocks
35 total across both properties

Average annual rainfall
711 mm or 28 inches

Main enterprise
Fine wool (17.5 – 18 micron)

Stock numbers
5500 Merino sheep (7250 DSE)
Up to 150 cattle (2100 DSE)

Stocking rate
4.6 – 6.1 sheep/ha (6 – 8 DSE/ha)

Main soil types
'The Hill' – traprock
'East Oaks' - 50% traprock, 40% basalt, 10% granite

Vegetation types
Formerly stringy bark, white gum, black sally, snow gum and New England peppermint grassy open forest, yellow box and Blakely's red gum grassy woodland, and native grassland dominated by tussock poa. Scattered large old trees and natural grassland remain.

Elevation
1020-1120 m above sea level

Left: Jon and Vicki Taylor at their property 'The Hill'. Photo courtesy of Matthew Cawood.

Like many landholders, Jon and Vicki Taylors' philosophy is one of land stewardship.

"Our philosophy is that the property is our 'tools in trade' to make a living from, but to be passed on in as good or better shape to the next generation," said Jon.

The Taylors' goal is to increase biodiversity for a healthier ecosystem, avoid overgrazing and reduce the land's exposure to sun, wind, rain and frosts, to maintain a milder micro-climate. And they are achieving it.

This booklet details the enterprises, management history and natural resource management issues the Taylors are dealing with. It goes on to demonstrate the techniques and tools the Taylors use to achieve their goals of productivity and biodiversity.

Biodiversity is the variety of all living organisms, including plants, animals, fungi and microbes. Biodiversity is necessary for productive, resilient ecosystems.

Contents

Enterprises & management history

Wool and sheep

Jon and Vicki's chief enterprise is fine wool and they join with three other Taylor families in the district to supply an Italian mill with a uniform style of 17.5-18.0 µm wool.

Across their two blocks, Jon and Vicki run about 3000 dry sheep (half wethers, half weaners) and join 2500 ewes. They shear 5500 sheep in late July-August and lamb in September-October, running the lambs over the summer until their annual February sale, where they also sell their surplus wethers and ewes. Lambing has averaged 83% during the last 15 years (Figure 1).

Jon and Vicki have stocked their country at a rate varying between 4.6 and 6.1 sheep/ha over the past 12 years (Figure 2), according to the seasons and carrying capacity.

Wool clip has fluctuated between 12,600 and 17,800 kg largely in response to seasons and fluctuating numbers of sheep over this period. Wool cut per sheep has consistently averaged around 2.9-3.2 kg/head (Figure 2).

Because of the greater amount of native pasture and lighter fertiliser history on 'East Oaks', Jon and Vicki run mostly dry sheep there, and mostly breeding stock, including cattle, on 'The Hill'.

The Taylors' conservative stocking rate means that they are have been buffered from the worst droughts on record (1994, 2002), and have maintained a consistent level of production over the past decade.

Jon and Vicki's wool gross margins have exceeded $200/ha in recent years (except in 2002 due to the drought), and as testimony to the quality of their production, 'The Hill' won 8th place in the 2002 Zegna International Wool Competition.

Cross-bred lambs have come and gone as an additional enterprise a couple of times during the past 20 years (1986-88 and 1995-99).

Above: Sheep and softwood pine plantations work well together at 'The Hill'. Photo courtesy of Nick Reid.

Cattle

In good seasons, cattle constitute about a quarter of the livestock (by dry sheep equivalent or DSE). Cattle complement the fine wool enterprise because they eat the long grass ahead of the sheep. Normally Jon runs 150 breeders, but in poor seasons he is prepared to sell all the cattle, if necessary.

Softwood plantations

Since the late 1970s, the Taylors have invested consistently in tree planting on 'The Hill'. With time, this has developed into a radiata pine softwood enterprise based on harvesting about 1.5 ha each year.

Jon says, "Each year, we like to plant one to two hectares, non-commercially thin one to two hectares, prune one to two hectares, commercially thin one to two hectares, and eventually finally harvest one to two hectares".

Pines that Jon and Vicki planted in 1979-80 have already been commercially thinned and will be ready for final harvest in the next 10 years, with a continuous supply coming on-stream thereafter.

The benefit of having timber is that

Figure 1. Rainfall and lambing percentage at 'The Hill' from 1986-2003. The drought years (1994 and 2002) are not included in the regression line for lambing percentage, calculated for the remaining years.

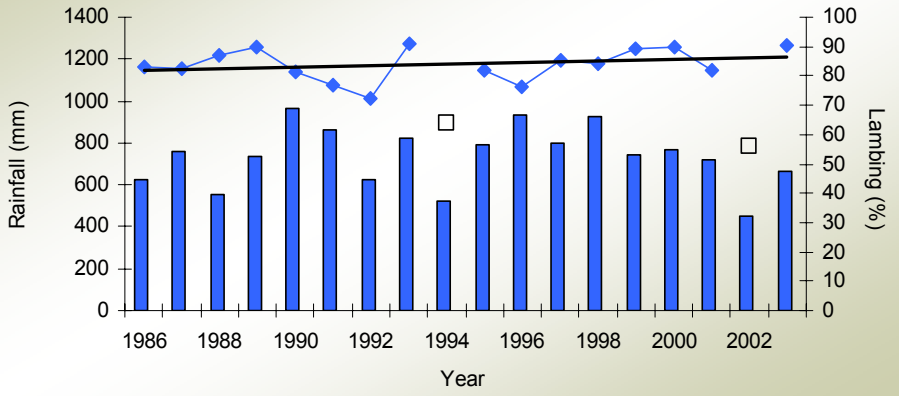

Figure 2. Wool production for 'The Hill' and 'East Oaks', from 1991 to 2003.

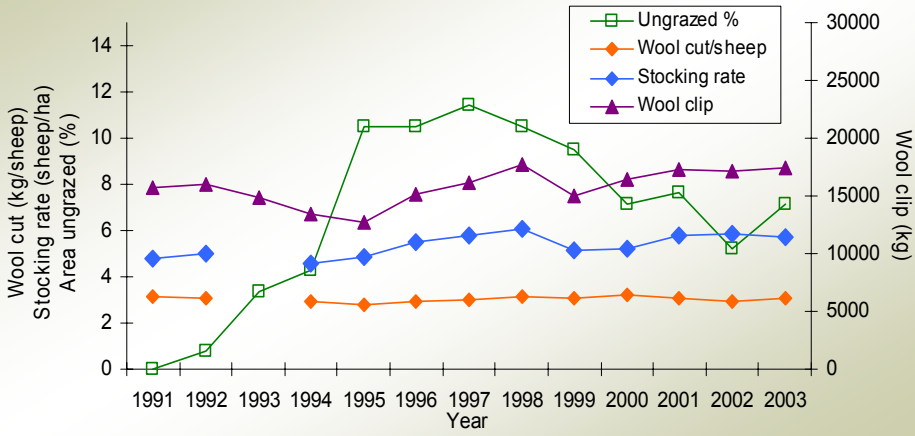

Figure 3. 'The Hill' showing paddocks and paddock areas (hectares). Aerial photograph courtesy of NSW Land and Property Information, Bathurst. The paddock overlay was developed in Practical Systems' FarmMap *software.*

Datum: AGD Australian Geodetic Datum. Grid: AMG84 Australian Map Grid 1984.

successive crops can be harvested when the price is right, or income from the timber is required. The Taylors' plantations were accredited under a Forest Harvest Plan prepared in accordance with NSW legislation.

Pastures

About 30% of 'The Hill' and 65% of 'East Oaks' is native pasture, dominated by tussock poa and has never been cultivated. Two small areas on 'The Hill' were sown to pasture in 1958; the remainder has been sown to pasture since 1967.

A couple of paddocks have been farmed and cultivated several times during the past 40 years, but generally Jon avoids renovating pastures, saying "I don't like ripping up soil – it's part of my conservation ethic.

"So long as the pastures have a reasonable diversity of species as a productive base, I am not in a big hurry to destroy the soil biota and modify them by re-sowing", he says.

All paddocks have received modest inputs of fertiliser (125 kg/ha of superphosphate in the past 5 years).

Jon values a mix of native and sown pastures for fine wool production. The virtues of the native and exotic pasture species complement each other, with some paddocks more suitable for different classes of stock.

"Shelter is important with little lambs, but composition is the main thing. If I have a lot of native pasture, I will put wethers on it—the wool is whiter and more even, whereas lambs, or ewes with a higher nutritional requirement, go on the pastures with more sown species," says Jon.

"I try to maintain a good pasture mix. In fact, very few of our pastures are either totally native or totally exotic. As long as it's edible, it's OK."

"Some poa is fine, but it tends to take over as stock preferentially graze other plants. It hangs on well into a dry time and provides good shelter, but it's low in protein. Good production is unlikely if you have 70 per cent tussock poa."

"We sow about 20 hectares of pasture every two to three years. Even when I spray, I don't take out everything—I will often deliberately leave strips of poa. A shotgun mix of oats, fescue, red clover and a mix of cocksfoot, white clover, sub clover and phalaris is good so that there's something for every season. In drought, the tough old natives hang on; in really good seasons, we've got softer species and the exotic species are likely to be more productive.

"It's the same with the trees. I like a bit of everything, I don't like monocultures," he said.

Groundcover is also important to Jon: "If you graze pasture too hard, you are more likely to have a problem later. Black thistle is a problem if we have bare ground: it's hard to handle the sheep at shearing, because the spines get in the wool."

Grazing management

Jon grazes rotationally but is flexible depending on circumstances. At times, it has suited to time-control graze, putting the sheep into one large mob. At other times, Jon set stocks, as in the recent drought, when smaller mobs were fed in their own paddock.

Jon's rotational grazing management is dictated by the threat posed by sheep intestinal parasites, seasonal grass growth and lambing. At lambing, Jon tries to spread the ewes thinly in every paddock because they lamb better in small mobs. After lambing, they go into a big mob.

To reduce worms, Jon keeps a mob in a paddock for 2 to 3 weeks and as the worms build up, moves them on. He also weans lambs into a paddock that has been rested for 2 or 3 months, to minimise the worm burden and does regular egg counts.

Jon regularly spells the country. Up to a quarter of the 35 paddocks on 'The Hill' and 'East Oaks' are not stocked at any one time, so each paddock ends up being stocked for 8 or 9 months of the year with 3 to 4 months rest. Paddocks are rested for between 2 and 4 weeks at a time.

Jon doesn't tend to discriminate between sown and native pastures in his grazing management.

Resource issues and problems

The history of vegetation management between 1840 and 1956 at 'The Hill' is largely one of progressive tree clearing and regrowth management on the most productive country to make room for more pasture.

The clearing occurred in cycles, between 1860 and 1890, and again between 1910 and 1930, by which time tree cover had been reduced to about 30%.

In 1956, when aerial superphosphate applications began, timber cover was about 25%.

Pasture improvement & dieback

Perhaps the most dramatic changes to occur at 'The Hill' in Jon's lifetime were pasture improvement and New England dieback.

Pasture improvement started at 'The Hill' in 1956 as aerial seeding and fertilising with superphosphate when Jon was a boy.

Jon describes the resulting dieback of the eucalypt woodland cover at 'The Hill', saying, "The supering led to increased stocking rates, which combined with the clearing, led to such a change in the ecology that things got

Below: Christmas beetles defoliating white gums planted along Terrible Vale Creek, February 2001. Photo courtesy of Nick Reid.

Above: New England Dieback at 'The Hill'. Photo courtesy of Vicki Taylor.

out of balance pretty badly.

"A lot of trees died in the 1960s, being defoliated two or three times a year by massive insect attack.

"The surviving trees were so sick, they didn't set seed, and even if they had, the seedlings would have been grazed by the increased stock numbers", said Jon.

"You don't often see regrowth coming on or surviving in heavily fertilised country. So between 1967 and 1990, nothing came up anywhere, and the tree ecology all fell in a heap."

From the mid 1950s to the mid 1970s, 125 kg/ha (a hundred weight to the acre) of superphosphate was applied annually at 'The Hill'.

In the late 1970s, the Taylors started to experiment with other fertilisers applied at the same rate when they weren't sure they were getting the response with superphosphate that they used to. When prices were low, no fertiliser was applied.

"In the 1980s, we only fertilised every four years at one hundred weight to the acre.

"Once we took over 'East Oaks', it had the same fertiliser applications as 'The Hill', although it hadn't been much fertilised prior to that.

"We fertilised both places twice in the early 1990s and have applied super twice at one hundred weight to the acre since 1999," said Jon.

Farming

There was little farming at 'The Hill' prior to 1967:

"After the 1965 drought, we started clearing a lot of the dead timber off the ground that had fallen down as a result of the dieback. It was quite thick in places.

"A tractor and blade were used to push up the fallen logs on up to 70 per cent of the country and a good percentage of that was subsequently ploughed.

"Pushing up timber disturbed the soil so much that we ploughed and sowed oats, sometimes for two years, and then in the third year sowed a pasture.

"Removing dead trees and logs and sowing oats had a big impact on the environment.

"It increased exposure, removed the dead wood that was a source of nutrients cycling back into the pasture, reduced the habitat diversity and produced a monoculture with spans of hundreds of metres of oats or pasture without a log or dead tree for sheep, lizards or other creatures," said Jon.

Solution: Taylor-made vegetation management

Pioneering revegetation

After the worst of the dieback was over, Jon and Vicki pioneered a tree planting movement that continues today. Apart from the exposure of the landscape to the elements, it just didn't 'look right' anymore.

They commenced tree planting on a large scale in 1979 with 20,000 bare-rooted radiata pine seedlings, at a cost of 15 cents each. Other exotic and native plants were more difficult to obtain and cost $2 per tube.

However, by 1982, the Taylors were also planting significant numbers of natives and other exotics for diversity's sake. And for efficiency, Jon developed a mechanical tree planter.

The Taylors then operated their own contract tree planting business, establishing many pine windbreaks across the New England district.

Landcare

The Taylors were founding members of Harnham Landcare group in 1990—one of the first landcare groups to form in the region. The community could see the need to conserve and restore native habitat for wildlife and biological controls to counteract dieback. But at this time, native trees and shrubs were still being propagated as tubestock and Jon was acutely aware that the costs would inhibit their broad-scale use.

After a trip to the United States, Jon and Vicki introduced the Swedish Hiko tray system to Australia in 1991 and

> "In our experience, insufficient biodiversity causes problems such as the loss of particular species: eucalypts in our case—the beetles got the upper hand here because there were not enough counteracting parasitic wasps."
>
> Jon Taylor

established Taylors Treeline Pty Ltd, a planting equipment company. It also allowed Jon and Vicki to experiment with a much wider variety of natives and exotics at 'The Hill', some of which they raised in their on-farm nursery.

Conserving remnants

The scattered surviving eucalypts on 'The Hill' are precious.

"We try to incorporate the remaining big old trees across the farm in our plantings, to minimise the stock pressure on them and allow them to seed into fenced off areas.

"I hadn't seen New England peppermints set seed on 'The Hill' since 1960 until the summer of 2001/2002, when several trees seeded.

"The canopies of these trees had remained reasonably intact for several years in a row."

Mostly, the trees have not seeded nor produced any young seedlings. However, the trees themselves often look healthier than surviving trees elsewhere, suggesting that insect pressure may have declined in the fenced off areas.

An experiment pays off

In 1980, there were 6 ha of undulating rougher ground in one paddock where the trees were still reasonably healthy. Five tree species were present and although the dead trees had been cleared in this area and some of it sown, Vicki and Jon decided to fence the area in the hope that the surviving trees might regenerate. They also planted pines in the surrounding area to provide protection from the elements and to speed things up.

The experiment worked, and when the fence came down in the early 1990s, there were 500 new wattles and 100-150 young eucalypts, some black sally and stringybarks. Some native shrubs had also regenerated, as had 30 egg and bacon plants, but these disappeared once livestock were allowed back in.

Revegetation today

Jon and Vicki have planted about 400,000 trees since 1979, mostly on 'The Hill', which brings tree cover to 15-20% of the property. Only a fraction of this is remnant native tree cover.

They plant about 3 ha per year, of which half is radiata pine and the rest a diverse mix.

"We want as much diversity as we can get. To reduce tree loss, we want species with good survival and that are habitat for a diverse range of insects and birds in order to beat the beetles and their defoliation," said Jon.

Radiata pine enterprise

Despite monitoring the survival and growth of nearly 200 different species and varieties of native and exotic tree, radiata pine is the only timber species that Jon and Vicki have been able to grow reliably and quickly in their country to afford a commercial return.

Radiata pines, for commercial production, are planted at high density (up to 1200 stems/ha) to minimise limb formation. But after pruning and thinning (of which much is left to rot back into the soil), less than 300 stems per ha remain.

The Taylors' last pine woodlot planting in Reserve paddock cost $750 for a 1.5 ha woodlot. This price includes the cost of spraying, ripping, planting, over-spraying and seedlings.

Contour plantings

In 1992, Jon and Vicki undertook their first whole-paddock contour planting.

Jon surveyed the area, marking out double tree rows on the contour that were on average 60 m apart. After preparing the ground and grazing the paddock to reduce weeds, Jon removed the stock and planted the entire paddock on the contour. Contoured plantings consisted of two lines of trees, one of pines for commercial timber, and the other of native trees and tall shrubs to continue to provide shelter and biodiversity benefits after the harvest of the pines. Table 1 illustrates how Jon managed stock in these areas.

Table 1. Grazing management of whole paddock contour plantings.

Year	Planting Cycle	Grazing Management
-1	Preparing to plant	Stock as normal
0	Plant	No stock at all
1	Post-planting	Maybe 2 head cattle/ha for 2 months in winter
2	Post-planting	2 Lambs/ha for 3 months plus 2 head cattle/ha in winter
3	Post-planting	3 Lambs/ha for 3 months plus 3 head cattle/ha for 3 months intermittently
4	Post-planting	Average 3 DSE/ha with intermittent grazing
5-6	Post-planting	Normal grazing density resumed

Right above: Rip lines are prepared on the contour across whole paddocks. Right: Normal grazing density is resumed after 5 to 6 years in contour plantings. Photos courtesy of Nick Reid.

Treefest

In 1992, Harnham Landcare Group organised the first Treefest (now a national biennial event) at 'The Hill'.

An open 3 ha hilltop site with a handful of stringybarks was fenced off for the occasion, and 6000 people came from all over Australia to look at the latest tree planting technology.

Many tree planting groups, individuals, companies and government agencies demonstrated tree planting techniques on the day. The result is now a well-vegetated block of diverse, mainly native, trees and shrubs.

Jon and Vicki preserve the site and keep it permanently ungrazed as a conservation initiative.

Above: Contour plantings occur across whole paddocks at The Hill'. Photo courtesy of Jon and Vicki Taylor.

Grazing planted areas

Over the past decade, Jon and Vicki have improved their approach to whole paddock contour planting in terms of obtaining earlier grazing value from the paddocks without the livestock damaging the young trees:

"Managing stock and finding ways of grazing newly-planted paddocks is quite an art. Two winters ago, we were able to put cattle into a paddock the day it was planted and leave them there for three weeks, and I think only one seedling was stepped on.

"But it's complex science. You need the right sort of stock of a certain age group, breed and background—that is, the type of paddock they have come from. It depends on the type and also the time of year, the amount and quality of feed in the paddock – if the pasture is short and green and growing, the stock are more likely to eat it than the trees; if the trees are shooting – stock are less likely to eat older leaves towards the autumn than fresh green tree shoots; and the types of trees – pines and eucalypts are less palatable than young oaks, willows and poplars in leaf.

"You need to be watching all the time, observing what the stock are eating, and checking for damage."

Jon and Vicki's most recent contour planting of the 25 ha Tank paddock cost an average of 50 cents per plant or $145 per ha: 4000 pines ($1,400), 1500 mixed natives ($1,400) and 1500 poplar cuttings ($270) were established. These costs include spraying, ripping, planting, over-spraying and seedlings.

Species selection

Species selection in the Kentucky area has been difficult over the years. The adage of planting local natives to ensure that trees and shrubs thrive doesn't necessarily apply.

Eucalypts in open areas are still heavily attacked by Christmas beetles and other defoliating insects, and the wattles, casuarinas and most eucalypts are severely affected by frost and waterlogging in lower parts of the landscape.

Shrubs, native and exotic, are all eaten by livestock once they are allowed back into the whole-paddock plantings. The natives mostly thrive in areas that are high in the landscape, in large block plantings and permanently fenced from livestock.

Jon says, "Shrubs would go into the whole paddock plantings if we could find any that stand up to stock. As it is, we tend to plant shrubs in 'special areas', around waters and on rocky knobs—niche areas—that are fenced to exclude stock. They help with the birds, so we plant more shrubs in the corridors with the trees. Finding shrubs for planting in stocked areas may be a waste of time—we have tried many over the years and stock eat most of them."

Weed management

An important issue with fencing out revegetation or remnant areas is the invasion of those areas by weeds such as blackberry. Jon and Vicki are fortunate because the Kentucky area has a low incidence of blackberry.

"We have never had much of a problem with weeds among our trees," says Jon.

Where to next?

Jon and Vicki plan to continue with their tree planting even though their need for shelter is now less acute.

"In recent years, we've just been doing whole paddock plantings – for shelter, biodiversity and timber production," they said.

Lessons Learnt

Remnant paddock trees—can improve in health if included in 'revegetation corridors'.

Fencing a remnant area—can encourage hundreds of volunteer seedlings that you don't have to plant!

Fertiliser decisions—fertiliser applications can reduce remnant tree health.

Contour and whole paddock plantings—are a good way of combining productivity (timber and grazing), biodiversity and shelter.

Grazing planted areas—is possible with careful observation and management.

Species selection—incorporating shrubs with paddock plantings is difficult as stock will preferentially graze them. These can survive in 'special' conservation areas on the property such as rocky knobs, wildlife corridors and around permanently fenced dams.

Solution: Taylor-made water management

Riparian zones

Jon and Vicki were concerned about the condition of Terrible Vale Creek, which runs through 'The Hill'. The riparian zone was an area of high livestock impact and hence overgrazing.

"We did a planting right near the creek, and fenced off a boggy patch. The trees grew so well in three years, that we decided we should fence out more of the creek and expand the planting to follow the creek right down," said Vicki.

They'd already started their whole paddock plantings by then, so they decided to manage the creek as a separate paddock. Watering livestock was simple: they extended the off-creek trough program they'd already begun.

Fencing out the riparian zone to create Long Frog paddock had some dramatic impacts, as Jon explains:

"The creek is disappearing! A long time ago, there were no banks or waterholes, but once the grass was taken away, the flow scoured out a gravel bed with a string of bare-sided waterholes along it with no vegetation due to heavy stock pressure.

"Since we fenced out the riparian zone and starting managing it separately, the banks have grassed up, reeds have come back, and the vegetation retains sediment.

"After we fenced out the riparian zone and the grass was about one metre tall, we got a big flood. The flood water slowed down, depositing a lot of silt and spreading flood rubbish along one-and-a-half kilometres of fence: we had to pitch fork it off. So we shifted the fences further back, using a temporary electric fence to start with. Now, in each flood, silt is deposited on the plant surfaces in the riparian zone. This has a filtering effect on the water and the silt is free fertiliser!"

"The pools used to be quite muddy and there used to be a lot more algal blooms, but most of the time now, the water is quite clear," said Jon.

But Jon is not sure that they have seen a production benefit from cleaner water:

"Stock prefer water if it's clean, but I don't think we have seen a detectable increase in production. There's a lot of feel-good with this, because you know it's an indicator of better system health and it probably means you have a greater diversity of biota," he said.

"Long Frog paddock is very good for grazing, especially with weaners because it grows a lot of the best grasses and it's well sheltered by the trees we have planted.

Right and below: Riparian zones are revegetated to create sheltered areas for stock and wildlife. In places, "the creek is disappearing". Photos courtesy of Nick Reid.

Left and above: The Taylors fence their new dams to exclude stock and provide niche areas for shrubs that are otherwise very palatable for stock. Photos courtesy of Nick Reid.

"It's also a wonderful spot to go for a walk. The little bird population is tremendous there."

But Jon despairs of it as an area to plant native trees:

"We haven't had much luck with natives: many natives have died there in the last 12 months. Insect damage is certainly a contributing factor, maybe too much frost and wet feet, it all combines to produce a syndrome which I call 'tree ill-thrift'. The natives don't do as well as the poplars and willows.

"Willows are better than nothing: we plant some non-noxious species back from the banks where they hold the banks together, slow down the flows, provide habitat for insects and birds and browse for livestock, and grow good grass beneath," said Jon.

"We manage them to stop them spreading if any varieties show that tendency," he said.

Farm dams

The Taylors have been reticulating water since the 1965 drought:

"My father had lots of problems with stock bogging in dams. The water quality drops off badly and stock will bog in virtually any dam, once it's down to the last foot of water. So we sub-divided paddocks, added a tank and troughs with polypipe, and pumped water with a windmill. Only in the last three years, have we gone to a motorised pump—it's more reliable."

Water reticulation is important at 'The Hill' because it ensures clean water for livestock, avoids stock bogging in dams, and affords Jon and Vicki the flexibility to redesign paddocks and supply water easily.

Jon and Vicki have fenced off four newly constructed dams in recent years. They gravitate clean water from the fenced dams to troughs for livestock drinking water.

"The dams we fenced off were new dams which we took the trouble to fence from the start, before they had an opportunity to be polluted by stock. We are not sure of the benefits of fencing the older dams – we are not sure how long the advantage of removing stock would take to kick in, in terms of water quality," said Jon.

The permanently fenced dams provide 'niche areas' for planting trees and shrubs for biodiversity, protected from livestock, and to reduce evaporation from the dams.

Lessons Learnt

Fencing riparian zones—

- Allows them to be managed as separate units.
- Allows the grass to regenerate, providing good feed reserves and reduces stream bank erosion.
- Slows down flood waters, and allows sediment (free fertiliser) to be deposited on creek flats.

Riparian zones—can be difficult to regenerate with native trees and shrubs due to frost, waterlogging and insect damage.

Reticulating water to troughs—from fenced farm dams and riparian zones provides stock with clean water, which they prefer.

Fencing farm dams—provides niche areas where native shrubs and a wide variety of trees are planted—away from the grazing effects of stock.

Outcome: Taylor-made wildlife

Reptiles

Reptiles have also fared well as a result of revegetation.

"Snake numbers dropped away in the 1970s and 1980s due to lack of habitat, and people were still killing them. In the 1990s, they've made a big comeback," said Vicki.

"Good tree cover means more snakes, and ground cover along the creek is important to them. While walking along the creek recently, three big snakes appeared within minutes," she said.

"Dark-coloured rock lizards [Cunningham's Skink] used to live in the old fallen trees, many have rotted away so you see less now. But there are still hundreds of them around here," said Vicki.

Echidnas

The frequency of echidna sightings has also increased:

"We used to see an echidna every couple of years, but for the past three years, we have seen four or five per year, and we've also seen two or three following each other nose to tail.

"There's lots of evidence of them in the fenced off areas—it's easy to find their scratchings", said Vicki.

Birds

According to Jon, bird numbers at 'The Hill' have fluctuated greatly in his lifetime:

"They hit a real low at the beginning of the 1960s, just after we had lost a lot of trees. Everyone was using a lot of organochlorine (dieldrin) and organophosphates in those days for jetting sheep, and that killed a lot of magpies."

Jon thinks that birds ingesting poisoned blowflies was a likely mechanism for the bird decline, along with them drinking from pools of jet spilt in the yards.

Koalas return

Jon and Vicki are proud of the benefits their tree planting has had for wildlife, particularly koalas, which were hunted out by fur trappers during the 1860s. They have seen many, including young ones, since the first to return ambled out of the bushes and walked across the Treefest paddock right in front of some Turkish foresters in 1995.

"When thinning the pines, we've had to leave trees because koalas were in them," said Jon.

Right: Koalas have returned to 'The Hill' after an absence of 80 years.

"Since we started planting trees, there's 20 to 50 times more birds, although there are still insufficient small birds," said Jon.

Kangaroos

Not all wildlife is viewed favourably: kangaroos damage fences and graze the de-stocked revegetated areas—especially in dry times. As a result, some culling has been required.

"In the late 1960s, there were only one or two kangaroos on the property. Nowadays, across 'The Hill' and 'East Oaks', we have had up to 100 resident kangaroos.

"Once, we only used to have eastern grey kangaroos. Now, there's a lot of wallabies and black wallaroos. The swamp wallaby—a tree browser—has come since the Treefest site has got going."

Possums

Some native mammals haven't fared so well, even with the increased tree cover.

"There used to be a lot of common brushtail possums," said Jon.

Since 1980, the Taylors have seen very few possums and they think the lack of hollow trees could be a reason.

"We went through a stage where there were a lot of hollows in trees and we had enormous numbers of possums—we were always trapping them in the garden for Mum because they would eat all the shoots. Now, there are only a few possums left."

During the 1960s, Jon remembers clearing hundreds of dead trees—pushing them over, piling them up and burning them. Possums and sugar gliders lost their habitat as a result and the new revegetated areas have few hollow trees as yet.

Feral animals

Vertebrate pests are an issue for Jon and Vicki:

"Foxes are no more abundant than they used to be, but they tend to use fenced off areas as shelter. The longer grass provides more cover for them.

"Rabbits and hares are still a problem, but tree planting hasn't made them worse.

"We shoot hares and rabbits, and we rip burrows, break up the logs they're under, and use 1080," said Jon.

Since 1980, Jon has stopped pushing up dead trees and logs lying on the ground, preferring to leave them for protection for livestock and habitat for wildlife:

"Where people have pushed up all their logs, they won't have the rabbit problem that we do, but they won't have the rock lizards either."

Right: The Taylors appreciate a diversity of vegetation types, including fallen logs, which are valuable habitat. Photo courtesy of Karen Forge.

The value of biodiversity for the Taylors

Trees save money

More than a decade after starting their revegetation and conservation program, the idea of taking one or more large paddocks out of production for several years and planting it to trees is still radical in a region where production of 'hungry' fine wool from well-utilised pastures is a common practice.

Having more than 11% of 'The Hill' and 'East Oaks' out of production in the past decade has had little, if any, impact on wool production.

Paradoxically, the Taylor's conservation program has paid for itself two or three times since they began.

Drought reserves

During both the 1994 and 2002 droughts, Jon was able to graze tree planted paddocks that contained large bodies of feed because they had been excluded from stock access.

"In 2002-03, we had to strip graze Junction Paddock with cattle due to the drought, despite the presence of the new tree plantings. It worked well—we didn't have to buy feed," said Jon.

Michael Pitt, economist with the then NSW Soil Conservation Service, calculated that the Taylors' ability to fatten steers in the contour planted Reserve paddock through the 1994 drought, and sell after the drought:

- avoided a cash loss of $8,000 through forced sale in July 1994
- saved a fodder bill of $17,000 if hand feeding had been required
- earned them a sale price of $21,000 after the drought broke in late 1994.

Clearly the fodder reserves that Jon and Vicki create through whole paddock tree establishment are disproportionately valuable in drought.

Jon comments: "I would estimate our conservation program contributes something significant to our economic bottom line on average every fourth year."

Jon has resisted time-controlled grazing of sheep in the agroforestry paddocks in the same way as the cattle during drought due to their inclination to browse the young trees. Sheep also require more substantial fencing.

Trees save stock

There is a fine balance between not enough and too many trees in an environment like New England's. Drought and competition for soil moisture and nutrients often occur, but extreme cold in winter and spring can occasionally result in massive losses of sheep in unsheltered paddocks.

Jon and Vicki have had 25 years to observe and reflect on the value of trees to their livestock enterprises.

There have been no detectable or measured increases in production in revegetated areas to date, although there is some anecdotal evidence.

Lambing percentages have stayed steady at about 83% between 1986 and 2003, with the exception of poor percentages in the severe drought years of 1994 and 2002. The problem during the 2002 drought was not so much the lack of shelter as the need to continually move lambing ewes in search of feed, leading to mis-mothering. Despite the dramatic increase in shelter at 'The Hill' during this period, there is no evidence of improved lambing percentage specifically due to shelter (Figure 1).

Jon attributes this to the fact that during the last 15 years, there has not been a lambing or post-shearing period when high stock losses have occurred due to extreme conditions, where shelter may have made a difference. In Jon's lifetime, such conditions have occurred two or three times in the southern New England, but not at 'The Hill' when tree cover might have made a difference.

Lessons Learnt

Remnants and whole paddock plantings—save stock and money, during droughts.

Contour planted paddocks—are showing better grass growth, even under grazing.

Pasture production—is better around the base of some trees than others, especially poplars, willows and some natives such as rough-barked apple.

Fodder trees—the growth and palatability of several willows are being trialed because they show potential.

Pruned branches and selective thinnings—in the radiata pine enterprise have not caused any known injuries to livestock.

Pine plots in most paddocks—have changed sheep grazing patterns. In summer, stock appreciate the shelter during the day and come out to graze early and late.

The triple bottom line

Jon and Vicki are cautious but positive about the financial benefits they have achieved from their transformation of 'The Hill' and 'East Oaks'.

"We believe our properties are capable of the same level of production as they were before we started tree planting. In other words, at the very least, the extra grazing production resulting from the shade, shelter, biodiversity and cleaner water compensates for the land taken out of production with trees."

Through their revegetation efforts, the Taylors have broadened their commercial options (e.g. the radiata pine enterprise), *and* reduced their risk of exposure to:

> "We believe our properties are capable of the same level of production as they were before we started tree planting.
>
> "In other words, at the very least, the extra grazing production resulting from the shade, shelter, biodiversity and cleaner water, compensates for the land taken out of production with trees."
>
> Jon & Vicki Taylor

- extreme climatic events
- another dieback disaster, and
- market declines.

For their impressive work in the wool industry, environmental repair, and plantation development, Jon and Vicki have won industry recognition in every field:

- they were placed 8th in the 2002 International Zegna Wool Award
- they won the 1996 Royal Agricultural Society of NSW's Regional Ibis Award for good conservation practice, and
- they won the 2002 Biennial Australian Forest Growers' National Farm Forestry Award.

Jon and Vicki's management of 'The Hill' and 'East Oaks' is a wonderful example of how thoughtful, inquiring, sensitive, practical management of the farm environment can improve the triple bottom line. They feel good about their achievements, they have a comfortable lifestyle and a range of economic options, the farm environment is steadily improving, and biodiversity has increased under their management—all of which is moving them towards social, economic and environmental sustainability—the triple bottom line.

Below: The Taylor's farmscape reflects the importance they place on nature and biodiversity as part of their wool enterprise. Photo courtesy of Nick Reid.

LandWater&Wool
Shaping the future
another innovation
native vegetation and biodiversity
Improving farm profits through biodiversity

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ACN 099 557 454
Resourcing Landcare in our region

This project has been funded by the national **Land, Water & Wool** program—a joint initiative of Australian Wool Innovation Limited and Land & Water Australia. The Native Vegetation and Biodiversity sub-program of Land, Water & Wool aims to work with wool growers to show that biodiversity has a range of values, can add wealth to their business and can be managed as part of a productive and profitable commercial wool enterprise.

The **Land, Water & Wool Northern Tablelands Project** is led by Associate Professor Nick Reid of the University of New England, in collaboration with Southern New England Landcare Ltd and the Centre for Agricultural and Regional Economics (CARE). A project steering committee of local landholders and technical experts directs the project.

More information

This brochure is part of a series belonging to the **Land, Water & Wool Northern Tablelands Project**. From 2004 to 2006, a number of extension materials will be developed as a part of this project, including posters, brochures, booklets, and fact sheets. Field trips and tours to the Case Study Farms can also be arranged.

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