Forestry Maps and Reference Trees

By Roger Underwood

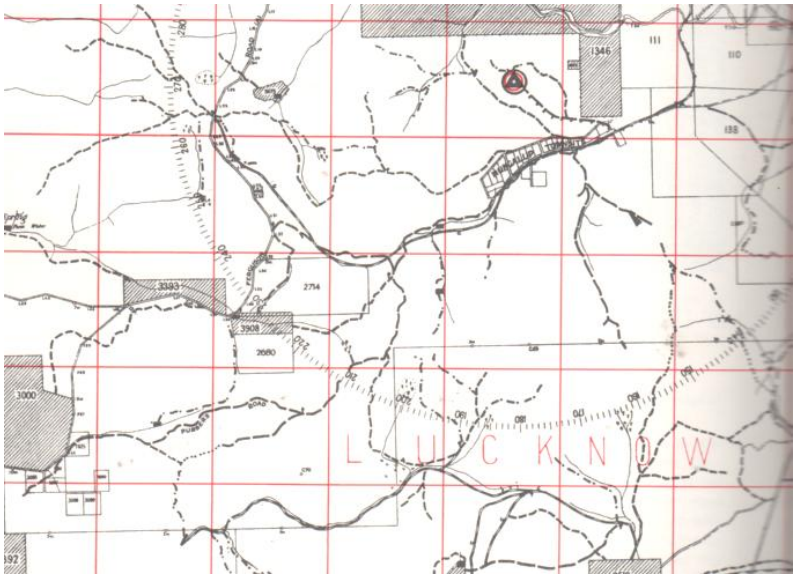
Forest management began in Western Australia in 1918 after the passing of the Forests Act. Amongst other things this established the Forests Department, created the land category of State Forest and led to the appointment of professionally trained foresters to run the department and protect and manage State Forests.

At that time, there was a general idea of the distribution of the southwest forests, but no detailed maps of the forest country. This was especially true of the southern forests for which no maps at all existed, or which were mostly blank. Government mapping undertaken by the Lands and Surveys Dept focused on areas of residential or agricultural settlement, not with the bush.

There were, of course, no aerial photographs and no GPS at that time.

One of the first moves of the first Conservator of Forests was to establish a Drafting (i.e., survey, mapping and cartography) Branch within the Forests Department. Their job was to produce detailed maps of the southwest forests, starting in the north around Mundaring Weir and moving south.

The first forestry map [Endnote1], titled 'FD 1/80', was issued in November 1921. This was the forerunner of what was to become the standard operational scale map of the Forest Department until metrication in the 1970s. 'FD 1' indicated that it was the first in a series, the '80' denoted the scale used for the map, i.e. 80 chains or 1 mile to the inch. After FD 5/80 all subsequent 80 scale maps including reissues of the originals, were given names e.g. FD 1/80 became the Mundaring 80.



Part of the first forestry map for the area just south-west of Collie

When the FD 1/80 map was reissued in 1924 an important innovation was the addition of a grid reference system. This took the form of a grid of inch squares marked over the map. Each square was identifiable by a 4-figure reference of 2 letters of the alphabet for the north/south position (the letters ran down the sides of the map) and two digits for the east/west location (the numbers ran across the

top and bottom of the map). Later, as the State Forest was extended to the east, three digits were required.

Because each square mile encompassed 640 acres, the maps could also be used to estimate area (roughly) by counting squares and parts of squares.

The south-east corner of the department's Walpole district map showing the grid letters down the side, and the grid numbers across the bottom. The mile square in the centre of this picture is identified as KB 118

Many of the forestry officers initially employed by the Forests Department, and most of the officers in the Drafting Branch, had been in the army during the recent War (World War 1). The grid system adopted for forestry maps was based on the system used by the army for their maps and for ranging artillery, with which they would have been familiar.

To produce its own maps, the department had to integrate existing topographical/cadastral information from Lands and Surveys maps with new surveys undertaken by timber industry surveyors, forestry officers and licensed surveyors employed by the Forests Dept. During the 1920s and even up to the 1960s, there were always parties of surveyors in the bush. This ultimately resulted in the detailed forestry maps showing roads, forest tracks, streams, reservoirs, private property, railways, plantations, lookout towers and other detail. A critical role was played by licensed surveyors who used the "high tech" instruments of the day, like theodolites, to establish the exact position of datum points throughout the forest. Forestry officers, using cruder instruments like the oil float compass, Abney Level and steel surveyor's chain, would "tie in" their surveys to the datum points established by the licensed surveyors.

In the squares on the maps small numbered circles were shown indicating the position of ***Reference Trees*** (also known as "Shield Trees and mostly referred to by forestry workers as "Ref Trees"). The original name had been "Bench Mark Trees".

Surveyors had been using marked trees from the earliest days as datum points and benchmarks. Diamond Tree, south of Manjimup was a famous karri tree whose position had been precisely established and then marked with a diamond shaped blaze. It became the starting point of many subsequent surveys. Similarly, there was a "marked tree" on a York gum on the summit of Mt Bakewell at York, from which the early settlers were given information about the location of their selections.

The concept was that marked trees, whose precise surveyed position was known, would be established throughout WA forests and their position shown on the forestry maps. As new roads or railway lines were built, and the route surveyed for plotting on the map, reference trees would be established along them. A sound tree would be selected (always jarrah by preference, but wandoo and karri were also used if jarrah was not available) and a shield shaped piece of bark removed from the tree's side, exposing the heartwood. A hammer and chisel would then be used to cut the numbers of the grid square into the heartwood, and also the number of the tree in that grid square. For example:

This is Reference Tree number 5 in the grid square BW 65.

There were precise specifications for a reference tree shield set out in The Foresters Manual. It had to be about 1 metre in height, 750mm across. cut through the bark and sapwood, and the foot of the shield about 1.5m above the ground.

Incidentally, the reference tree in the picture has a small broad arrow cut into the shield above the letters. This signifies that the position of the tree was established by a licensed surveyor using a theodolite and is thus totally accurate. In the 1960s and 70s the Forests Department employed its own full-time licensed surveyor, Bill Redwood. Ref trees established by Redwood had the letter R cut into the shield. All trees established by theodolite were depicted on the map with a double circle.

It would have been unusual for one grid square to have five reference trees, as with the one shown above. Mostly there would be one or two.

It was also common for the exposed heartwood of the shield to be painted white. This made them easier to see at night and also helped to protect the exposed wood against sun and rain.

Many thousands of Reference Trees were established throughout WA's southwest forests. It was a unique system, adopted nowhere else in Australia as comprehensively.

Reference trees were invaluable for two main reasons:

1. If you were lost, or uncertain of your exact locality, you looked for the nearest “ref tree”. Once you found it (always at the side of the road, or at a road junction) and noted its coordinates, you would consult the map, run your finger down the side and then across to the appropriate grid square, check the number of the tree, and there it was! Immediately you knew precisely where you were in the wide, wide world, down to the nearest few square yards.
2. The ref trees provided a “tie-in point” for subsequent surveys. Say you wanted to survey the boundary of a bushfire, or of an area of regeneration. You would start your survey at a reference tree, survey out the distances and angles from it around your target area, eventually looping around and back to the same point, thus “closing the survey” as the jargon had it. When you got back to HQ, the survey data in your field book would then be plotted onto a map, and you would be confident it was located accurately.

The ref trees also provided convenient meeting places – “I’ll meet you at CN65/2 at 11 am” we would say, and both parties knew exactly where that was.

Forestry officers in those days were all trained (if not professionally licensed) surveyors and knew how to locate and scribe a reference tree. This is a picture of me taken in 1964 south-east of Northcliffe where I was surveying a recently constructed forest road, and inserting the ref trees along the way (the axe work was a bit untidy, and it was not much of a tree, but would have been the best available).

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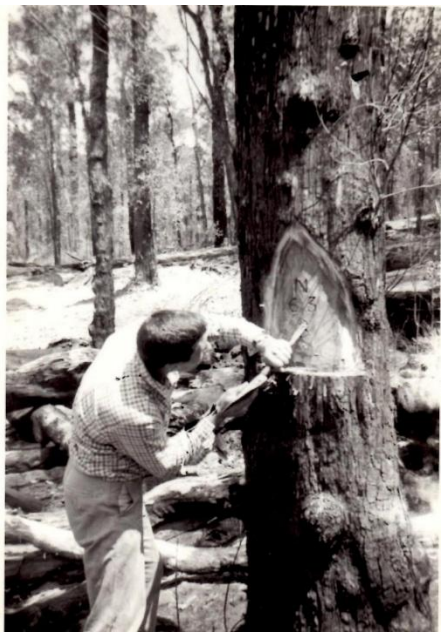
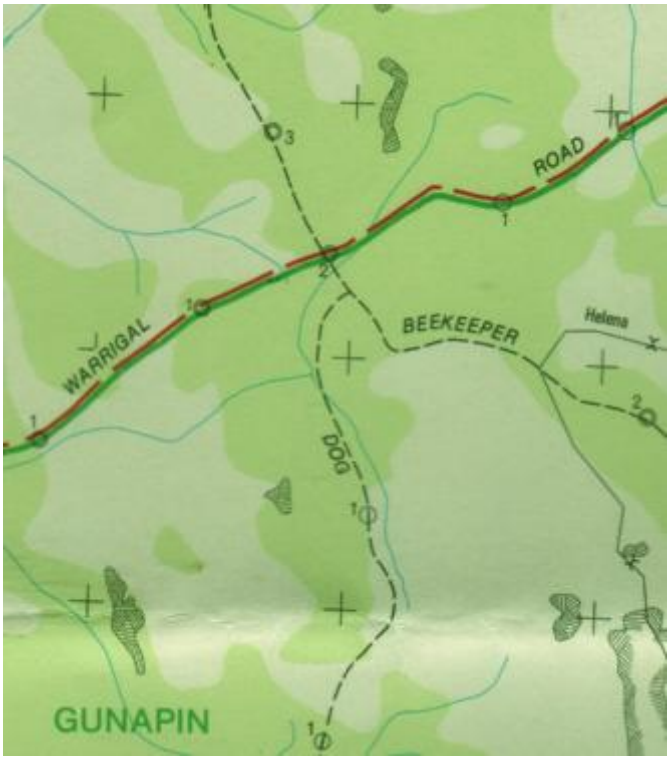


It is characteristic of eucalypt trees that they are highly efficient at repairing a wound. To the tree, a reference shield was not a survey marker, but a wound, and no sooner was the shield cut than the tree would commence growing new bark over it. Forestry officers all carried an axe, and a hammer and chisel in those days, and when you came across a ref tree where the blaze was being overgrown, you would stop and clean it up. Some of the districts actually employed someone who did nothing else but move around the district repairing and repainting ref trees (it was a good winter job for men who worked as fire lookouts over summer). The ref trees were our navigational lifeblood, and we looked after them.

In 1962 when I started my forestry career, the whole of the southwest was by then covered by forestry maps at a scale of 80 chains to the inch, and they were the best maps available. They showed topographic information (roads, railways, streams, rock outcrops etc.), cadastral information (towns, private property, farmland, reserves) and forest type (jarrah, karri, wandoo, pine and mallet plantations). They were the basic tool of bushfire management, with maps in the lookouts, the district office, the fire spotting aircraft and every vehicle. A compass rose was printed on the map around each fire lookout so that bearings could be given for locating a fire outbreak.

Each forestry district had its own map or overlapping maps, for example the “Pemberton 80” or the “Dwellingup 80”. They were multi-coloured and clearly printed. We regarded them as a thing of beauty as well as a tool of management. The maps were constantly being updated to ensure up-to-the-moment accuracy and detail.

When Australia went metric in 1972 all of the old forestry 80s became obsolete overnight. Over the next few years, they were progressively replaced by metric maps at the scale of 1:50,000. These were not as easy to use (everyone understood one inch to the mile, but what does 1:50,000 mean? The nearest I could get was that 1 cm on the map was equivalent to 0.5 km on the ground). Initially the one-mile square grid markers were retained on the metric scale maps, but (I think) they are now left off. Modern maps are produced from aerial photographs using a technique known as photogrammetry. I don’t think there would be many departmental field staff any more who knew how to do a topographical survey and plot it on a map ….



Part of the current metric Gunapin 1:50,000 map showing roads, reference squares, reference trees, rock outcrops and the distribution of wandoo (in darker green).

Today, with the advent of GPS, Reference Trees have also become obsolete. If you need to know where you are, you just dial up a satellite with your mobile phone. The department stopped maintaining

reference trees several years ago, and most are becoming overgrown or in some cases the trees have died, been burnt in a wildfire or blown over in a storm … and not replaced.

I once came across Reference Tree BC 86/1 on a powderbark tree in the Helena catchment, all but grown over.

I suppose the time will come when Reference Trees are no longer shown on maps, thus bringing to a close one of the great forestry innovations of the early 20th century.

There are a few ex-forestry officers who look after ref trees in their own time. For example, I still stop and clean up an old shield if I come across one that needs it, like the one pictured above, and there is a retired forester living in Harvey (Bryan Doust) who has made a project of it and has restored hundreds of ref trees in the jarrah forest. Here below are examples of his excellent work, an overgrown Ref Tree on the left and after restoration on the right:

However, the probability is that as the old foresters die out, so will the ref trees gradually grow over and disappear. Foresters are no longer employed to manage forests in WA, current staff are mostly not interested in forestry history, all carry mobile phones or have GPS in their vehicle, and many young officers would not know what a reference tree was if they stumbled upon one (Endnote 2).

Perhaps groups like bushwalking clubs could include ref tree maintenance as part of their enjoyment of a day in the bush.

Incidentally there was only one area of State Forest where no reference trees were installed. This was the Dryandra Forest. Apparently, the resident foresters were so intimately familiar with the tracks and trails and hills and dales of Dryandra that they never felt the need for ref trees. The legendary District Forester at Dryandra Jack Currie was reputedly able to find his way around the entire forest blindfold.

Finally, I conclude with a comment from my old mentor Barney White, who was my boss when I first started work in the karri country. Back in the early 1950s, Barney had led a survey and assessment team classifying the forest north and north-west of Walpole, thousands of acres of forest that was at the time just a "blank on the map". There were no roads, no reference trees, no surveys. He and his crew camped out in the bush for a month at a time, living under canvas, and eating "The Foresters Seven Day Stew" (Endnote 3) and running survey and assessment lines. "Did you ever get lost?" I asked him once. "Foresters never got lost" Barney told me, "But occasionally we got a bit worried".

Roger Underwood's website of stories about trees and forests can be found at www.forestleaves.blog

Endnotes

1. I consulted John Sclater's excellent book *Lost Your Block* for some of the information presented here and the 1969 Forests Department publication *Fifty Years of Forestry in WA*.

2. DBCA has recently produced an information sheet about ref trees, for the use of staff as well as forest visitors.

3. The Foresters Seven Day Stew is described in my story:

   https://www.forestleaves.blog/post/bush-cooking-notes-on-rough-husbandry-in-the-field