

**THE CLEARING AND FARMING OF AUSTRALIA'S
RAINFORESTS**

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For nineteenth century farmers, clearing the immense rainforests of the east coast required a simple technique which was quick and cheap. The answer was fire. The technique has no special name, essentially it was slash and burn, though the use of that description is avoided as it invites confusion with different techniques used in traditional agriculture in Asia and Africa.

By the 1820s fire was being utilised as the best method to clear patches of rainforest around Sydney and by the 1880s a common technique was found throughout the rainforests. Indeed, whether tropical or temperate rainforest; north Queensland or south Tasmania; or including eucalypts or not, the same technique was effective. Easily taught and applicable to different environments, the technique spread quickly and widely and allowed the rapid clearance of vast areas of rainforest. Even as late as the 1950s this method dominated settlement in the rainforests. The basic method consisted of three steps: cutting, the 'burn' and 'picking up'.

CUTTING

Clearing commenced at a convenient point of access, perhaps a pack track or a clearing made earlier by surveyors, cedar-cutters, or neighbours. The first objective was to clear the dense understory. Vines, palms, ferns and small shrubs were cleared with the scythe-like brush-hook. When sufficient room had been cleared to swing an axe larger understory trees were cut.

The difficulty of clearing varied enormously from place to place depending on the vegetation. Part of the rich oral folklore of the rainforests is the insistence in many areas that the local forests were taller, denser, steeper or wetter than all others (particularly neighbouring areas). Settlers also identified particular tree varieties as the most difficult to cut, bestowing on them descriptive common names such as Steelwood, Iron-wood, Flintwood and Axe-breaker.¹

Particular vines were notorious for entangling brush-hooks and their users. The lawyer vine was so named because its hooks entrapped the unwary. Stinging trees and sword grasses injured workers and slowed progress. Even the beautiful tree ferns brought forth curses as their thick pithy stems were difficult to chop cleanly with axes. Charles Bryde on the Atherton Tableland described his experience of brush-hooking as, 'no matter where or how you hit anything it invariably falls on top of you, and every damn thing has spikes on it.'² Edward Sorenson in the Big Scrub found this the easiest part of the work, but, 'thousands of little hooks and needle-points wait for the slightest contact of the unwary, tearing the clothes to ribbons, and lacerating hands and arms.'³ Clearing was much easier where the canopy was dense and the understory light, as in mature rainforest.

The clearers worked to a plan of cutting everything below a certain diameter. Eighteen inches was the most common, otherwise twelve or twenty-four inches. Where trees had broad buttresses, the cutters worked from springboards, often metres in the air. If there were just a few large trees the settler could opt for the lower diameter and clear quickly, but if there were many large trees the upper limit was reluctantly used. The objective was to leave a scattering of large trees which the settlers would not attempt to cut. These remaining giants were killed by the simple process of ringbarking (the removal of a large band or ring of bark). A small number were selected for felling and their timber used for housing and fencing. In some regions, where there was easy access to transport, timber was sold. However, this was not common, the settlers were pressed for time, government officials frowned on selectors who seemed to be just timber-getters and local markets for timber were often glutted. Occasionally the odd individual chose to immediately cut down all of

¹ Nan and Hugh Nicholson, *Australian rainforest plants*, authors, The Channon, 1985, p. 58.

² C.W. Bryde, *From Chart House to Bush Hut: being the record of a sailor's 7 years in the Queensland bush*, Champion, Melbourne, 1921, p. 59.

³ Edward Sorenson, *Life in the Australian backblocks*, Whitcomb and Tombs, London, 1911, p. 187.

their trees, but this was generally seen by neighbours as unnecessary, eccentric and even foolish.⁴ There was a practical advantage to leaving dead trees standing. Upright they were able to dry out, ready for later burning. In contrast, on the ground they absorbed water and were very difficult to burn.

A technique known variously as 'driving', 'nicking', 'notching' or 'scarfing' was used to speed up clearing. A small cut (nick, notch or scarf) was made into a number of trees. Then a large tree was felled so that it was driven (crashed) into these trees. The weight of the large tree broke these other trees off at these cuts. In this way up to a quarter of a hectare (50 metres by 50 metres) could be cleared very quickly in one drive, with a minimum of axe work.⁵

One valuable record of driving was the 1949 feature film, *Sons of Matthew*. Shot on location on the Lamington Plateau, it was a fictionalised account of settlement by the O'Reilly brothers. Director Charles Chauvel hired some experienced clearers to teach his young, mainly city-bred cast the techniques of cutting. As a result he was able to film in close-up a spectacular recreation of clearing rainforest.⁶

Clearing was a dangerous occupation. Accidents were common. The conditions were wet and slippery. New settlers were often inexperienced in the use of axes and brush-hooks. Dead branches and rotten limbs, known as 'widow-makers', fell without warning. Sudden winds toppled ring-barked giants. Driving was particularly dangerous. Safety was sacrificed for speed. Misjudgements or inexperience led to trees falling the wrong way.

On the Atherton Tableland one windy day Charles Bryde had his wrist and arm broken by a drive which went wrong,

A strong gust came along, making the trees sway dangerously. I stood a second or two undecided whether to go or stay, and "he who hesitates is lost." A sharp crack! and the crowfoot broke back over the scarf [which he was cutting, so that tree fell back towards him] automatically becoming the driver, and sending the lot down on top of me.⁷

Bryde was fortunate he was working with others, who took him to hospital. After being hit by a falling tree, one lone selector in south Gippsland,

was stunned and lay for three hours unconscious. When he recovered, he found himself pinned down by a small sapling across his chest. His axe had fallen almost out of his reach, but after a long while of scratching and straining he managed to get it at last, and he slowly and painfully nicked the sapling in two and freed himself.⁸

In another accident nearby, brothers Burnet and Joe Watt were less fortunate,

⁴ For an example of such an individual see, Mary Fullerton, *Bark house days*, Endacott, Melbourne, 1921, p. 143.

⁵ The technique worked best if the trees were not too close together (and the falling 'driver' could gain momentum). An interesting contrast is with the technique developed to clear Mallee scrub in the late nineteenth century. The Mallee was characterised by multiple stems. These were too time-consuming to cut individually, nor were there trees of sufficient size to be effective 'drivers'. Instead a heavy cylindrical roller with protruding bars was dragged through the scrub, smashing down the stems. The large diameter of many rainforest trees precluded this technique spreading into wetter areas.

⁶ Elsa Chauvel, *My life with Charles Chauvel*, Shakespeare Head Press, Sydney, 1973, pp. 97-9.

⁷ Bryde, *Chart house to bush hut*, pp. 108-9.

⁸ South Gippsland Pioneers' Association, *The Land of the lyre bird: a story of early settlement in the Great Forest of South Gippsland*, Shire of Korumburra, Korumburra, 1972, 1st. pub. 1920, pp. 108-110.

They crowded behind a log for a time, and then thinking the danger had passed, Burnet put his head up to have a look and was struck by a falling spar and killed instantly. Joe Watt was badly injured but lived for another three years before dying of his injuries.⁹

Many settlers suffered axe wounds, especially those inexperienced with the use of axes against living trees and understory. In south Gippsland, a Mrs Williams recalled that,

My husband came limping in one day with a piece of leather, a piece of sock, and a piece of his big toe in his hand; fortunately, they were not big pieces. The axe had slipped and cut his boot, taking the three pieces off as clean as if cut with a razor.¹⁰

Of the eight O'Reillys cutting on the Lamington Plateau, five suffered major cuts, with at least three being hospitalised.¹¹ They also had a number of very near misses, one day,

Herb was chopping 20 feet up on a great leaning Litsea tree. It was apparently sound, but as proved later, had a large hollow; the narrow timber outside of the hollow which was carrying the whole strain, must have been as taut as a violin string, for after twenty minutes chopping, the whole side of the tree literally exploded without warning. Herb jumped from his board, round to the side of the tree and hung by his hands from the cut while the monster ripped to pieces around him. He was unharmed, but his shattered spring board was found twenty-two yards away and his axe buried under tons of debris.

Tom O'Reilly suffered the worst cutting injury due to a giant stinging tree (known to them as a Gympie tree), he,

Was working stripped to the waist as our axeman always worked on a small Gympie tree, when it twisted in a choppy wind and fell across him burying his half naked body in its huge stinging leaves.¹²

The touch of its leaves were, 'as painful as a scald of boiling water' and the effects lasted for weeks. His brother Bernard believed that Tom had developed a certain amount of immunity from previous brushes and this alone saved his life. Bernard O'Reilly wrote that the tree was known to have caused fatalities in northern Queensland, 'in fact its record is worse than that of the universally feared black snake'. However, I have been unable to find details of any such deaths and it is possible that this is merely folklore.¹³

Other dangers included snake bites and getting lost. At Mirboo North in south Gippsland, two prospective settlers went to inspect a block, got lost and died of starvation and exposure. None of the locals knew their names and their identities were never discovered.¹⁴

Working in groups allowed settlers to reduce risk, pool their resources and learn from the more experienced. The ex – sailor Charles Bryde was invited to join his neighbours. They started him off with brush-hooking - the simplest task - while they cut trees. Each took turns to be cook, often the most difficult job for inexperienced bachelors. Working together, they spent a few days on one property, then moved to another and so on.¹⁵

Clearing was incremental, individual settlers or small groups only cleared small patches each year. Bryde recorded that he cleared a half of a hectare of understory brush on his first day and after six weeks of intensive work his group had brushed eight of his hectares and felled between one and

⁹ John Murphy, *No parallel: the Woorayl Shire 1888-1988*, Shire of Woorayl, Melbourne, 1988, p. 31.

¹⁰ South Gippsland, *Land of the lyre bird*, p. 351.

¹¹ Bernard O'Reilly, *Green Mountains*, Smith and Paterson, Brisbane, c1944, pp. 77-8.

¹² O'Reilly, *Green Mountains*, p. 78.

¹³ O'Reilly, *Green Mountains*, p. 78.

¹⁴ Murphy, *No parallel*, p. 35.

¹⁵ Bryde, *Chart house to bush hut*, pp. 61-5.

two. Near Healesville in Victoria, E.C. Brooke and his four sons and two son-in laws took it slowly, mixing clearing with carting and timber cutting. The first year they cleared one hectare, the second and third two hectares each year and in the fourth, three hectares. James Schmidt in south Gippsland farmed his land full-time. In the first year he cleared and planted eight hectares, in the second, six hectares, the third 15 and in the fourth another eight hectares.¹⁶

In temperate regions, clearing took place in winter and early spring - July to September or October. In tropical regions it took place in the wet season - January to March or April. Clearing was then abandoned and many settlers shifted their attention to other activities, such as farming already cleared land, timber-cutting, gold fossicking and casual labouring. For many struggling settlers small jobs for cash were vital to pay rent, interest on loans and store accounts.

BURNING

The slashed understory was left to dry for four to six months, while the dying ring-barked trees shed their leaves and bark. Now was a period of great transformation, of tangible progress. In Gippsland Mary Fullerton wrote how she found, 'there is an especially romantic period in the turning from green to dry of ring-barked gumtrees'.¹⁷

After sufficient drying, this great mass of vegetation was set alight. This event was universally known as 'The Burn'. The terminology used by the settlers is instructive, it was always the burn, never a fire. Johan Goudsblom, in his seminal *Fire and Civilization*, argued that all Western European languages have two quite different words for fire and burn. Fire denotes something they control and use positively for warmth and cooking, in contrast to burn, which is often uncontrollable, painful, or destructive.¹⁸ The settlers of the rainforests used the burn, but their control of it was uncertain.

In temperate regions the burn took place in late summer - February or March, in the tropics at the end of the dry season - July or August. Great care was taken over the decision of when to burn. Too early and the vegetation may still be too green and not burn. Too late and early rains might come without warning. There were grave fears of the fire getting out of control and burning houses, fences and fields of crops.¹⁹ A visitor to the Otways recorded that,

The selector's life is one of incessant toil and constant anxiety especially in summertime when he - and his wife and family should he be fortunate to possess such - labors almost night and day to prepare for burning off the accumulated debris upon his land, and watching carefully lest fire should come upon him.²⁰

To try to minimise fires running out of control settlers in the Big Scrub left firebreaks of uncut rainforest. In south Gippsland settlers met and agreed on a specific date when they would all start burning. Sometimes co-operation broke down. On the Atherton Tableland Charles Bryde found that one of his neighbours did not want a burn, as he feared it would destroy his already sown grass. After much fruitless negotiation, the frustrated Bryde and his other neighbours surreptitiously lit their fires anyway, later innocently claiming it was an accident.²¹

¹⁶ Bryde, *Chart house to bush hut*, pp. 61 & 65; Hubert de Castella, *John Bull's vineyard: Australian sketches*, Overseas Press Service, Melbourne, 1981, 1st. pub. 1886, p. 189; Schmidt selection records held by Joyce Jepson.

¹⁷ Fullerton, *Bark house days*, p. 44.

¹⁸ Johan Goudsblom, *Fire and civilization*, Allen Lane, London, 1992, pp. 65-6.

¹⁹ Tom Griffiths, *Forests of ash: an environmental history*, Cambridge University Press, Cambridge, 2001, p. 37.

²⁰ *Colac Herald*, 25 May 1886.

²¹ Sorenson, *Australian backblocks*, p. 189; Barry Collett, *Wednesdays closest to the full moon: a history of South Gippsland*, Melbourne University Press, Melbourne, 1994, pp. 140-1; South Gippsland, *Land of the lyre bird*, pp. 67-8; Bryde, *Chart house to bush hut*, pp. 119-120.

The burn was a great spectacle. Bernard O'Reilly on the Lamington Plateau estimated that the smoke plume rose 5,000 metres and wrote that, 'only a volcano in full eruption can depict a scene as fiercely splendid'. As the fire took hold, the gullies full of cut vegetation, 'under the searing heat, gives off inflammable gas, until the valley is filled with some cubic acres of it, then it ignites with an explosion which tosses burning logs like twigs.' In addition there were hours of the continual explosion of super-heated rocks.²²

In south Gippsland, T.J. Coverdale enthused,

A good burn is a grand sight. The fire in great billows of flame rolls across the scrub or shoots upwards as the wind catches it, black-red masses of smoke hang low on the scrub one moment, and the next are tossed high by the volcanoes of fire beneath. Immense sheets of flame reach out ahead and seize the dry trees and stumps, then the fire rushes on and leaves them behind - flaming records of its march - like burning homes in the wake of a ravaging army. And all the while band of skirmishers, in the shape of burning bark and sparks, lead the attack on the enemy in front; hundreds of little spurts of flame and smoke showing where their shells have fallen. A gale roars through the timber, and soon you hear the boom of the big, dry trees as the fire begins to bring them down.²³

Coverdale wrote this in 1916, which explains his overuse of military metaphors. It is interesting that neither O'Reilly nor Coverdale drew a parallel between the burn and a bushfire. It is also notable that while descriptions of burns abound and indeed some tourists made special trips to experience them, there are very few photographs of actual burns. Certainly the forests contained many amateur photographers and there are many photographs taken after burns. Indeed one settler described a burn as, 'a study in pyrotechnics that would make the eyes of a moving-picture man water.'²⁴ Why then were there so few pictorial records of these spectacular 'volcanoes of fire'? There are two probable explanations. First, few photographers were willing to risk setting up their valuable and cumbersome equipment near a huge and volatile fire. Second, the smoke and heat may have ruined any pictures taken.²⁵

The settlers hoped for a 'good burn' that would destroy nearly all of the large trees. If little burned it was a 'bad burn'. Success or failure depended on the length of drying time, the weather leading up to the burn, the amount of regrowth and the nature of the forest. After his first burn, Charles Bryde was,

assured that I had a good burn, but when I saw the black waste, gridironed with logs and strewn with big stumps, I was a bit dismayed. What on earth could I do with it to make a living? It looked pretty hopeless.²⁶

It was only after years of experience that he realised that he had been fortunate in obtaining a good burn.

Different vegetation burnt in different ways. In south Gippsland,

After a good burn in hazel country, the ground is covered with a white ash and the hills gleam white through the trees as if covered with snow, till the first rain falls. But in spar

²² O'Reilly, *Green Mountains*, pp. 81-2.

²³ South Gippsland, *Land of the lyre bird*, pp. 110-1.

²⁴ South Gippsland, *Land of the lyre bird*, p. 75.

²⁵ Tim Bonyhady, *The colonial earth*, Miegunyah, Melbourne, 2000, pp. 190-217, describes how artists and photographers often used their axes to improve access to views, though he does not consider their reluctance to capture the 'burn'. In the feature film *Sons of Matthew*, Charles Chauvel did not show the 'burn', but included two bushfires for dramatic effect.

²⁶ Bryde, *Chart house to bush hut*, p. 79.

[mature eucalypts, mainly mountain ash or blue gum] or in musk country the ground is black, and in the former, covered with great spars and not at all a cheerful landscape.²⁷

In New Zealand a good burn was a 'white-burn', the fire had been fierce enough to reduce the vegetation to fine white ash. A bad burn was a 'black-burn', the vegetation was blackened but not destroyed.²⁸ Though these terms were not used in Australia, they illustrated well what Australian farmers were trying to achieve and to avoid.

PICKING UP

The burn destroyed dried leaves, bark, undergrowth and small branches and trees. However, the larger trees, whether cut or not, and many of the cut understory trees were merely blackened. These now had to be destroyed as quickly as possible for two reasons. First, the settlers needed the ground cleared in order to be ready to plant crops when the rains arrived. Second, if left too long the half-burnt heaps would be entangled in quick-growing weeds.

The cutting, stacking and burning of fallen timber was termed 'picking up'. Settlers often found that this was the most difficult step of the clearing process. Some, having cleared and burnt, gave up when faced with the labour of picking up.²⁹ The work was boring, repetitive, physically exhausting, dirty and dangerous. Cutting down a tall tree had been a simple task. Destroying the remains involved cutting the trunk into manageable pieces, perhaps chopping through it a further ten times, then lifting and stacking these pieces into a heap and setting fire to it. As the pieces burnt through, the ends had to be gathered and thrown back into the fire or restacked and lit again.

The remaining timber, blackened by fire, was unpleasant to handle. W. Holmes in south Gippsland complained,

The charcoal on the logs causes the skin on the points of the fingers to wear so thin that they appeared to have just a mere film left, and this would often crack and become very painful when stoking up the hot burning timber.³⁰

A neighbour G. Matheson remembered,

Picking up was hard, rough work, and only strong men could stand it; the charcoal on the logs when wet would wear the skin off the hands until they bled; the smoke and heat of the fires was very enervating and severe on the eyes.³¹

Where cut logs had rolled into gullies or swamps, it was saturated and difficult to burn. Mary Fullerton in Gippsland told of one water-soaked log which took six weeks to destroy and Holmes complained that wet mountain ash would only burn for an hour or two and then go out.³² Working beneath dead standing trees there was a constant danger of falling timber. Another source of injury was tripping and falling on sharp stumps.

²⁷ South Gippsland, *Land of the lyre bird*, p. 111.

²⁸ Geoff Wilson, *The urge to clear the 'bush': a study of native forest clearance on farms in the Caitlins District of New Zealand, 1861-1990*, Department of Geography, University of Canterbury, Christchurch, 1992, p. 12. Clearance methods in New Zealand were very similar to Australian, see also Rollo Arnold, *New Zealand's burning: the settlers' world in the mid 1880s*, Victoria University Press, Wellington, 1994 and Graeme Wynn, 'Destruction under the guise of improvement? The forest, 1840-1920'. In Eric Pawson and Tom Brooking (eds.), *Environmental histories of New Zealand*, Oxford University Press, Melbourne, 2002, pp. 100-116.

²⁹ Griffiths, *Forests of ash*, p. 41.

³⁰ South Gippsland, *Land of the lyre bird*, p. 76.

³¹ South Gippsland, *Land of the lyre bird*, p. 283.

³² Fullerton, *Bark house days*, pp. 45-6 & South Gippsland, *Land of the lyre bird*, p. 76.

The settlers could undertake the cutting, burning and picking up, or they could, if they had the capital, hire local contractors. These contractors were generally small farmers, though there were also itinerant labourers. The proportion of forest which was cut by owners versus that cut by contractors is unclear, similarly the extent of share-farming and leases are indistinct. However, they do point towards a possible social division in the rainforests between those with capital and those struggling for cash.

THE ASH BEDS

Once the burn was completed, the settlers raced to plant crops before the rains came, for rain either created a hard crust which seedlings found difficult to penetrate or washed away the bare topsoil. South of Sydney the principal crop was grass, to the north it was often maize. Seeds were planted directly into the ashes, the only equipment necessary (indeed possible), being a 'dibble stick' or hoe. It often took three or four years of cultivation and further burning before the land was fit for ploughing. Some settlers specialised in growing seed and selling it to newcomers, poorer farmers cut their first crop for seed.

The burning of vegetation to release nutrients was a common practice in nineteenth century Australia. In the wheat-belts farmers knew that burning the stubble after harvest fertilised the soil.³³ The notion of the high fertility of ash was quickly transferred to the rainforests and it provided a further incentive for settlers to burn as much rainforest as possible.

An idea of this fertility can be gained from some forestry experiments. A tonne of eucalypts was completely burnt, leaving a residue of 4.5 kilograms of ash (0.45 percent of the original weight). The ash was analysed as containing 1200grams of calcium, 500g of potassium, 250g of magnesium, 250g of sodium and 100g of phosphorus, a total of 2300g (just over half the weight of the ash) of valuable minerals. As a 'typical' Victorian eucalypt forest in high rainfall areas was measured as containing 265 tonnes of flammable material per hectare (of which 212 tonnes were branches and trunks), if it was completely burnt it would yield nearly 1.2 tonnes of ash per hectare, including over 130 kilograms of potassium and 26 kilograms of phosphorus.³⁴ Nineteenth century settlers were not aware of the exact chemical composition of ash, but they knew that it greatly stimulated plant growth.

ORIGINS AND EVOLUTION

Where did these techniques come from? Were they imported and adjusted to Australian conditions or were they purely local inventions? A likely source was the coastal forests of north-east North America. In the seventeenth and eighteenth centuries Americans had developed two techniques for clearing land for agriculture. The first was clearfelling (i.e. clearing all trees) and burning, the second was girdling (ringbarking) and later clearing of dead trees. Indeed, Americans even used the terms 'good burn' and 'drive'.³⁵ There appears to be no evidence that in planning the NSW settlement the British authorities collected and disseminated information about American forest clearing methods or selected persons skilled in these techniques. It was probably assumed that farming would take place on the treeless meadows which James Cook had misrepresented as

³³ Thomas Cherry, *Victorian agriculture*, Paterson, Melbourne, 1913, p. 93, advised farmers in the acidic high rainfall areas to burn stubble to release alkali. Stephen J. Pyne, *Burning bush: a fire history of Australia*, Allen and Unwin, Sydney, 1992, pp. 237-8, noted that if vegetation was just ploughed in, or left to rot, the resultant micro-organisms would consume scarce nitrogen.

³⁴ F.R. Humphreys and F.G. Craig, 'Effects of fire on soil chemical, structural and hydrological properties'. In A.M. Gill, R.H. Groves and I.R. Noble (eds.), *Fire and the Australian biota*, Australian Academy of Sciences, Canberra, 1981, p. 184 & J. Walker, 'Fuel dynamics in Australian vegetation'. In Gill et al, p. 102.

³⁵ Michael Williams, *Americans and their forests: a historical geography*, Cambridge University Press, Cambridge, 1989, pp. 60-5.

characterising Botany Bay.³⁶ However, probably enough of the first settlers in Australia had experience of North America to pass on some of this knowledge. Another possibility is that clearing knowledge came via British, Dutch and French island colonies in the West Indies, Atlantic and Indian Oceans.³⁷

In 1790 Watkin Tench visited the Government Farm at Rose Hill (Parramatta) and spoke at length with Edward Dod, the supervisor. Much experimentation was being undertaken. As well as the common cereals of British farming (wheat, oats and barley), maize, which was unknown as a crop in Britain, was being tried. The best month to plant various crops was still being debated.³⁸ No attempt had yet been made to plough the land. The lack of animal manure was a major concern. Tench ventured an opinion that crop rotation should be tried. However, a method of clearing the dry sclerophyll forests seemed well established. The trees were, 'all...cut down, and not grubbed up'. Tench did not record when they were cut or how long they were left to dry. Eventually, 'the trees were burnt, and the ashes dug in'. The problem was,

the roots and stumps remain; on which account a tenth part of surface in every acre must be deducted. This is slovenly husbandry; but in a country where immediate subsistence is wanted, it is perhaps necessary. None of these stumps, when I left Port Jackson, shewed any symptoms of decay, though some of the trees had been cut down four years. ... [on Norfolk Island, a stump] rots and turns into mould in two years.³⁹

Tench also visited James Ruse at Rose Hill. Ruse was a convict who had finished his sentence and been granted a small farm. Formerly a farmer in Cornwall, Ruse emphasised his farm was better managed than the Government Farm. However, he too had cut and burnt the timber, then dug in the ashes. Ruse had been granted his farm in December 1789 and planted his first crops in May 1790, so that cutting, drying and burning had taken six months at the most.⁴⁰

The forest cover at Rose Hill was light, the trees were small and there was no understory. However, the technique used to clear the land was clearly the forerunner of the methods used later on in the denser rainforests. Trees were cut, not grubbed out. The dried remains were burnt. Stumps were a problem, digging them out was postponed in the hope they would rot. Some sort of similar technique was being used on Norfolk Island, except there the stumps of rainforest trees quickly rotted. The colony had been established for less than two years, appropriate farming methods were still not settled, but a successful method of clearing the lighter forest had been adopted. Given the youth of the colony, it was likely that the clearance method was an adaptation of the American method, rather than the result of experiments in Australia.

By the 1820s settlers were clearing the denser forests, though detailed descriptions of the methods used were rare. In one account from 1826, James Atkinson recorded that as the earlier settlers needed to clear lightly forested land quickly,

³⁶ Watkin Tench of the First Fleet sarcastically noted that the meadows were actually swamp, see Tench, *A complete account of the settlement at Port Jackson*, 1st. pub. 1793, republished as 1788, Text, Melbourne, 1996, pp. 152-3.

³⁷ For forest clearance on these islands see Richard H. Grove, *Green imperialism: colonial expansion, tropical island Edens and the origins of environmentalism, 1600-1860*, Cambridge University Press, Cambridge, 1995.

³⁸ The commonly held view that the first settlers were astounded to find the seasons reversed is wrong. The experiences of other European settlements in the Southern Hemisphere, especially the Dutch at Capetown, which the First Fleet called at, were well known. Nonetheless, local conditions in NSW, where the seasons are not the exact reverse of Britain, had to be adjusted to.

³⁹ Tench, *Settlement at Port Jackson*, pp. 134-5.

⁴⁰ Tench, *Settlement at Port Jackson*, pp. 137-8.

they naturally fell into the system of stump falling, or cutting down the trees at about a yard from the ground; and having burnt off the stems and tops, broke up and cropped the land without regarding the stumps.⁴¹

However, Atkinson noted that there were some recent modifications to this method. Many farmers now wished to remove the stumps. Some grubbed them up, some stacked branches around them and set them alight. He also recorded that a few farmers had, 'taken off a belt of bark all round the tree, and killed it while standing'.⁴²

Though Atkinson concentrated on the clearing of lightly forested land, he also noted that some rainforest was being cleared. However, apart from recording that clearing it was more expensive, he gave no details of the methods used.⁴³ Perhaps the technique was so similar to that used on the lighter land that he felt it not worth repeating. Or possibly he had not seen rainforest cleared and did not know the method.

A year later, Peter Cunningham recorded a detailed description of clearing in NSW,

The more usual method, however, is to chop a row of trees fully half through, then fell a heavy one at the end of the row, so that it may fall against the second, which snapping at the chopped part of the stem, falls in like manner against the third, and so on till the whole row of trees is beaten to the ground in the same way as we see children upset a pack of cards placed on edge.⁴⁴

Cunningham noted that this method saved a third of labour costs. He also described the picking up process, how trees were killed by girdling and burnt three years later and how the ash was seen as a superior fertiliser.⁴⁵ Cunningham's description clearly demonstrates that the drive, burn, ringbarking and picking up were being used in NSW by 1827.

However, this is not to say these methods were universal. In the 1840s Henry Reed near Deloraine in northern Tasmania cleared rainforest by cutting and uprooting every tree. Even using convict labour this cost a very expensive £80 an acre and few of his neighbours followed his example. It was not until the 1850s and increased contact with gold-rush Victoria that the ringbarking and burn method was introduced.⁴⁶

The 'drive', in use in America in the seventeenth and eighteenth centuries, seemingly came late to Australian rainforests. It was not mentioned until Cunningham in 1827 and even during the great rushes of the last quarter of the nineteenth century it is often noted as being introduced well after clearance began. For example at Poowong in south Gippsland, clearance began in 1874 without the drive. In 1884 the building of the railway attracted outside labourers and scrub-cutters. They used the drive and it was taken up by the sons of the original pioneers.⁴⁷ In different regions it was known by different names - drive, nick, notch and scarf. If the technique was introduced directly from America, why this variation? One possibility is that it was initially forgotten and then reinvented locally. When Sydney was settled in 1788 the drive was unnecessary, as clearance was confined to lightly treed forests without undergrowth. From the 1820s clearance commenced

⁴¹ James Atkinson, *An account of the state of agriculture and grazing in New South Wales*, Sydney University Press, Sydney, 1975, 1st pub. 1826, p. 83.

⁴² Atkinson, *Agriculture in NSW*, p. 86.

⁴³ Government 'clearing gangs' of convicts cleared forest for payments of 5 bushels of wheat per acre and rainforest ('brush') for 7, see Atkinson, *Agriculture in NSW*, p. 87.

⁴⁴ Peter Cunningham, *Two years in New South Wales*, Angus and Robertson, Sydney, 1966, 1st pub. 1827, p. 266.

⁴⁵ Cunningham, *Two years in NSW*, pp. 266-7.

⁴⁶ John Rowland Skemp, *Memories of Myrtle Bank; the bush-farming experiences of Rowland and Samuel Skemp in North-Eastern Tasmania 1883-1948*, Melbourne University Press, Melbourne, 1952, p. 24.

⁴⁷ Ross Hartnell, *Pack-tracks to pastures: a history of the Poowong District*, Centenary Committee, Poowong, 1974, pp. 39-41.

in the denser rainforests. The first pioneers were cedar-cutters and many settlers combined cutting and farming. When felled the immense cedars made enormous openings in the forest, crashing down the undergrowth and smaller trees.⁴⁸ Perhaps from observing this, some cutter-clearer realised that driving any large tree against the scrub was a quicker and cheaper method of clearance. Independently reinvented, perhaps in a number of different places, the new technique gained a wide range of names.

⁴⁸ Alexander Harris, *Settlers and convicts: or recollection of sixteen years' labour in the Australian backwoods*, Melbourne University Press, Melbourne, 1964, 1st. pub. 1847, p. 44. John Vader, *Red Gold: the tree that built a nation*, New Holland, Sydney, 2002, 1st. pub. 1987, pp. 161-175.

The Daintree Rainforest is the largest rainforest in Australia yet it only covers 20% of Australia's land-mass. The Daintree Rainforest is situated north of Cairns in the tropical north of Queensland and gained world heritage listing on the 9th of December 1988. The human impact on the Daintree Rainforest. Farming affects the Daintree Rainforest because farmers burn the rainforest in order to clear land for more farming. Development is affecting the Daintree Rainforest because people are destroying the rainforest to build houses, roads and infrastructure. Mining is a problem because miners clear the rainforest and dig up the ground to extract minerals. Rainforest in Australia. Rainforests are closed forest communities which support a diverse array of humidity dependent flora. In Australia three types of rainforest occur and can be distinguished from each other by their floristic origin, community structure, predominant leaf size, and type and abundance of such accompanying lifeforms as vines, epiphytes, ferns and stranglers. Each rainforest type corresponds with a major climatic zone (Fig. 1). These forests occur as ribbon-like bands in sheltered gullies to the west of the escarpment (Fig. 3). They are restricted to sandy soils along the bottom of gullies and support only a few of the hardiest rainforest tree species. Coachwood is typically the dominant. Brisbane. The Gondwana Rainforests of Australia, formerly known as the Central Eastern Rainforest Reserves, are the most extensive area of subtropical rainforest in the world. Collectively, the rainforests are a World Heritage Site with fifty separate reserves totalling 366,500 hectares (906,000 acres) from Newcastle to Brisbane. The Gondwana Rainforests are so-named because the fossil record indicates that when Gondwana existed it was covered by rainforests containing the same kinds of species that are living... Gondwana rainforests of Australia. This site is comprised of over fifty protected areas sited near or along the Great Dividing Range escarpment, which parallels Australia's east coast. The outstanding geological features of its shield volcanic craters and the high number of rare, threatened and primitive warm temperate and subtropical rainforest species are of international significance for science and conservation. COUNTRY. Australia. NAME. Gondwana Rainforests of Australia [formerly Central Eastern Rainforest Reserves of Australia]. Natural world heritage serial site. 1986: The Aus... The Gondwana Rainforests of Australia contains the largest area of subtropical rainforests in the world and is flourishing with picturesque landscapes just waiting to be explored! The park's clear water pools, incredible waterfalls, and quiet creeks make the location feel like a dream. The lush woodlands provide plenty of trails and guided tours that can take three to five days to explore and hike through. Queensland. Here you can explore Australia's cool and subtropical rainforests through hiking exhibitions. If you're lucky, you may even see the rare Albert's lyrebird while exploring Lamington National Park. In northern Queensland, you can explore the wet tropics such as Kuranda Rainforest as well as the world's oldest tropical rainforest called The Daintree Rainforest.