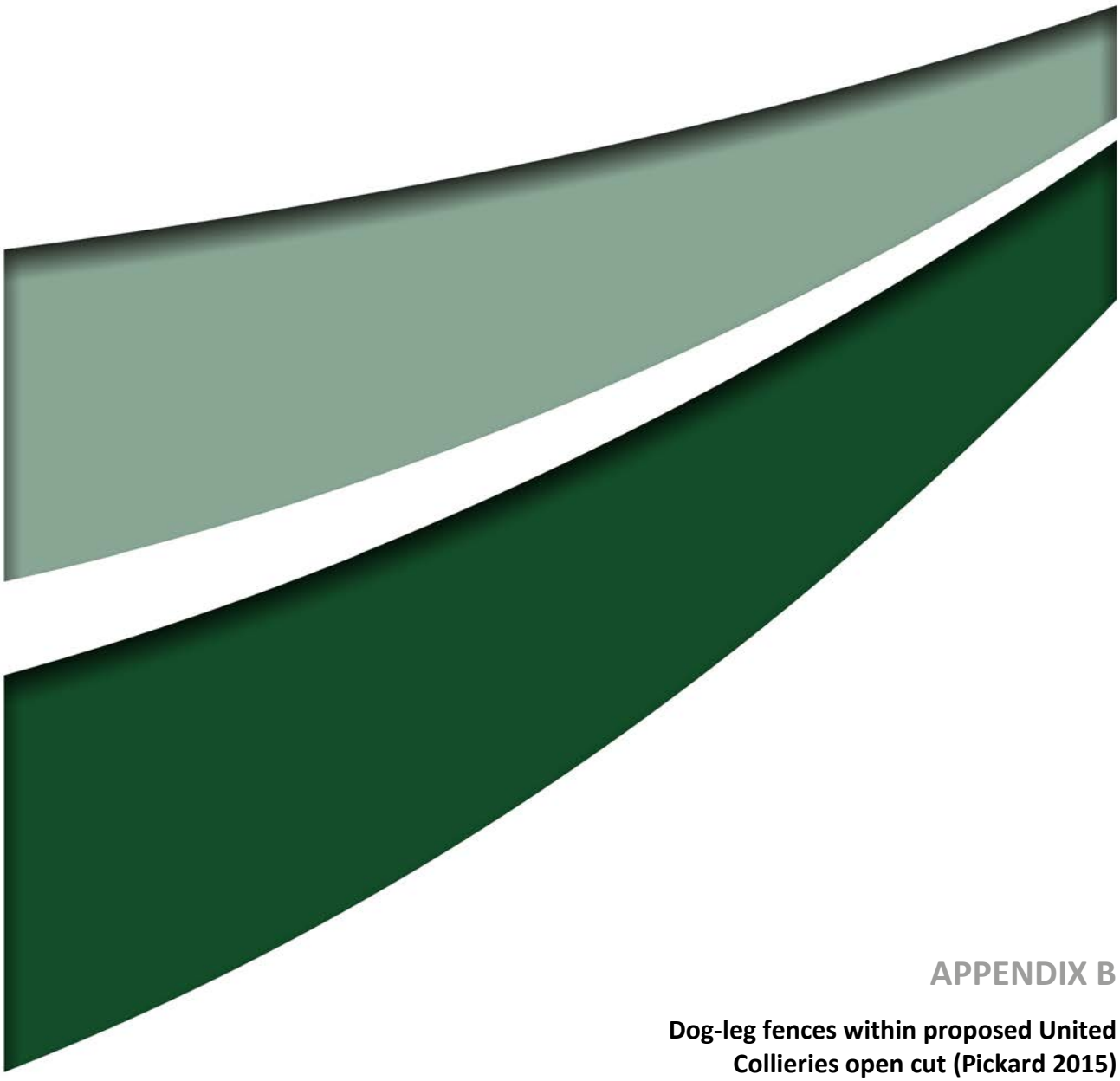

APPENDIX B

Dog-leg fences within proposed United Collieries open cut (Pickard 2015)

Dog-leg fences

within proposed United Collieries open cut

One of the more intact sections of the dog-leg fence. The log on the left rests on a sandstone block and overhangs part-way to the next block. Dog-legs support a decayed top log. The next pair of dog-legs is beyond the ranging pole. [Image 1] DSC_1031 Pic 62.

John Pickard

Report prepared for Umwelt (Australia) Pty Ltd, 8 September 2015

Dog-leg fences within proposed United Collieries open cut

John Pickard

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Date of report

8 September 2015

Purpose of the report

This report has been prepared in response to a request from Umwelt (Australia) Pty Ltd and United Collieries for a report and description of dog-leg fences within the proposed open cut.

Citation

Pickard, J. (2015) *Dog-leg fences within proposed United Collieries open cut.* Unpublished report prepared for Umwelt (Australia) Pty Ltd. 8 September 2015.

Dog-leg fences within proposed United Collieries open cut

John Pickard

Summary

Approximately 1.7 km of dog-leg fence are located either in, or close to the proposed United Collieries open cut. The fence was erected before 1920, most likely in the 1870s along boundaries of Conditional Purchases.

The fence has two logs, both ironbark, the lower supported on sandstone blocks. Pairs of dog-legs rest across the lower log, and support a higher log in their crutch. The dog-legs are split ironbark, and like the logs, were sourced from abundant trees near the fence. The sandstone blocks have shallow circular channels chiselled across their tops forming a more secure bed for the lower log.

While the overall structure is typical of dog-leg fences, the use of sandstone blocks is unique. These blocks are all that remain at the eastern end, the logs being burnt in bushfires. There are no truly intact portions of the fence, and considerable lengths are simply logs lying on the ground.

Approximately 450 m of the fence at the eastern end will be destroyed by the proposed open cut. Within the remaining ~ 1.3 km, there are many places where the original structure is intact, although partially collapsed.

A short length of post-and-rail fence in the north-south section of the fence was erected across a gully where the dog-leg fence would have been unsuitable.

Introduction: dog-legs and dog-leg fences in Australia

Several different Australian fences have been called "dog-leg fences", and some dog-leg fences have been given different names. One of the most common confusions has been between dog-leg fences and cockatoo fences (Pickard 2013; copy attached as Appendix 1). In this section I summarise the range of fence structures called "dog-leg" to provide context to the fence at United Collieries.

Dog-legs

Poles arranged in pairs from either side of a fence and crossing on the top of the fence, forming a crutch in which a log or rail is rested. Dog-legs increase both the height and stability of several forms of fences, and may be integral to the original structure, or added later to raise the height of the fence.

> "**Dogleg**, *adj*. applied to a primitive kind of fence made of rough timber. Crossed spars, which are the doglegs, placed at intervals, keep in place a low rail resting on short posts, and are themselves fixed by heavy saplings resting in the forks above." (Morris 1898, p. 123; **bold** in original)

The log, rail or pole supported by the dog-legs was rarely given a specific name in Australia. 'Jumbuck' (1868, p. 6) called it a "top rail", while Kaleski (1910, p. 65) called it a "cockatoo rail".

I have been unable to determine the origin of the term "dog-leg" as applied to fencing, but is was apparently coined in colonial Australia (Pickard 2013). I have adopted the hyphenated version rather than Morris' single word because it appears to be more common.

Also known as: cross legs, shears, trestles.

Dog-leg fences

In the broadest sense, a dog-leg fence is any form of fence with pairs of dog-legs forming crutches supporting a higher log or rail.

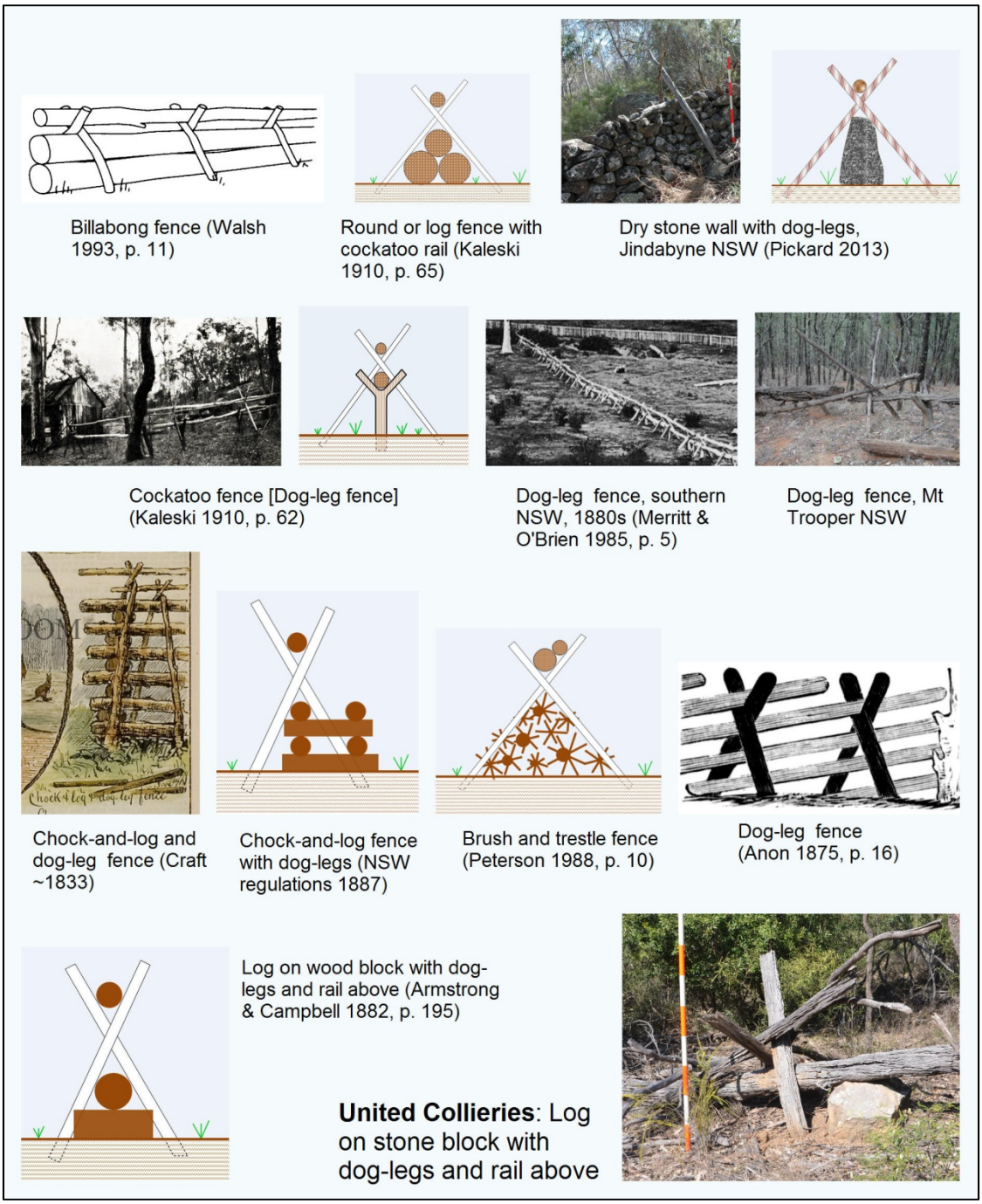
The name comes from the crossed dog-legs and not a fancied similarity to the proverbial dog's hind-leg. Commonly (and incorrectly in many modern interpretations) used as a synonym of zig-zag fences, but unless dog-legs are arranged across the fence, they are more accurately called zig-zag fences.

Also known as: dogs-leg fences.

There are three general classes of dog-leg fences: a fence with dog-legs and rail(s) incorporated from scratch, or added later; forked posts or blocks supporting a rail with dog-legs and rail on top; and crossed poles supporting slanting rails. Dog-legs are integral to the latter classes, and were always incorporated from scratch.

The following variations are described below:

- Brush, log, chock-and-log or other fence with dog-legs
  - Brush and trestles fence
  - Log fence with dog-legs (Billabong fence)
  - Chock-and-log fence with dog-legs
  - Dry stone wall with dog-legs
- Forked posts supporting a rail with dog-legs and rail on top
- Crossed poles supporting slanting rails



Forms of dog-leg fence used in Australia. Diagrams (except for dry stone walls) are interpretations of written descriptions. Note the similarity of the fence described by Armstrong & Campbell (1882, p. 195) using wood blocks, and that erected at United Collieries using stone blocks.

Brush, log, chock-and-log or other fence with dog-legs

Dog-legs could be included in the original structure (e.g. Billabong fence), or added to reinforce and increase the height of a sagging log or brush fence.

Brush and trestles fence

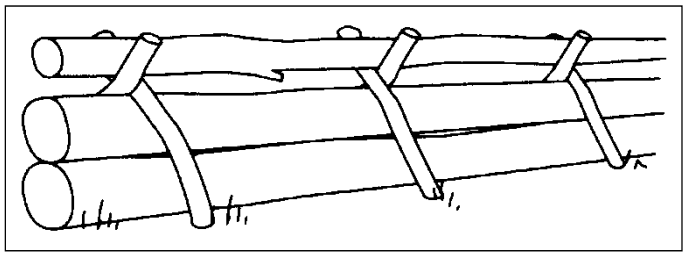
Peterson (1988, p. 10) describes a brush fence with dog-legs used in yards.

> "Forks-and-poles Fence (Cockatoo Fence or Zigzag Fence) A sapling was felled and the next length to the butt, about 9 (2500 mm) or 10 feet (3000 mm) is sawn off and put on one side for the corner post of the milking yard and another length is taken off to be 'run out' or split into rails (Palmer 1961). The residue of the tree was dragged away for use elsewhere on a brush fence. A fork trestle was formed every nine feet; a rail was placed inside the fork and another one placed on top. This was a regional variation, the 'brush and trestles' fence (with trestles of leaning poles or small logs). It was used for small yards (for example horse yards and milking yards), as it was timber-intensive. " (Peterson 1988, p. 10)

Log fence with dog-legs (Billabong fence)

A dog-leg fence with two lower logs, one on top of the other, dog-legs over these, and a top log.

> The "'Billabong fence' (first erected by Mr. Rawdon F. Greene on the Billabong Run) – is formed by laying on the ground a large log, generally not less than 18 inches in diameter; another large log is placed on the top of this; two strong cross legs, from 4½ to 5 feet long, are then put in the ground (one on either side of the logs), and crossed on the top of the second log, at a distance of about twelve feet apart; and in the fork formed by these cross-legs is laid another log, of from six to nine inches in diameter, which firmly binds the two first logs, and forms the upper rail of the fence. This description of fence would cost in average timbered country from £36 to £40 per mile, and in stringy-bark or pine country about £25 per mile." (Gordon 1867, pp. 32-33)



This interpretation of a billabong fence incorrectly shows round instead of split dog-legs as described by 'Jumbuck'. (Walsh 1993, Fig. 1. p. 11)

Under his pseudonym 'Jumbuck', Gordon] (1868, p. 6) gives a more detailed description of building a "Billabong fence".

> "The foundation of the fence is made by laying a number of logs, of any length, and as nearly as possible of a uniform diameter of two feet, longitudinally along the ground on the line in which it is proposed to erect the fence, the ends being so cut and fitted together as to prevent the possibility of the escape of lambs; care also being taken that any inequalities should be chocked up, so that there may be no means of escape under the bottom log.
>
> After the bottom logs have thus been laid along a considerable portion of the line, logs of a somewhat smaller diameter are, in the same manner, laid along on the tops of the former.
>
> Strong 'crosslegs' are then split, sunk in the ground, one on either side of the fence, and made to cross each other on the top of the second log in the usual way; and in the angle formed by this crossing, a large heavy sapling, not less than nine inches in diameter, is

> embedded. This binds the fence firmly, and forms its top rail. The intervals between each pair of crosslegs ought not to exceed twelve feet, and it is desirable, in all cases, to have the cross-legs of split stuff, as it is found that they last longer in the ground than saplings.
>
> From a mere written description it would be difficult for a casual reader to understand how the second log can be elevated to and made to rest firmly on the top of the bottom log. A little practical experience in its construction will soon enable him to overcome the first difficulty by means of a team of bullocks and chain, by the process so well-known to all bullock drivers as ‘parbuckling;’ and the apparent difficulty of the second will vanish if it is borne in mind that very few of the trees in this colony are quite straight, and this, which in most other cases would constitute a fault in the timber, is here turned to account by giving a wider surface for the log to rest upon, than would be the case with the straight pines of America. I have seen and assisted in the erection of miles of this fence, and I have never known either of the above difficulties hard to overcome.
>
> It will be found that the work of construction will be greatly facilitated by first laying the bottom logs in place for as long a distance as possible, and then return to the point of commencement and put up the second logs. In this way the men become more expert by continuing at the same description of work for some time, than by alternately placing a bottom log and then raising another on its top. In fact, the work would proceed more expeditiously and a better fence would be put up, if one set of men and team of bullocks were to be employed solely in placing the bottom logs, and another set kept at work exclusively raising into place the second logs.
>
> The advantages of this fence are, that it is very strong and durable, can be constructed by the ordinary class of bush laborers, and requires the use of few tools.
>
> To the small farmer it will be found to possess an additional advantage, inasmuch as it will utilise a quantity of timber felled for the purpose of clearing the land.
>
> Its disadvantages may be stated as - (1). Like all other bush fences, more liable to fire than post-and rail. (2). The liability of the crosslegs to ‘jump’ or rise out of the ground during heavy rains; and (3). Their liability to rot. As so much depends upon these crosslegs, it is absolutely necessary - if the fence is to be made a lasting one - that they should be of strong, sound, split timber, and well sunk in the ground. The weight of the upper rail will, of course in great measure, determine both their strength and the distance they should be sunk in the ground. Much will depend upon the manner in which the hole is sunk; if made just sufficiently large to receive them, so that the pressure will be on a ‘bone,’ - that is, on soil which has not been disturbed by the spade, there will be little fear of their ever ‘jumping.’ As a rule, the heavier the top rail the stronger and firmer will be the fence.
>
> I can, from experience, recommend this description of fence, but its value will, in some measure, depend on the ‘savey’ [*sic*] of the men employed in its construction.” (‘Jumbuck’ 1868, p. 6)

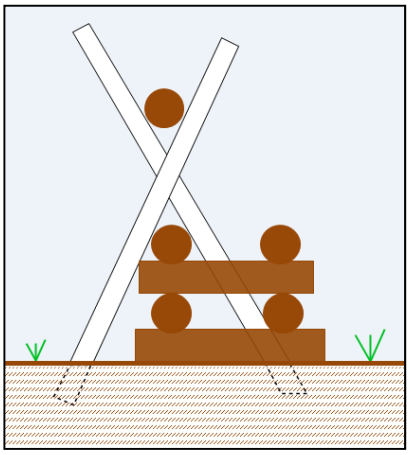
“Dog-and-log fence” is most likely a synonym for a log fence with dog-legs.

> [SA, 1840s] “The ‘ditch and bank’, and ‘dog and log’ fence are occasionally met with.” (Lancelott 1852, Vol. 1, p. 137.)

Chock-and-log fence with dog-legs

The height of a low chock-and-log fence would be raised

> "by placing two straight spars in opposite slanting directions at stated intervals, resting against the top log, and then placing additional logs in the forks formed by these spars." (Armstrong & Campbell 1882, p. 195)



***Left*:** A rather fanciful engraving of a *Chock & log & dog-leg fence* (Detail from Percy R. Craft *c*. 1883 *Hunting the kangaroo*. Image courtesy of The Antique Print Room.) ***Right*:** Interpretation of the NSW 1887 fencing regulation.

By 1887, such fences were regarded as sufficiently permanent that they were included in Regulations under NSW lands legislation for types of fencing satisfying improvement conditions of Conditional Purchases:

> "9. A fence of at least four feet in height, composed of logs and chocks, the chocks to be of no greater thickness than will leave an opening of nine inches between the logs, and the same distance between the lower log and the ground, or composed of logs and chocks, the top log to rest between two crossed stakes (dog-legs) not less than six inches in diameter, and inserted six inches in the ground, with the same distance between the logs as mentioned above, no one log in either case to exceed sixteen feet in length." (NSW 1887, p. 471)

Dry stone wall with dog-legs

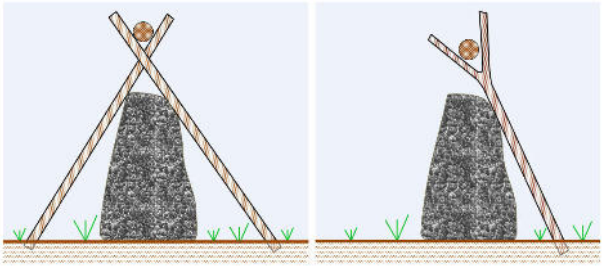
Dog-legs were used to raise the height of a low dry stone wall of granite boulders erected in the mid-1880s near Jindabyne NSW (Pickard 2015). A series of paired cut poles and single forks rests against the wall. Some are regularly spaced ~ 4 - 5 m apart, and at least one fork still has a cut pole resting in its crutch. These poles and forks differ from random tree and branch falls which are generally crooked, often have branches attached, and have broken ends with no evidence of being cut with an axe. It is not possible to determine when the dog-legs and forks were added to the wall. However, given the low height of the wall, it is likely that the dog-legs and rail were incorporated during construction, rather than subsequently as cheap repairs.

A truncated pair of dog-legs across a low part of the wall.

A cut fork resting across the wall still retains the cut pole that was originally supported by dog-legs at its uphill end.

Remains of four dog-legs (arrowed) ~ 5 m apart.

Ranging pole with 200 mm divisions.

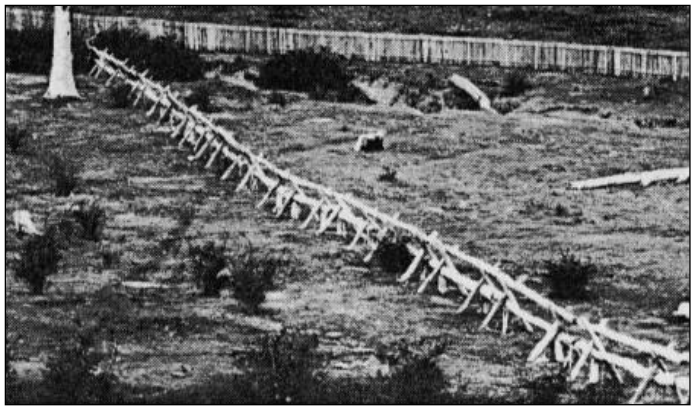


Using dog-legs (*left*) and forks (*right*) to support a log above walls to increase the height of the fence, or to quickly repair a partially fallen wall.

Dog-legs and forks used to increase the height of a dry stone wall. Mill Creek, E of Jindabyne NSW.

Forked posts supporting a rail with dog-legs and rail on top

This is the classic form of dog-leg fence, and was described in detail from Queensland in 1878, and more generally in 1882.



Dog-leg fence on 'A cleared property in Southern New South Wales, c. 1880'. (Detail from Merritt & O'Brien 1985, p. 5)

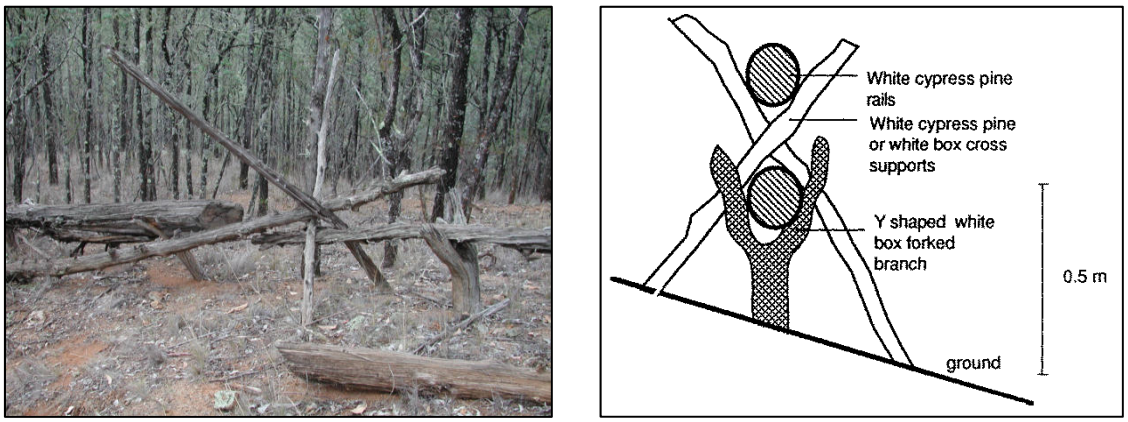
> [Qld] "Cattle men have wasted, and still continue to waste, great sums on what some call 'dog-leg,' but the original name of which is the 'cockatoo' fence. This fence is only to be endured for the sake of the clearing the land which the construction of it causes; one mile of it consists of 1200 pieces of timber, which I reckon will clear off 1000 trees, …

> It is erected by putting in the ground stout forks, 12ft apart and 12in. deep; these forks must not be less than 6in. through at the junction of the fork; on this the first spar is laid, and it should overlap the forks 2ft at each end. Across this, at each end, put in two shear legs, 8ft. long, 5in. diameter, and not less than 15in. in the ground; this depth is of vital importance to the goodness of the fence - the shallow depth these shear legs are generally put in is the cause of so many of the small settlers' fences giving way. Also remember that the more spread these legs have the stronger the fence will be; again, great care is required in making the back of the hole for these legs *perpendicular*. On the top of the shears put the top rail - this should be the heavier of the two, and should not be less than 5in. in diameter at the small end.
>
> If made of good ironbark wood, and all the timber barked, it will last six years; if well looked after, and faithfully erected according to my directions, it may last eight or nine years. If not barked the fence is useless, and will most assuredly be burnt down the very first fire. This fence can be erected, in the coast country north of Maryborough, for about £30 a mile - teams to be found by station. I forgot to say that the small end of the one spar should be held down by the big, or heavy, end of the other." ('An ex-station manager' 1878, p. 27) [paragraphs added for clarity]

The lower log could also be supported on a block or chock of wood.

> "A two-rail [dog-leg] fence may be formed by *placing one log upon sawn blocks*, or in forks, sunk into the ground, and about 2 feet from the surface, and completing the fence in the manner we have just described." (Armstrong & Campbell 1882, p. 195) [*italics* added for emphasis]

The United Collieries fence substitutes large stone blocks for forks or Armstrong & Campbell's sawn blocks to support the bottom log.

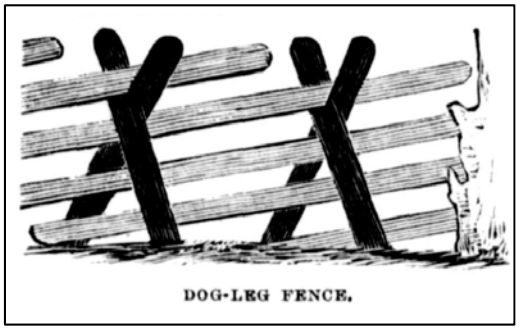


Left: Lateral view of dog-leg fence showing forked posts of white box supporting logs of white cypress pine. The bottom logs were laid with their butts uphill, and head-to-butt with adjacent logs. The upper logs were laid in the crutch formed by the white cypress pine dog-legs with butts downhill. One partly dislodged log remains. The log in the right foreground was a second-layer log, but fell as the next pair of dog-legs collapsed. The dog-legs are midway between the forked posts. Neither the logs nor the dog-legs are split. Mt Trooper, S of Ingebyra NSW. ***Right:*** End elevation of the dog-leg fence at Mt Trooper. (Pulsford 1991, Fig. 3.1) (Image courtesy of Ian Pulsford, © 1991)

Crossed poles supporting slanting rails

This is the most uncommon form of dog-leg fence, and no extant surviving example is known in Australia.

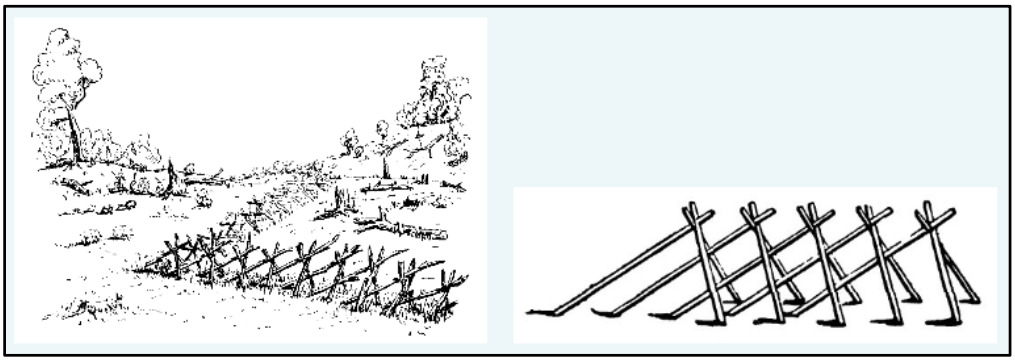
> [NSW] "Dog leg Fence. This fence is put up with strong split stakes, not less than 6 inches by 4 inches charred at bottom, and let one foot into the ground. The rails perfectly straight, 16 feet in length, and no less than 6 inches at the smallest end. A fence like this at Gurley, near Narrabri cost £42 per mile, everything found to the contractor." (Anon 1875, p. 16)



(Anon 1875, p. 16)

> [Tas, 1870s] "… the dog-leg fence, formed by crossing two short spars and leaning upon them, where they cross, a longer spar and so on. This description of fence is only fit for internal use on a farm, and cannot be recommended in any respect, except for cheapness of construction." (Furlong 1982, p. 96)

Identical structures are described from New Zealand, and Central Europe.



***Left*:** "Dog-leg fence" from New Zealand (Hargreaves 1965, Figure 2, p. 47). ***Right*:** "Primitive paling fence" from central Europe (Loudon 1826, Figure 389, p. 442).

Rolls' (1984, p. 192) description of a dog-leg fence on Upper *Cumble Run* (north of Baradine NSW) in 1885 appears to be a different form again, with diagonally crossed rails in the line of the fence and dog-legs across the fence:

> "These popular fences were based on short posts sunk about fifteen centimetres into the ground. Each panel was formed by butting a long rail against one of the upright posts and leaning its top on the next, then butting another long rail against the bottom of that post and leaning it on top of the first. They naturally crossed in the middle of the panel. When similar rails were put in the adjacent panels, their ends crossed over the tops of the upright posts. Each upright post thus had rails butted against it on each side and rails leant on its top from each side. Other shorter rails were driven into the ground each side of the upright posts and leant towards the line of fence so that they crossed in the cross on top of each upright. More long rails were then lifted into the forks. These fences were as

> insubstantial as a tower of cards. Each rail supported and was supported. A rogue horse or cow could demolish panels a day."

It is difficult to see how this structure could be stable unless the posts were forked, and this is probably why Rolls considered them "a tower of cards".

Fences on the proposed United Collieries open cut

Information on survey plans

Seven plans cover the relevant portions within or adjacent to the proposed open cut. No fences are shown on the earliest plans (1867 – 1873).

Summary of survey plans and legislation, 1867 - 1980

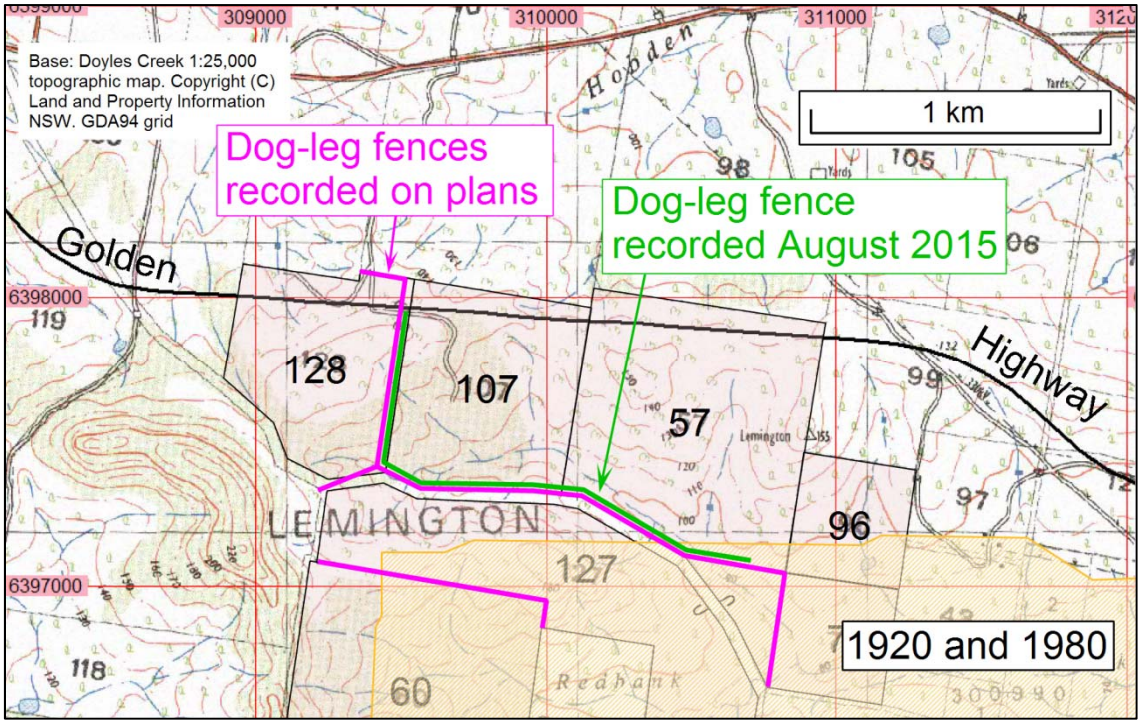
Date	Portion / lot	Plan	Legislation
20 Nov 1867	7	140.1538	S. 13 *Crown Lands Alienation Act 1861*
5 May 1871	57	255.1538	
15 Feb 1872	96	280.1538	S. 21 *Crown Lands Alienation Act 1861*
6 Feb 1873	107	311.1538	
19 Jun 1920	127	H1572.1538	S. 44 *Crown Lands Consolidation Act 1913*
	128	H1573.1538	S. 87 *Crown Lands Consolidation Act 1913*
11 Apr 1980	1	DP617852	

Blue shading indicates that no fences were recorded on plans.

Section 13 of the *Crown Lands Alienation Act 1861* (NSW) allowed selection of between 40 and 320 acres of unoccupied Crown land as a Conditional purchase under conditions laid in S. 18. Basically the purchaser paid a deposit, had to reside on the land and effect certain improvements of a permanent nature. Holders of Conditional Purchases under S.13 could also apply for further land (Additional Conditional Purchases) under S.21. If the purchaser met the conditions and paid the balance of the purchase price, they could complete the sale and freehold tenure would be granted. Alternatively, the purchaser could chose to indefinitely pay interest on the outstanding balance.

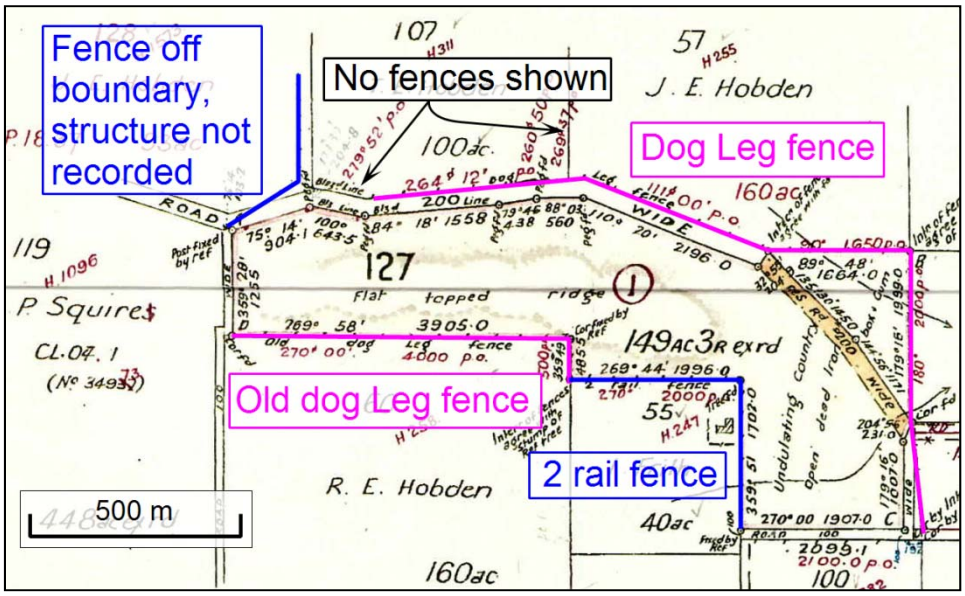
Section 44 of the *Crown Lands Consolidation Act 1913* (NSW) was an extended version of S.13 of the 1861 legislation. It allowed both Conditional Purchases and Additional Conditional Purchases. under conditions in S.174-182. Section 48 required fencing within three years, and maintained for a total of at least five years. Sections 199-203 list conditions on boundary fencing. Section 87 of the *Crown Lands Consolidation Act 1913* (NSW) allowed Conditional Purchases within "classified land". Portion 128 was within land set aside for Additional Holdings.

A common feature from the first creation of Conditional Purchases was the requirement to improve the land as part of the conditions. Improvements included ring-barking, building a hut, digging wells or dams for water, and erecting fences. Unless an extension was granted, fences had to erected within three years, and the types of fences permitted were specified in Regulations (e.g. NSW 1887).

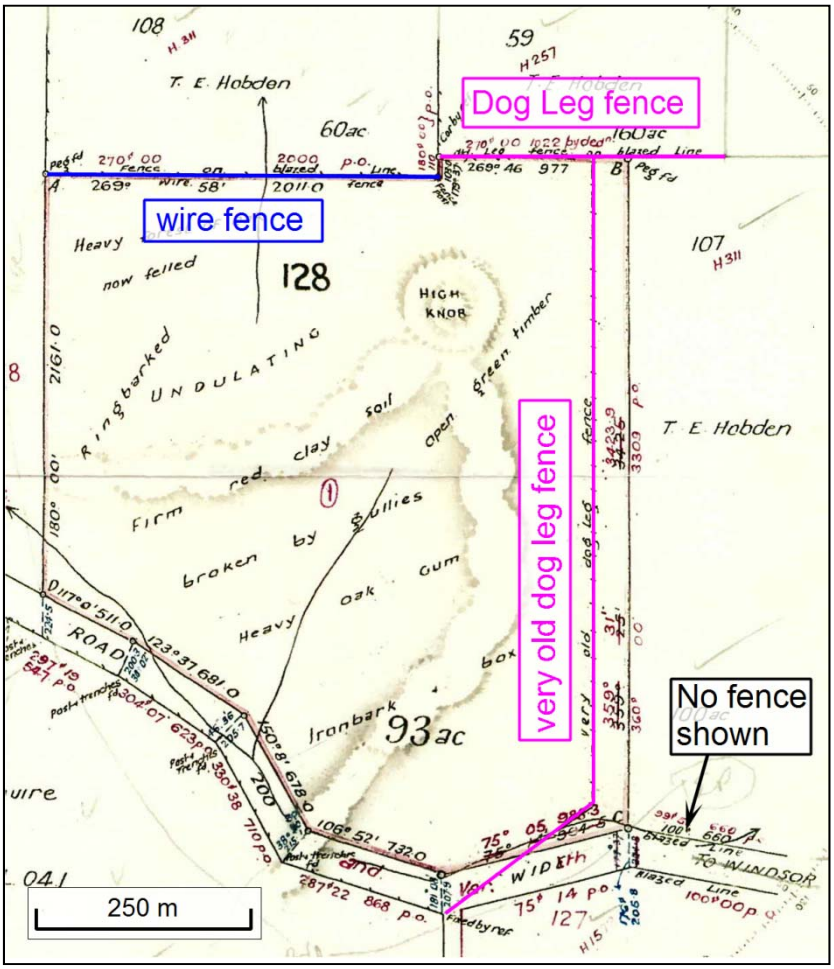


Dog-leg fences recorded on survey plans in 1920 and 1980 (pink lines) and recorded in August 2015 (green line). Relevant historical portions and the proposed mine expansion (orange shading) are shown.

No fences were recorded on the first plans of Portions 7, 57, 96 and 107. This is to be expected as the surveys was relatively soon after the blocks were selected, and within the three years permitted to erect boundary fences.

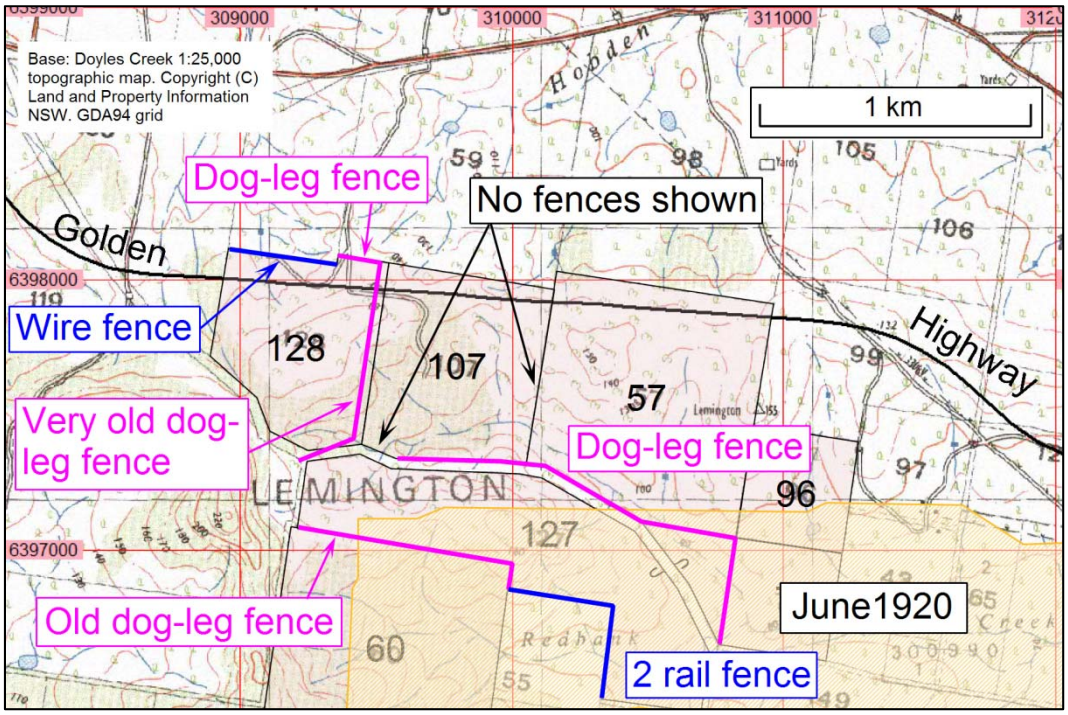


(Detail of plan H1572.1538, Portion 127, Parish of Lemington, County of Hunter).



(Detail of plan H1573.1538, Portion 128, Parish of Lemington, County of Hunter).

Fences recorded on survey plans of Portions 127 and 128, June 1920.



Summary of fences recorded on survey plans June 1920.

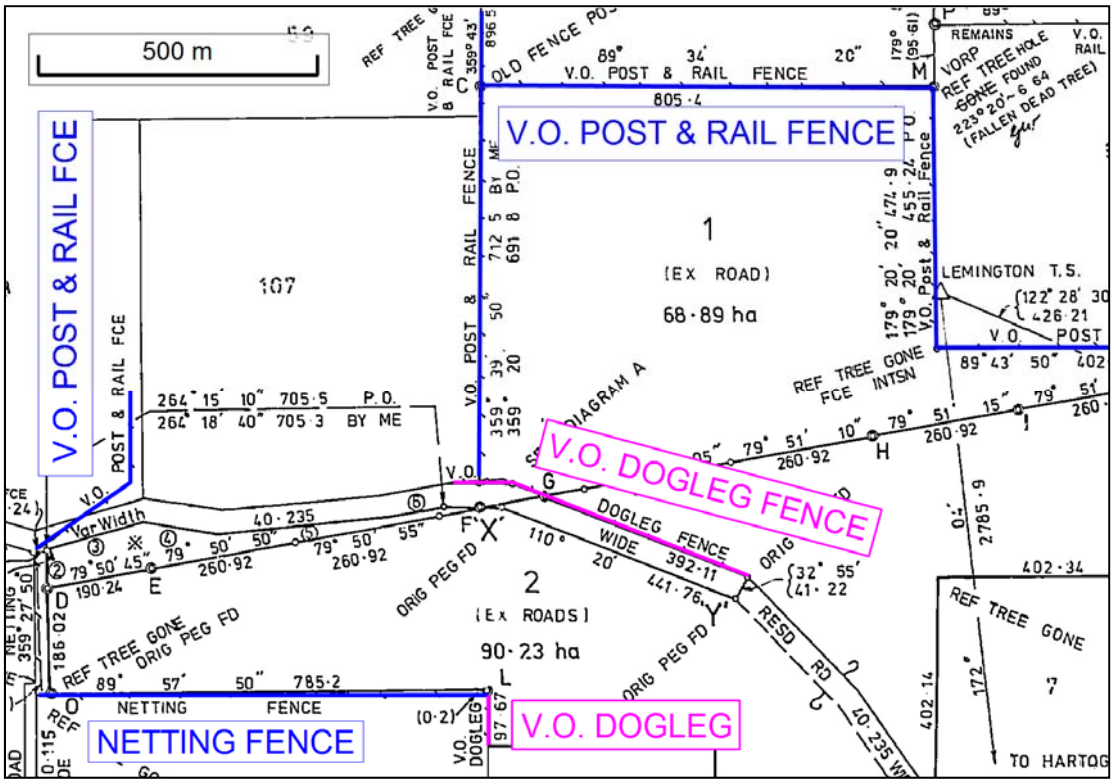
A dog-leg fence ran along most of the northern boundary of Portion 127, but a short gap was shown as a "Blaz[d] Line" in the south-west corner of Portion 107. The "very old dog leg fence" in Portion 128 was likely to have been erected as the western boundary fence of Portion 107 although it was built with a consistent error of ~35 m beyond the actual surveyed boundary.

Neither of the 1920 plans records a fence in the south-west corner of Portion 107. Instead a blazed line is noted. It is difficult to believe that a blazed line was more important to record than a permanent improvement like a fence. Especially if the fence is on a surveyed boundary. Consequently, this suggests that the dog-leg fence was incomplete, and not yet linked to the north-south fence less than 200 m away.

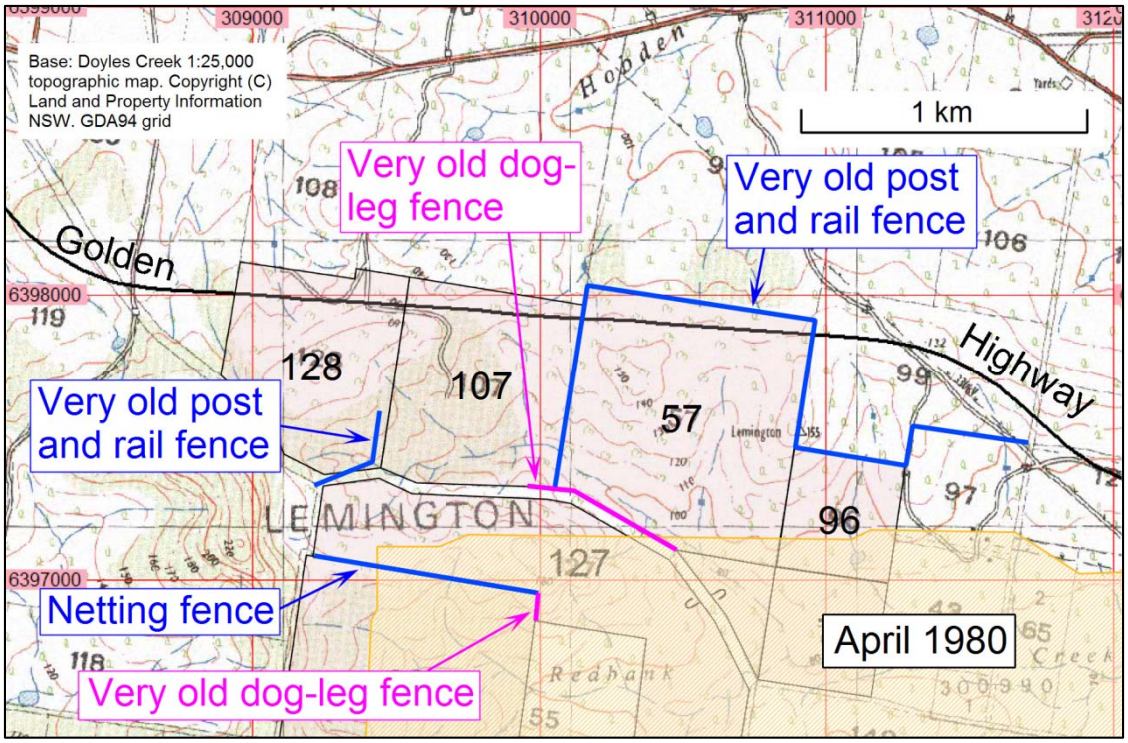
No fence was recorded on the common boundary of Portions 57 and 107.

Taking the annotations about age at face value, then the dog-leg fences can be arranged in a relative age sequence, possibly suggesting the order in which they were erected. If this is correct, then the western section of the fence in Portion 107 may well have been incomplete, with the boundary marked with a blazed line. However with no confirmation from other evidence, this is speculative.

Boundary	Description	Relative age
Por. 128 / Por. 107	"Very old dog-leg fence"	Oldest
Por. 127 / Por. 60	"Old dog-leg fence"	
Por. 107 / Pors 57 and 127	"Dog-leg fence"	Youngest



(Detail from DP 617852, Lots 1 and 2, Parish of Lemington, County of Hunter).



Summary of fences recorded on survey plan April 1980.

The survey in April 1980 combined and subdivided Portions 57, 96 and 127 (and others that are not relevant to this report) into Lots 1 and 2. A “very old dog-leg fence” was recorded along the southern boundary of Lot 1, extending into Portion 107. The fence in Portion 128 was described as

a “very old post and rail fence”, as were boundary fences around what had been Portions 57 and 96. The “old dog leg fence” recorded on the boundary between Portions 127 and 60 had been replaced with a netting fence, except for a short length at the eastern end.

Together the plans provide both complementary and conflicting information on the fences. Neither of the 1920 plans records a fence in the south-west corner of Portion 107. Instead a blazed line is recorded, suggesting that the dog-leg fence was incomplete, and not yet linked to the north-south fence less than 200 m away. Although there is little room on the plan in this corner, it is difficult to believe that a blazed line was more important to record than a permanent improvement like a fence. Especially if the fence is on a surveyed boundary.

The relative ages in the descriptions suggest that this boundary was the last fenced, and so the western gap with a blazed line may indeed have been the final, incomplete, section of the fence. One reason may be that the fence crossed a large creek east of the corner, and the owner may have been contemplating how to build a fence across a creek 4 m deep and 10 m wide.

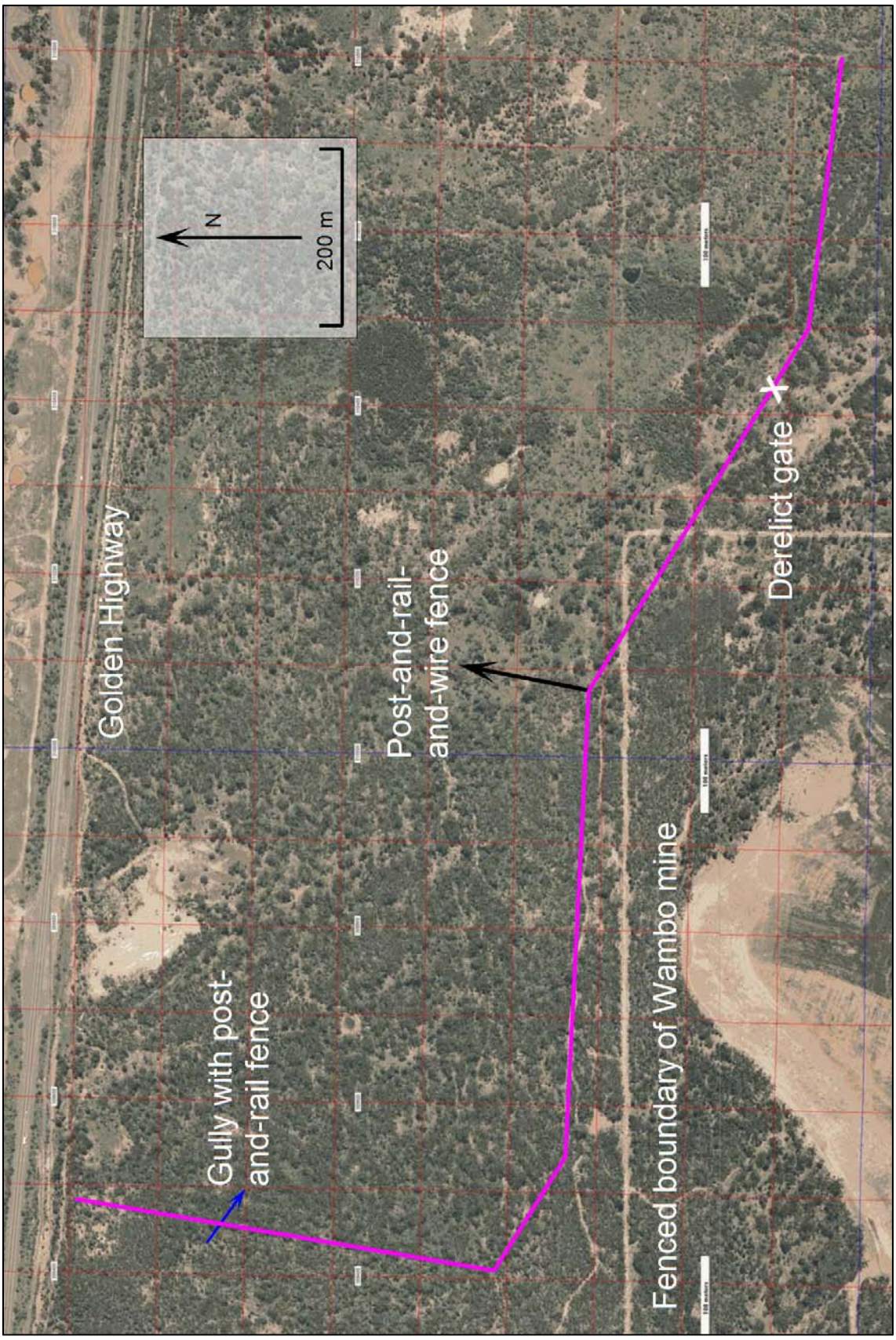
The 1980 plan shows a “very old” dog-leg fence extending west beyond the south-east corner of Portion 107. The plan offers no information on the fences in the south-west corner, but as this was well off the line being surveyed, it is not surprising.

Field inspection

After a visitor site-induction, and driving to the eastern end of the fence, the full length was walked, photographed, and recorded at a reconnaissance level on 19 August 2015. Weather was fine, sunny and warm. Bushes and branches were cleared off the fence at several places to improve visibility, but no component of the fence was disturbed. Despite problems with one GPS, tracks and image locations were recorded on two others.

Party: Dr John Pickard, Aislinn Farnon (Approvals Manager, United Collieries), Tim Adams and Alison Lamond (Umwelt (Australia) Pty Ltd).

Field inspection route (red line) and location of images in report. (Google Earth base).



Extent of surviving dog-leg fence (pink line), showing location of derelict gate, post-and-rail fence in northern section, and post-and-rail-and-wire fence running north. (Google Earth base).

Description of the dog-leg fence

The fence is built on, or close to and parallel with, portion boundaries, but the type of stock (sheep, cattle or both) being constrained is unknown.

Structure

The basic structure of the fence is two logs supported by sandstone blocks and dog-legs. The blocks are variably spaced, but usually 3 – 4 m apart. Lower logs span at least two, but more often three or four blocks, resting in channels chiselled across the blocks. Dog-legs are arranged mid-way irregularly between blocks, and support the higher log. Both top and bottom logs are generally laid butt-to-butt and head-to-head.

Despite the Conditional Purchase fencing regulations specifying a maximum gap of 9 inches between logs and between the bottom log and the ground, many gaps in the fence would have been wider. In several places, rocks have been packed under it to close the gap. Logs have also been used.

Because of the current condition of the fence, it is not possible to determine its original height, but it is likely to have been about 4 feet, the height required to meet the regulations about improvements on Conditional Purchases.

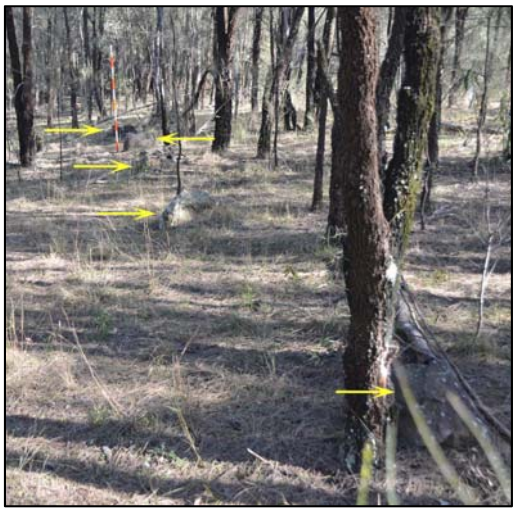
The fence was very robust with large heavy components contributing to stability and resistance to stock. A gate was erected in the fence, but the posts have fallen, and the gate removed.

[Image 2*] DSC_0997 Pic 26.

Typical examples of the dog-leg fence showing structure.

[Image 3] DSC_1052 Pic 85.

* indicates image location on satellite image.



[Image 4] [DSC_0973 Pic 2. Stone blocks (arrowed) are all that remain of the fence at the eastern end. Logs and dog-legs have been burnt in bush fires.

[Image 5] DSC_1049 Pic 81. Recurrent bush fires will inevitably consume the remaining logs in dense shrubby regrowth on the boundary between Portion 57 and 107.

[Image 6] DSC_0982 Pic 12.

One of the very few intact dog-legs at the eastern end of the fence.

[Image 7] DSC_0986 Pic 16.

[Image 8] DSC_1030 Pic 61. Two bottom logs sitting on blocks, and arranged butt-to-butt.

[Image 9] DSC_1021 Pic 52. Rocks packed under the bottom log to reduce the gap and prevent stock escaping. Two pairs of dog-legs remain, one in front of the tree immediately beyond the log. and the other near the ranging pole.

[Image 10] DSC_1065 Pic 98. The large gap formed by the upward arch of the two bottom logs has been filled with a log between the blocks.

[Image 11] DSC_1000 Pic 31. Derelict gate-way in the dog-leg fence. The gate was most likely a double-leaf wooden barred gate, swung off the posts in the foreground and immediately left of the ranging pole. Stone blocks (arrowed) show the continuation of the fence beyond the gate.

[Image 12] DSC_1046 Pic 78. Junction of fences in the southern end of the boundary between Portion 107 and 128. The end assembly at the ranging pole is on the lip of the step creek bank ~ 6 high. Wire was used across the creek. A stone block and bottom log in the foreground are part of the north-south fence, but the dog-leg fence running east is out of the image.

Components

The fence has four components: sandstone blocks, lower and upper logs, and dog-legs.

Blocks

Sandstone blocks supporting the bottom log vary in spacing, shape and size. Spacing is irregular, but generally 3 – 4 m. Blocks vary from almost cubical to slabs, but regardless of shape most have a shallow channel chiselled across the top to form a more stable bed for the bottom log. Many blocks are partially buried by sediment, but dimensions are generally within the range of 0.3 – 0.5 m high, 0.5 – 0.8 m wide, and 0.3 - 0.4 m thick. Lithology varies from coarse sandstone with petrified wood fossils to fissile finer-grained sandstone. Rock outcrops along the line of fence, or nearby, provided the blocks.

The blocks were most likely moved from to the fence using horse- or bullock-drawn sleds.

[Image 13] DSC_0977 Pic 6.

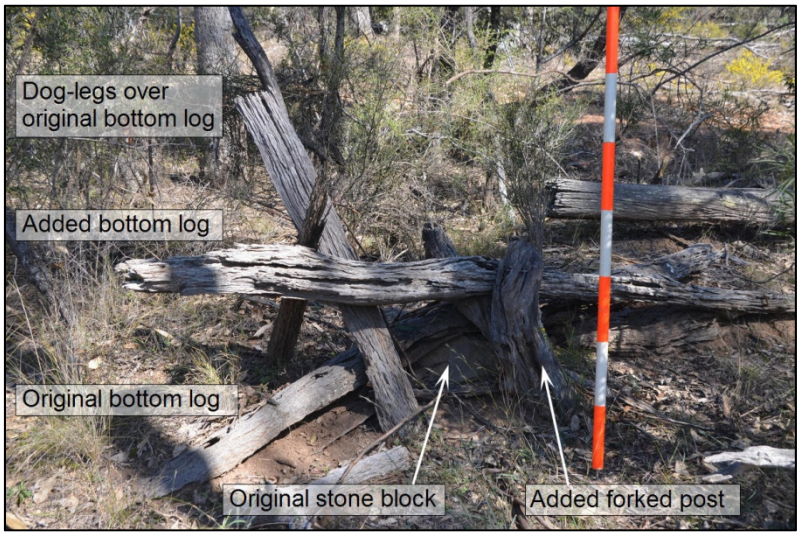
[Image 14] DSC_1002 Pic 33.

[Image 15] DSC_1053 Pic 86.

[Image 16] DSC_1055 Pic 88.

Variations in stone blocks used to support the bottom log. Note the channel chiselled across the top of the blocks. The lower right block is splitting along bedding planes.

In a reversion to the "standard" type of dog-leg fence, a forked post was used as a repair. Presumably it was easier to use a fork than the same or another stone block.



[Image 17] DSC_1008 Pic 39. A forked post has been used to repair the fence, adding another bottom log, probably to replace the original log which had rotted. Why a fork was used and not another stone block is unknown.

Logs

Several species of ironbark are abundant in the area and along the line of fence. Although much of the ironbark today may be regrowth after initial clearing decades ago, they show that the trees grow straight with little taper, forming ideal logs for the fence.

The most striking feature of the logs used in the fence is their sheer size. One log, 12 m long would have weighed over 600 kg when cut; another, 10.5 m long weighed 700 kg. Moving such long and

heavy logs through the open forest or woodland to the line of fence and then lifting them on to the dog-legs would have been difficult and very physical work.

Position*	Length (L) m	Butt dia (D) m	Head dia (d) m	Green mass** kg
Top	7.5	0.20	0.11	174
Bottom	12.0	0.30	0.16	617
Top	10.0	0.13	0.09	115
Bottom	10.0	0.23	0.17	380
Bottom	10.5	0.30	0.23	700

* Position: top or bottom log in the fence.

** Calculated assuming that the logs form frustums of cones.
Volume = 0.2618 L (D^2 +Dd + d^2), and assuming green density of ironbark 1,200 kg m^3 (Bootle 1983, pp. 420-421)

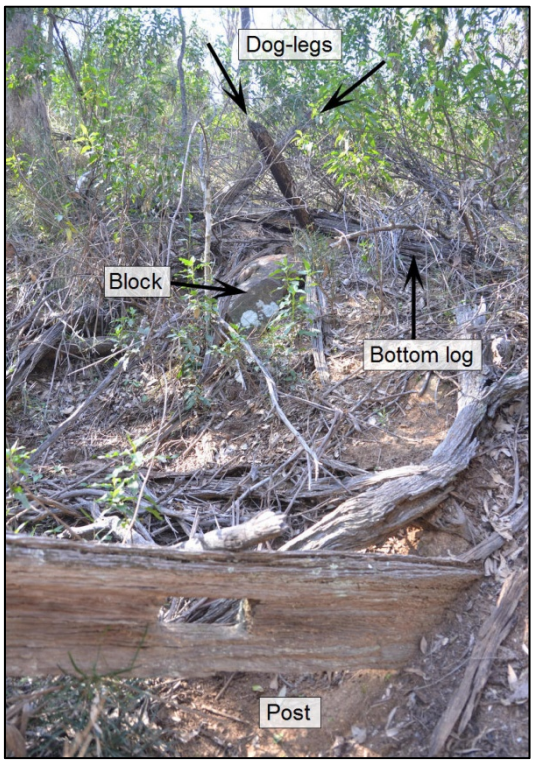
Dog-legs

Dog-legs are split ironbark, generally in the range 130 - 160 mm wide and 40 – 90 mm thick. The original length is unknown. Although many remain, very few are in close to their original positions.

[Image 18] DSC_1011 Pic 42. Termite tracks on split dog-leg.

Post-and-rail fence in gully on N-S section

A steep gully run east across the fence on the north-south section, the boundary between Portions 107 and 128. The steep sides of the gully make a dog-leg fence impracticable, so a short length of split post-and-2 rail fence was erected. None of the rails is in place, and the posts are either leaning precariously or fallen.



[Image 19] DSC_1058 Pic 91. Looking north out of the gully past a split post to the continuation of the dog-leg fence on the lip of the gully. The foot of the post is ~ 1.5 m below the block.

Post-and-rail-and-wire fence on boundary of Portions 57 and 107

A split post-and-2 rail-and-2 wire fence runs north from the dog-leg fence north along the boundary of Portions 57 and 107. This was not recorded on the 1920 plans, but was labelled a post-and-2 rail fence on the 1980 plan. Apparently the surveyor missed the empty wire holes in the posts.

This is a typical example of a fence of this structure, with posts 8’ apart. The split rails are missing, perhaps removed for re-use in another fence. All the wire has been pulled, again, for possible re-use in another fence. The size of the holes in the posts, although enlarged by decay and fires, indicate that plain wire was used.

[Image 20] DSC_1017 Pic 48. Split posts on the boundary between Portions 57 and 107. Arrows indicate wire holes.

By the 1920s, post-and-rail-and wire fences were obsolete. Including the rails constrained panels to 8 feet, and thus negated many of the advantages of wire. Although the 1920 plans do not show this fence, it is unlikely to have been built after the survey. In this case, absence of evidence is not evidence of absence.

CONCLUSIONS

While the condition of the fence is poor, there are enough semi-intact sections to enable the original structure to be deciphered. The fence is a unique form of dog-leg fence using stone blocks to support the bottom log. No other examples have been described or have been recorded.

The lack of logs at the eastern end clearly shows the long-term effects of recurrent bush fires, and it is inevitable that the rest of the fence will burn sooner or later. The fence on the north-south boundary between Portions 107 and 128 is in very poor condition, with most sections collapsed and many logs splitting from age. Dense scrub here makes further fire damage inevitable.

Protecting the fence against fire would be impossible. Hazard reduction is not a preferred option on land associated with open-cut coal mines, and mechanical fire breaks are simply not wide enough to be effective in this type of vegetation.

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Member Professional Historians Association.

8 September 2015.

QUESTIONS

Although peripheral to the present report, several questions remain unanswered, and may never be answered unless a farm diary or wages book is found with daily records of employment, work performed, etc.

The age of the dog-leg fence.

To meet the requirements of Conditional Purchases, fences had to be built within three years. But for various reasons, this was often delayed, and so simply adding three or four years to the date the Conditional Purchase started is not a reliable calculation of the age of the fence.

Searching the various files associated with each Conditional Purchase for inspection reports *may* provide definitive information on who built the fence and when.

How the fence was actually constructed.

In the modern era of large and powerful machines, it is easy to forget that the dog-leg fence was built with hand-tools and muscle power: human, horse and bullock. Bottom logs could be levered and lifted onto the blocks, but the top logs are more difficult. They have to be lifted over the dog-legs and into the crutch formed by the dog-legs. In some cases, this would mean lifting the log nearly 2 m off the ground to clear the tops of the dog-legs. Although 'Jumbuck' (1868, p. 6) describes using a parbuckle to place logs one on top of another, this technique would not work with the top log. Perhaps they were lifted by a team of men.

How many men were employed to erect the fence

In his description of the Billabong fence 'Jumbuck' (1868, p. 6) suggests using different teams to work simultaneously on different aspect of the fence. If a similar approach was used when erecting the dog-leg fence in the proposed open-cut, this requires integration of several activities. These may operate simultaneously or sequentially when material has been stockpiled. These include:

Quarrying, transporting, setting and chiselling channels in blocks.

Felling trees and cutting to length for logs, snigging logs to fence with bullocks.

Felling trees and cutting to length for dog-legs, splitting, transport to fence in drays.

Lifting bottom logs onto blocks.

Setting dog-legs.

Lifting top logs into crutch.

How long did the fence take to build

This is clearly related to how many men were employed, but also to the owner's finances and other priorities for attention, and how closely the three-year time limit for fencing was policed.

REFERENCES

'An ex-station manager' (1878) Fencing. No. I. *The Queenslander* (Brisbane) Saturday 5 October 1878, p. 27.

Anon (1875) Bush fences. *Australian Town and Country Journal* (Sydney) Saturday 23 October 1875, p. 16

Armstrong, A.S. & Campbell, G.O. (1882) *Australian sheep husbandry: a handbook of the breeding and treatment of sheep and station management. With concise instructions for tank and well-sinking, fencing, dam-making &c*. George Robertson, Melbourne.

Bootle, K.R. (1983) *Wood in Australia. Types, properties and uses*. McGraw Hill, Sydney.

Furlong, C. (1982) *The settler in Tasmania 1873 -1879*. Sullivan's Cove, Adelaide.

Gordon, P.R. (1867) *Fencing as a means of improving our pasture lands and its advantages to the stock-owners and the Colony, with suggestions for a Fencing Bill, and the improvement of pasture by means of sapping*. William Maddock, Sydney.

Hargreaves, R.P. (1965) Farm fences in pioneer New Zealand. *New Zealand Geographer* **21**, 144-155.

'Jumbuck' [Patrick R. Gordon] (1868) Fencing. *The Brisbane Courier* (Brisbane) Saturday 17 October, p. 6.

Kaleski, R. (1910) *The Australian settler's guide*. Anthony Hordern & Sons, Sydney.

Lancelott, F. (1852) *Australia as it is: its settlements, farms and gold fields*. Colburn and Co., London. Volume 1.
http://www.archive.org/details/australiaasitisi01lanciala

Loudon, J.C. (1826) *An encyclopaedia of agriculture; comprising the theory and practice of the valuation, transfer, laying out, improvement, and management of landed property; and the cultivation and economy of the animal and vegetable productions of agriculture, including all the latest improvements; a general history of agriculture in all countries; and a statistical view of its present state, with suggestions for its future progress in the British Isles*. Longman, Hurst, Rees, Orme, Brown, and Green, London.
https://archive.org/details/anencyclopdiaag00loudgoog

Merritt, A. & O'Brien, C. (1985) *The striding years. Squatters and selectors in 19th century Australia*. CCH Australia Limited North Ryde.

Morris, E.E. (1898) *Austral English. A dictionary of Australasian words phrases and usages with those Aboriginal-Australian and Maori words which have become incorporated in the language and the commoner scientific words that have had their origin in Australasia*. Macmillan and Co., London.
http://www.archive.org/details/australenglishdi00morruoft

New South Wales (1887) Amendment to Regulation 97 under the Crown Lands Act of 1884. *Journal of the Legislative Council of New South Wales* **42 (1887 Second Session)** (1), 471.

Palmer, H. (1961) *Fencing Australia*. Longmans, Melbourne.

Peterson, R. (1988) *Fences and gates c. 1840-1925*. National Trust of Australia (Victoria), Melbourne.

Pickard, J. (2007) Australian rural fences: heritage challenges for conserving the unconservable. *International Journal of Heritage Studies* **13** (6), 489-510.

Pickard, J. (2009) *Illustrated glossary of Australian rural fence terms*. Heritage Branch, NSW Department of Planning, Sydney.
http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/IllustratedglossaryofAustralianruralfenceterms2009.pdf

Pickard, J. (2013) Dog-legs and cockatoos: clarifying two confused and confusing early Australian fencing terms. *Australasian Historical Archaeology* **31**, 33-41.

Pickard, J. (2015) Stone walls near Jindabyne NSW: European fences, not Aboriginal stone arrangements. *Australasian Historical Archaeology* [to be published September 2015]

Pulsford, I.F. (1991) *History of disturbance in the white cypress pine* (Callitris glaucophylla) *forests of the lower Snowy River Valley, Kosciusko National Park*. M.Sc. thesis, School of Forestry, Australian National University, Canberra.

Rolls, E.C. (1984) *A million wild acres*. Penguin Books, Ringwood.

Walsh, G. (1993) *Pioneering days. People and innovations from Australia's rural past*. Allen & Unwin, St Leonards.

SURVEY PLANS USED

Crown Plans

Parish of Lemington, County of Hunter

Portion 7	140.1538
Portion 57	255.1538
Portion 96	280.1538
Portion 107	311.1538
Portion 127	1572.1538
Portion 128	1573.1538

Deposited plan

Lots 1 and 2	DP617852

APPENDICES

1. Pickard, J. (2013) Dog-legs and cockatoos: clarifying two confused and confusing early Australian fencing terms. *Australasian Historical Archaeology* **31**, 33-41.
2. CV of John Pickard.
3. List of fence-related publications of John Pickard.

Dog-legs and cockatoos: clarifying two confused and confusing early Australian fencing terms

JOHN PICKARD

Dog-leg and cockatoo fences were widely used by selectors and squatters in colonial Australia in the early years of developing their selections and runs. However as the terms, which have their origins in colonial Australia, were applied to a range of structures, interpreting contemporary descriptions may be difficult. This paper explores the meanings of the terms and their origins. Dog-legs are paired poles laid diagonally across a fence of any form, but usually some form of log or brush fence, with a log supported in the crutch to increase the height or stability of the fence. They have also been recorded with dry stone walls. In general the term 'dog-leg fence' should not be interpreted as a zig-zag fence, although dog-legs may be used with these structures. Cockatoo or cocky's fence was a derisive term applied to any of a wide range of rough fences, again usually log or brush, and including dog-leg fences, erected by small-scale selectors known as cockatoo or cocky farmers. Historical archaeologists should be careful assigning a specific structure to a contemporary use of this term.

INTRODUCTION

One of the primary objectives of historical archaeology is to integrate disparate and usually incomplete information from various sources into a coherent description or explanation of some event, place or person. Interpreting early documents may be difficult if the terms used were imprecise or overlapped so that the same names applied to different objects or activities. It may not matter if a name is not unique if the context is clear. Thus there is unlikely to be confusion between a tap as a light touch (verb and noun), a valve to control fluid flow (noun), or a tool for cutting screw threads in holes (verb and noun). On a larger scale, there is no confusion between fencing as a sport using swords, and fencing as erecting posts and wires on farms. But when the same name is applied to different objects in the same general sphere, or conversely the same object has multiple names (including some applied to other objects), then confusion is inevitable. This is the case with names for many obsolete and current fences in rural Australia, and particularly with dog-leg and cockatoo fences.

Various types of fences are named after the structure, function or dominant component. Thus the ubiquitous post-and-wire fence (structure) may also be called a paddock or boundary fence (functions) or abbreviated to a wire fence (component) in the same conversation with a farmer. Animal names are applied to many fences, usually because the fences are designed to exclude those species, e.g. rabbit fence, dingo fence, kangaroo fence, etc. (Pickard 2010:150-256). However two names apparently derived from animals – dog-leg and cockatoo – neither engender a clear image of a structure (as straight as a dog's hind leg?) nor refer to a function (fencing out cockatoos?). Both these names were widely used in the 19th century to describe fences, but they are now generally misunderstood because both encompass a range of structures.

In this paper I explore the origins of these two terms, and the fence structures to which they have been applied. I conclude that dog-leg fences are a range of fences incorporating crossed poles or dog-legs supporting a higher rail; and that cockatoo fence was a derisive term applied to any rough log or brush fence (including some dog-leg fences) built by impecunious small farmers known as cockatoo farmers.

DOG-LEGS AND DOG-LEG FENCES

At first glance, the name 'dog-leg fence' might suggest a worm or zig-zag fence, which is as straight as a dog's hind leg. Indeed this is a reasonably common modern use, and is based on the series of sharp bends providing structural stability to zig-zag fences. A typical example is Stone and Garden (1984:128) in a generalised history of colonisation: 'A more sophisticated type of fence was the dog-leg made of zig-zagging the poles so that they became self-supporting'. Another example is the caption provided by photographer John Collins for his image of a zig-zag fence in Wyperfeld National Park (north-western Victoria) (Figure 1).

Figure 1: 'Rainbow. Wyperfeld National Park. Dog Leg Fence' (State Library of Victoria)

The earliest explicit description that I have found of a dog-leg fence provides no detail of the structure, but the abbreviated description is clear. When describing hunting in the English-style in South Australia, William Shaw (1854:146-147) noted 'three descriptions of fences, the dog leg, the kangaroo, and the post and rail; the former, which is in the shape of an X'.

Two decades later, the Hills' description of a 'dog's leg fence' near Mt Barker (South Australia) in mid-April 1873 is somewhat unclear but appears to describe a zig-zag fence with forked posts supporting some of the branches:

> This is formed of bare branches of the gum-tree laid obliquely, several side by side, and the ends overlapping, so that they have somewhat the appearance that might be presented by the stretched-out legs of a crowd of dogs running at full speed. An upright stick at

intervals, with a fork at the top, on which some of the cross-branches rest, adds strength to the structure. Its advantage is that it is quickly and cheaply made, no posts having to be shaped or nailed together, or holes dug to receive them (Hill and Hill 1875:61).

Rather than being applied to zig-zag fences, the more usual historic usage of the term 'dog-leg fence' was of any fence incorporating dog-legs – poles arranged in pairs from either side of a fence and crossing on the top of the fence, forming a crutch in which a log or rail is rested. This is clear from Morris' (1898:123) definition:

> Dogleg, *adj*. applied to a primitive kind of fence made of rough timber. Crossed spars, which are the doglegs, placed at intervals, keep in place a low rail resting on short posts, and are themselves fixed by heavy saplings resting in the forks above (Morris 1898: 123)

A similar definition of dog-legs is found in regulations under New South Wales lands legislation for types of fencing satisfying improvement conditions of Conditional Purchases:

> A fence of at least four feet in height, composed of logs and chocks, the chocks to be of no greater thickness than will leave an opening of nine inches between the logs, and the same distance between the lower log and the ground, or composed of logs and chocks, the top log to rest between two crossed stakes (dog-legs) not less than six inches in diameter, and inserted six inches in the ground, with the same distance between the logs as mentioned above, no one log in either case to exceed sixteen feet in length. (New South Wales 1887:471)

Figure 2: 'Chock & log & dog-leg fence' showing two sets of dog-legs or crossed poles increasing the height of the extremely high (and perhaps fanciful) chock-and-log fence, and supporting top rails or poles (The Antique Print Room).

An early illustration (Figure 2) shows how they were used with a chock-and-log fence.

Despite considerable searching, I have been unable to determine the origin of the term 'dog-leg' as used in Australian fencing. There is no apparent use of the term in early British or American works describing fences, even though dog-legs were used in the USA, but under a different name. 'Dog' is an old English term 'applied to var. instruments used to hold anything in its place'; one form was 'an instrument used by sawyers to hold timber together', typically 'a short bar of iron, with the ends turned up and sharpened, used to hold a piece of timber steady for sawing. One end of the dog is driven into the timber, the other into the frame of the sawpit' (Wright 1900:110). Salaman (1975:172-173) illustrates several variants, and also describes and illustrates various dogs used in handling timber (Salaman 1975:484-485). However, none of these is similar to the crossed poles used in fences. The closest is a 'saw buck' (Salaman (1975:441-442) of two frames forming a crutch to support and hold timber when sawing. In Australia this is usually called a 'saw horse' and the term is still used today. Bark roofs on huts in colonial Australia were kept in place with small logs or spars crossed over the ridge of the roof, and pegged together. These spars in turn supported horizontal spars (Lewis 2003). However, the vertical spars were not called 'dog-legs' despite their obvious similarity to those in fences.

Abrupt bends in almost any otherwise straight object – including fences – are often referred to as 'dog legs', a clear reference to the proverbial dog's hind leg. But it is difficult to see how this was applied to spars arranged across an otherwise generally straight fence. Regardless of why it was originally coined, the term was applied to Australian fences from at least 1836 when a parcel of land in Tasmania was described as 'all that portion of Land Bounded on the north by a dog leg and furze [gorse] fence' (Tasmanian Non-State Records 103/3 25 October 1836, quoted in Ramson 1998: 210). In 1840 Alfred Weaver had '80 acres of land, enclosed with a dog-leg fence' at his property Woodlands on the South Road from Adelaide (Cockburn 1925:118). Unfortunately, there is no way of knowing if either fence was a zig-zag or had crossed poles supporting a log.

Morris' (1898:ix) inclusion of the term in his dictionary of 'words and uses of words peculiar to Australasia' is strong evidence of a colonial Australian origin. I have adopted the hyphenated version rather than Morris' single word because it appears to be more common.

Dog-legs were also known in Australia as crosslegs or cross legs, and shears (Gordon 1865:3), and trestles (Buley 1905:33-34; Peterson 1988:10) (Figure 3). Both cross legs and trestles are descriptive terms. Shears or sheers were crossed poles or spars 'lashed together near the top with a block suspended from the point of intersection' and used to lift heavy objects (Brande and Cox 1867:428). Thus these alternatives have fairly obvious derivations. The log, rail or pole supported by the dog-legs was rarely given a specific name in Australia. 'Jumbuck' [Patrick R. Gordon] (1868:6) called it a 'top rail', while Kaleski (1910:65) called it a 'cockatoo rail'. A specific form of dog-leg fence was used in New Zealand (see below), but the term was not used in the United States of America where dog-legs were known as 'stakes' and the supported logs as 'riders' (Martin 1892:11-12; Meredith 1951:135). Not surprisingly, such fences were called 'stake and rider fences' but I have found no record of this term in Australia.

'Jumbuck' (1868:6) gives a detailed description of building what he called a 'Billabong fence' (Figure 3), essentially a carefully-made log fence topped by dog-legs supporting an additional log. Gordon (1867:32) suggests that the name is derived from *Billabong Run* (northeast of Holbrook, NSW)

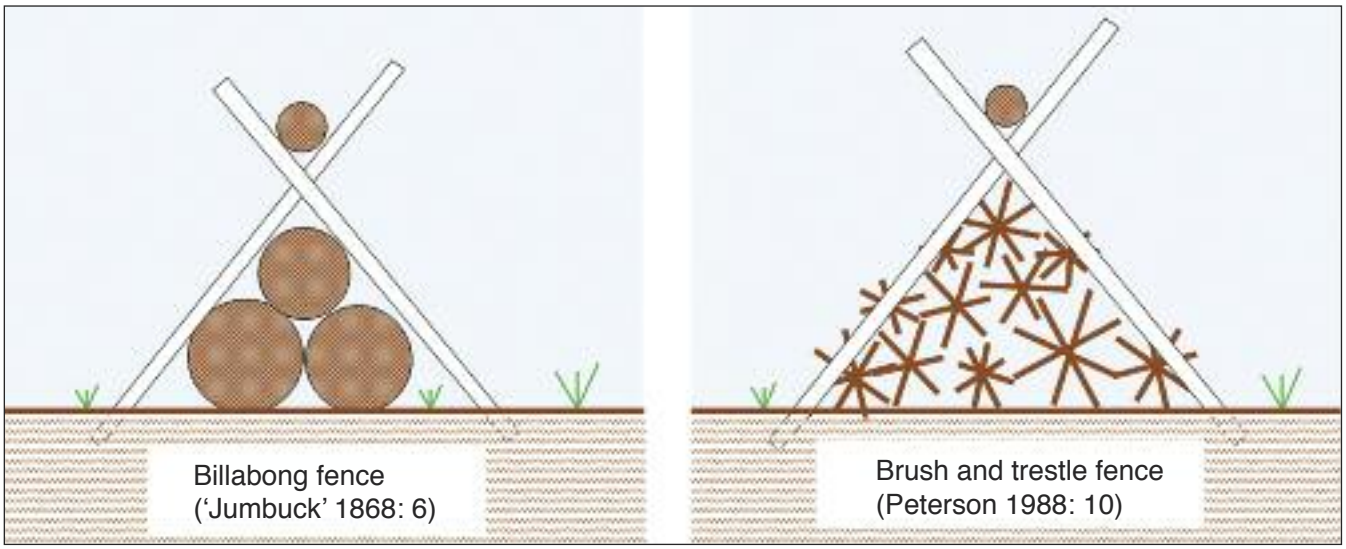


Figure 3: Interpretations of two forms of dog-leg fence. Left: Billabong fence using two base logs supporting a second tier, and the top log or pole in the crutch of the crosslegs or dog-legs. Right: Brush and trestle fence with top rail.

where Rawdon F. Greene first erected a fence with this structure.

> The foundation of the fence is made by laying a number of logs, of any length, and as nearly as possible of a uniform diameter of two feet, longitudinally along the ground on the line in which it is proposed to erect the fence, the ends being so cut and fitted together as to prevent the possibility of the escape of lambs; care also being taken that any inequalities should be chocked up, so that there may be no means of escape under the bottom log.
>
> After the bottom logs have thus been laid along a considerable portion of the line, logs of a somewhat smaller diameter are, in the same manner, laid along on the tops of the former.
>
> Strong 'crosslegs' are then split, sunk in the ground, one on either side of the fence, and made to cross each other on the top of the second log in the usual way; and in the angle formed by this crossing, a large heavy sapling, not less than nine inches in diameter, is embedded. This binds the fence firmly, and forms its top rail. The intervals between each pair of crosslegs ought not to exceed twelve feet, and it is desirable, in all cases, to have the crosslegs of split stuff, as it is found that they last longer in the ground than saplings …
>
> The advantages of this fence are, that it is very strong and durable, can be constructed by the ordinary class of bush laborers, and requires the use of few tools.
>
> To the small farmer it will be found to possess an additional advantage, inasmuch as it will utilise a quantity of timber felled for the purpose of clearing the land.
>
> Its disadvantages may be stated as – (1). Like all other bush fences, more liable to fire than post-and-rail. (2). The liability of the crosslegs to 'jump' or rise out of the ground during heavy rains; and (3). Their liability to rot. As so much depends upon these crosslegs, it is absolutely necessary – if the fence is to be made a lasting one – that they should be of strong, sound, split timber, and well sunk in the ground. The weight of the upper rail will, of course in great measure, determine both their strength and the distance they should be sunk in the ground. Much will depend upon the manner in which the hole is sunk; if made just sufficiently large to receive them, so that the pressure will be on a 'bone' – that is, on soil which has not been disturbed by the spade, there will be little fear of their ever 'jumping.' As a rule, the heavier the top rail the stronger and firmer will be the fence. ('Jumbuck' 1868:6)

By the early 1880s when wire fences were the *de facto* standard, Armstrong and Campbell (1882:195) considered that:

> The dog-leg fence is now almost out of use, and is very seldom seen. It forms neither a secure nor neat fence, and is so seldom used that we consider an explanation of its construction almost unnecessary.

However, they describe using dog-legs to raise the height of a chock-and-log fence:

> A somewhat similar description of fence may be used to raise the height of a low chock and log, which is done by placing two straight spars in opposite slanting directions at stated intervals, resting against the top log, and then placing additional logs in the forks formed by these spars. A two-rail fence may be formed by placing one log upon sawn blocks, or in forks, sunk into the ground, and about two feet from the surface, and completing the fence in the manner we have just described (Armstrong and Campbell 1882:195).

Surveyor A. Ebsworth recorded 'chock and dog-leg fences' near Jindabyne NSW on his plan of Portion 131, Parish of Coolamatong, County of Wallace, (plan 4148.1604 dated 29 June 1891), suggesting a structure similar to that illustrated in 1883 (Figure 2), i.e. a chock-and-log fence with dog-legs supporting a higher log. However, even otherwise meticulous surveyors could be somewhat cavalier in their descriptions of fences, as he labelled the same fence 'chock and dog-leg' and 'dog-leg' in adjoining portions he surveyed on the same day.

The single known extant example of a dog-leg fence (Figure 4) was built to form a paddock for mustering and holding wild unbranded cattle in the late 19th century on the Snowy River NSW (Pulsford 1991:31-32; Stephenson 1980:37). Originally described as a cockatoo fence by Pulsford, who found it, Pickard (2007:494-495) preferred calling it a dog-leg fence because of the crossed poles. A considerably neater dog-leg fence with the same structure was photographed, but not named, at an unknown location in southern NSW *c*. 1880 (Figure 5).

Figure 4a: Lateral view of dog-leg fence at Mt Trooper, south of Ingebyra, New South Wales, showing forked posts supporting logs laid head to butt. The second tier of logs rests in the crutch of the dog-legs, and one partly dislodged log remains. The log in the right foreground had been a second-tier log, but fell as the next pair of crossed poles collapsed.

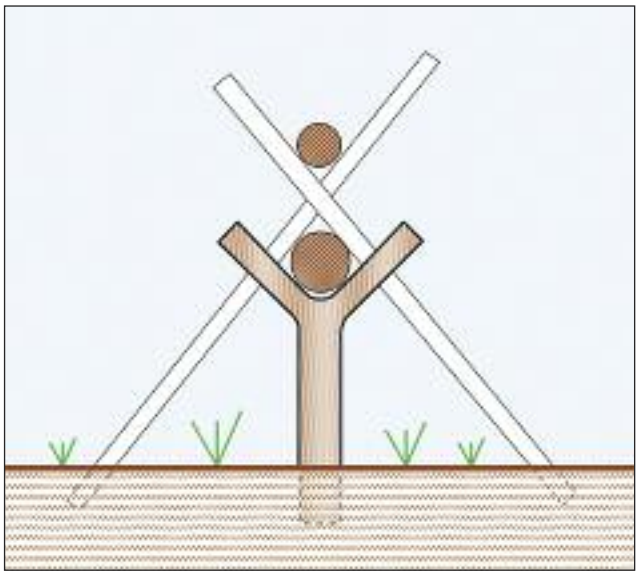


Figure 4b: Interpretation of the structure.

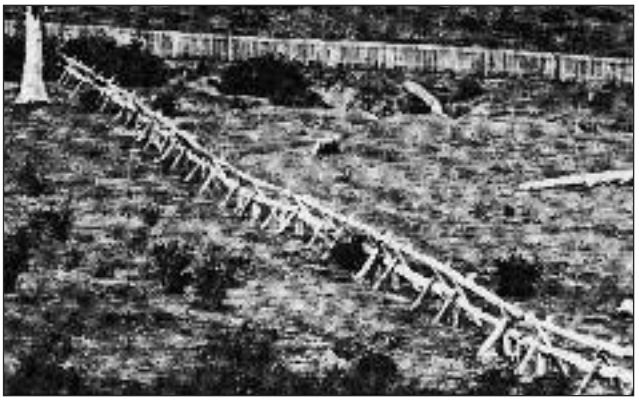


Figure 5: Dog-leg fence on 'a cleared property in Southern New South Wales, c. 1880' showing structure of forked posts supporting a lower log, and dog-legs supporting the second tier (Merritt and O'Brien 1985:5).

Buley (1905:33-34) clearly describes the structure of the dog-leg fences used by his generic selector:

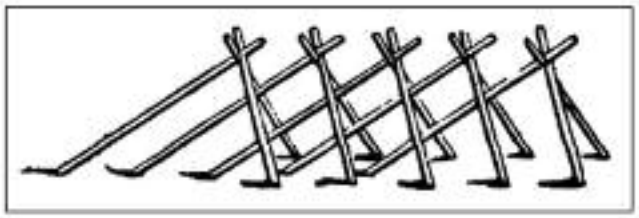
> A walk around the selection shows that its owner is master of every imaginable makeshift. Dog-leg fences, made of long saplings, supported on improvised and shaky trestles, run crookedly between the paddocks, inviting the stock to break through and stray.

One 1870s' description of a dog-leg fence in northern Tasmanian differs significantly from the usual Australian forms: 'the dog-leg fence, formed by crossing two short spars and leaning upon them, where they cross, a longer spar and so on' (Furlong 1982:96). This appears to match a dog-leg fence from New Zealand illustrated by Hargreaves (1965:147); and another made in 1862 described by Sherrard (1966:160-161) as having 'consisted of pairs of sticks crossed about three or four feet above ground level, each pair a foot from the next, with longer limbs slanting from the ground to rest in the crotches'. Hargreaves' diagram and Sherrard's description are identical with a so-called 'primitive paling fence' 'formed without nails or tyes [sic] of any sort, by inserting the pales or stakes in the ground in different directions, by using forked or hooked stakes' (Loudon 1825:442) and used in Central Europe in the early 19th century (Figure 6).

Rolls' (1984:192) description of a dog-leg fence on *Upper Cumble Run* (north of Baradine NSW) in 1885 appears to be a different form again, but it incorporates the crossed poles:

> These popular fences were based on short posts sunk about fifteen centimetres into the ground. Each panel was formed by butting a long rail against one of the upright posts and leaning its top on the next, then butting another long rail against the bottom of that post and leaning it on top of the first. They naturally crossed

Dog-leg fence from New Zealand
(Hargreaves 1965: Figure 2, p. 47)



"Primitive paling fence" from central
Europe (Loudon 1825: Figure 389, p. 442).

Figure 6: Dog-leg fence from New Zealand and identical early primitive paling fence from central Europe.

in the middle of the panel. When similar rails were put in the adjacent panels, their ends crossed over the tops of the upright posts. Each upright post thus had rails butted against it on each side and rails leant on its top from each side. Other shorter rails were driven into the ground each side of the upright posts and leant towards the line of fence so that they crossed in the cross on top of each upright. More long rails were then lifted into the forks. These fences were as insubstantial as a tower of cards. Each rail supported and was supported. A rogue horse or cow could demolish panels a day.

It is difficult to see how this structure could be stable unless the posts were forked, and this is probably why Rolls (1984:192) considered them 'a tower of cards'.

Perhaps the most unusual use of dog-legs is to raise the height of a low dry stone wall. A single extant example is known, a wall erected in the mid-1880s near Jindabyne, New South Wales. A series of paired cut poles and single forks rests against the wall (Figure 7). Some are regularly spaced approximately 4–5 m apart, and at least one fork still has a cut pole resting in its crutch. These poles and forks differ from random tree and branch falls which are generally crooked, often have branches attached, and have broken ends with no evidence of being cut with an axe. It is not possible to determine when the dog-legs and forks were added to the wall. They could have been incorporated during construction, or subsequently as cheap repairs. Meredith (1951:140) illustrates a similar structure from Virginia.

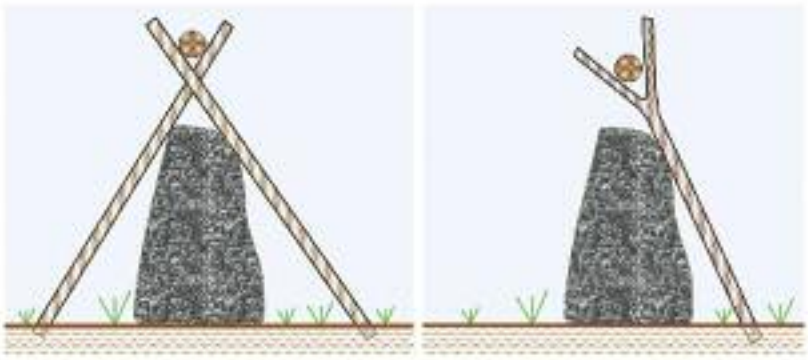
In summary, dog-legs were a quick and relatively easy way to increase the height of a low fence, or to stabilise an existing fence. Dog-leg fences were not zig-zag, but any of a range of generally log and brush fences with added dog-legs supporting a top rail. Using dog-legs allowed making maximum use of raw material from felled trees. The largest and longest logs were always on the bottom, whether on the ground, on chocks or on forked posts. The next largest were laid in the crutch of the dog-legs which were the smallest poles.

A truncated pair of dog-legs across a low part of the wall.

A cut fork resting across the wall still retains the cut pole that was originally supported by dog-legs at its uphill end.

Remains of four dog-legs (arrowed) ~ 5 m apart.

Ranging pole with 200 mm divisions.



Using dog-legs (*left*) and forks (*right*) to support a log above walls to increase the height of the fence, or to quickly repair a partially fallen wall.

Figure 7: Dog-legs and forks used to increase the height of a dry stone wall near Jindabyne, New South Wales.

COCKATOO FENCES

Australia has many species of large cockatoos, and the sulphur-crested cockatoo (*Cacatua galerita*) is one of the most well-known for its snowy white plumage, and yellow crest. It is found in large flocks from north-western across the Top End, and down the east coast to Victoria and Tasmania. Its range extends from the coast to the slopes and plains, but not to the arid interior. It is a seed-eater, and can cause considerable damage to crops when large flocks descend *en masse* to dine on ripe wheat, oats or maize. Small-scale farmers who selected land from the domains of squatters were called cockatoos because they were regarded as similar predatory pests:

> Cockatoo, *n*. (2) A small farmer, called earlier in a *Cockatooer*. The name was originally given in contempt … but it is now used by farmers themselves. *Cocky* is a common abbreviation … After the gold fever, *circa* 1860, the selectors swarmed over the country and ate up the substance of the squatters; hence they were called *Cockatoos*. The word is also used adjectivally …
>
> Cockatoo, *v. int*. (1) To be a farmer. (Morris 1898:92-93; emphasis in original).

Morris' earliest example (1898:93) is a letter in the form of a poem *Shamrock Leaves* written in dog-Irish by a fictional Judith Phin to her cousin Bridget in Ireland 1863:

> At last Oi took a notion that Oi'd lave the town and troy
> A short bout in the country, and so, Biddy, here am Oi;
> At Kilmore [Victoria], where at service Oi have nearly six months tarried,
> And there's little chance o' laving, as Oi'm going to be married,
> To what is termed a Cockatoo – which means a farmer – who
> Has lots o' land and milking cows, and pigs and poultry too (Beveridge 1863:154)

Forty years later, Buley (1905:32) offered a significantly different explanation, referring to the problems of being a small-scale farmer rather than their impact on squatters:

> In the vernacular of the bush, the selector is a 'cockie,' and cockie is short for cockatoo farmer. He is a cockatoo farmer because he works early and late to clear a patch of ground and plough it. Then he sows his seed, only to wake at dawn the next day and find his field white with cockatoos, all busily devouring the grain. Those cockatoos are the only crop he has.

The *Australian National Dictionary* (Ramson 1998:153) has a similar definition 'small farmer', but adds specific information about its origins: 'orig. with reference to tenant farmers, brought from Sydney and settled in the Port Fairy [Victoria] district'. The earliest record is from 1845:

> Most of the settlers on Mr Atkinson's special survey, either have or are about to flit; it appears that the agreement between 'Cockatoo settlers' and their landlord, was merely verbal. (*Standard* 13 August 1845:3/2 in Ramson 1998: 153)

Morris (1898:93) also records the term from New Zealand in 1867. Sulphur-crested cockatoos are not native to New Zealand, apparently becoming feral in the late nineteenth – early twentieth centuries in a few places when caged Australian birds escaped. As the term had already been in New Zealand for several decades by then, it is likely that it migrated across the Tasman Sea to New Zealand as part of the vocabulary of Australian miners who flocked to the Otago (South Island) gold rushes in their thousands in the 1860s. An additional source would be from Australian squatters seeking greener or additional runs in New Zealand, and small selectors (already known as cockatoos), and dispirited ex-miners from Australia wanting to farm small blocks.

The trials and tribulations of selectors are the stuff of Australian legend, and feature strongly in literature: e.g. Steele Rudd's [Arthur Hoey Davis] *Dad and Dave* series including the classic *On our selection*, many of Henry Lawson's short stories, and Eric Jolliffe's *Saltbush Bill* cartoons (Pickard submitted). A common theme is the chronic shortage of money during the early years of trying to clear and develop the land for farms. With little money to spend on permanent improvements, selectors resorted to effective but short-lived expedients, relying on their own labour and available resources. Trees that had been cleared for farming were laid in lines for various forms of brush and log fences. Even squatters with deeper pockets who could afford better fences also used similar structures when first fencing their runs.

Because of their association with cockatoo farmers, many of these rough fences were labelled cockatoo fences. A possible, but perhaps unlikely, derivation may come from the similarity of men and cockatoos perched on the top rail of a fence: 'The correct thing, on first arriving at a drafting yard, is to 'cockatoo,' or to sit on the rails high above the tossing hornbillows' (Boldrewood 1890, volume 1:110). The top rail where both cockatoos and men perched could have become known as the cockatoo rail, and the term subsequently applied to fences with a top rail.

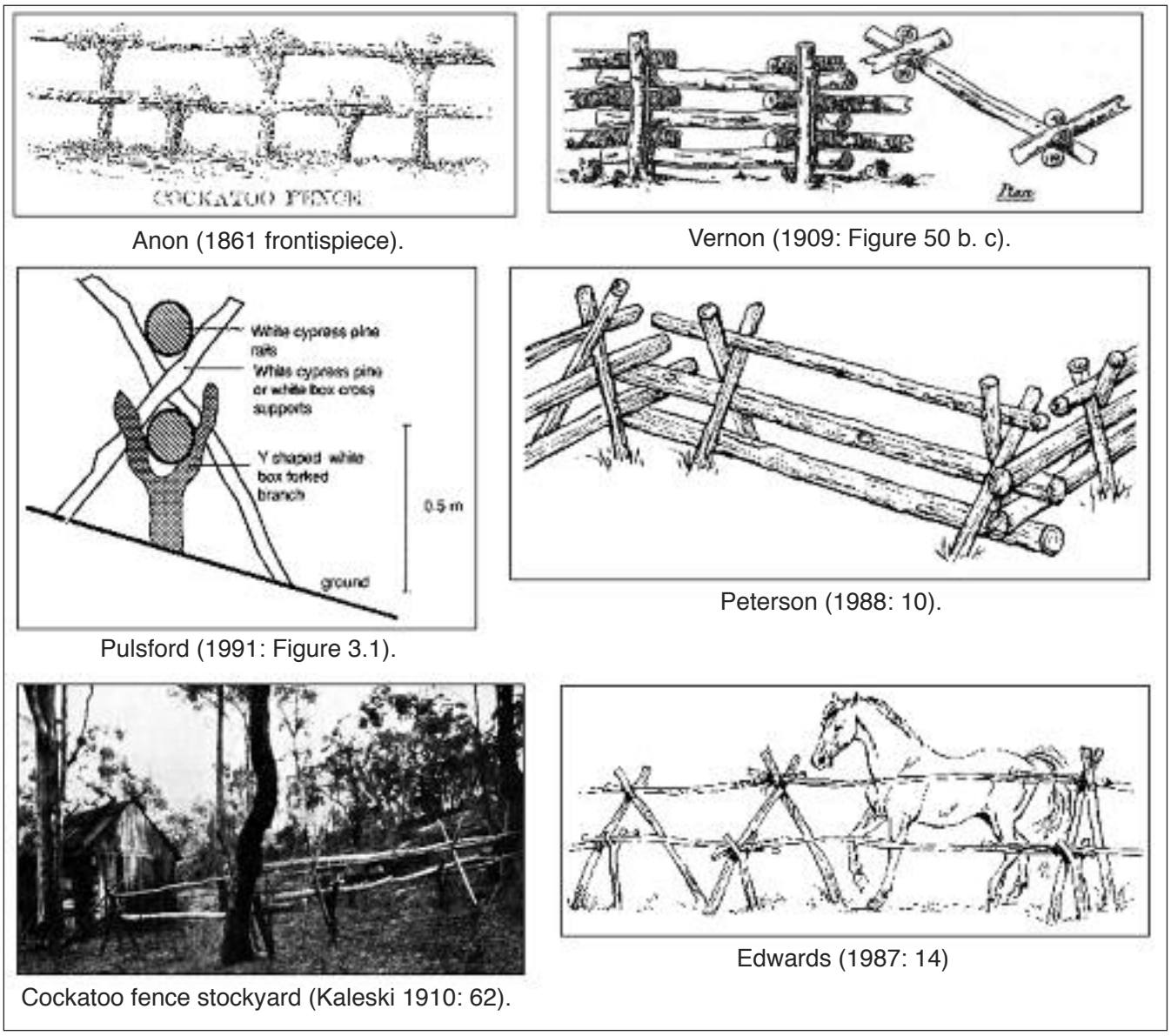
The problem with cockatoo fences is that the name was applied to quite different structures, and without an explicit description, it may be impossible to determine exactly what was meant (Table 1, Figure 8). The earliest dictionary definition (Morris 1898:93) provides no information on either structures or materials, just the owners. However, one of the sources Morris collected, 'Lyth' (1890:120) included materials (branches and logs) and their arrangement. The earliest known description (Tourle 1840) is rather cryptic, but seems to have forked posts (strods) supporting a rail at its core, with trees, logs and branches added, 'the rougher the better'. Anon (1861) provides both a clear description and engraving (Figure 8), but much of her information is suspect, and must be used carefully. Kaleski's (1910) photograph of his cockatoo fence stock-yard shows a rather flimsy-appearing fence of forked posts with dog-legs supporting poles (Figure 8). The structure is identical with the more robust fence described by Pulsford (1991:Figure 3.1) (Figure 8). Both are better described as dog-leg fences.

It is difficult to place much credence on Vernon's (1909:165) inclusion of cockatoo in his list of synonyms for snake fences. His book is primarily an English compilation from many unspecified sources, and his information on Australia is all derivative. His description of the structure and his engraving show a zig-zag fence with supporting posts at the bends (Figure 8). This carefully-made structure bears no resemblance to earlier Australian descriptions which emphasise the rough nature of the cockatoo fence.

Unfortunately, Karney's (1991:3) account of fencing in 1870 is semi-fictionalised and it is difficult to know what is direct contemporary quotation and what is her interpretation or interpolation. A subsequent diary entry dated 28 May 1881 describes 'carting post and rails on the fence line', but Karney adds her interpretation: 'As the trees are felled some of the huge trunks are split longitudinally with maul and wedges into slabs for buildings or fencing. Others are piled together to make log fences; sometimes the branched ends of larger limbs are pronged together for greater stability, called cockatoo or fork-and-log fences' (1991:13-14). This interpretation is

Table 1: Definitions and descriptions of cockatoo fences.

Source	Definition or description
Tourle (1840)	'Our Fencing is what is termed Cockatoo, ie Trees felled and rolled in line. A single Post & Rail with Boughs thrown in the fill up &c – The Rail lying in a Strod [a forked post] and the rougher [?] the better.'
Anon (1861:13)	'…a cockatoo fence, … consists of forked sticks driven into the ground, and saplings or young trees laid across them. A second and shorter row is requisite, making it a two railed fence.' (see Figure 8)
Karney (1991:3, 189)	'... in April 1870 the Crown Bailiff inspected his [William Mills'] land [at Balnarring on the Mornington Peninsula of Victoria] and reported that '165 pound worth of improvements had been effected, consisting of: 60 chains of log fencing, 180 chains of fork and log (or cockatoo) fencing'
	[and] 'Cockatoo fencing. Log fencing made of forked logs pronged together, also called fork-and-log.'
Pulsford (1991:31-32)	Cockatoo fence erected in 1880s (see Figure 8).
'Lyth' (1890:120)	'The fields were divided by open rails or cockatoo fences, i.e. branches and logs of trees laid on the ground one across the other, with posts and slip rails in lieu of gates.'
Morris (1893:93)	'Cockatoo Fence, n. fence erected by small farmers.'
Vernon (1909:165)	'Snake or Zigzag Fences, Cockatoo, or, as called in Australia, 'Drop Fences,' … are still used in American and Australia.'
Kaleski (1910:63)	'the next thing to do is put up a 'cockatoo' fence stock-yard.' (see Figure 8)
Edwards (1987:14)	Sketch of a 'fork-and-pole' fence of crossed light poles supporting equally light poles. (see Figure 8)
Peterson (1988:10)	'Forks-and-poles fence (Cockatoo Fence or Zigzag Fence). A sapling was felled and the next length to the butt, about 9 (2500 mm) or 10 feet (3000 mm) is sawn off and put on one side for the corner post of the milking yard and another length is taken off to be 'run out' or split into rails (Palmer 1961). The residue of the tree was dragged away for use elsewhere on a brush fence. A fork trestle was formed every nine feet; a rail was placed inside the fork and another one placed on top. This was a regional variation, the 'brush and trestles' fence (with trestles of leaning poles or small logs). It was used for small yards (for example horse yards and milking yards), as it was timber-intensive.' (see Figure 8)
Ramson (1998:154)	'A fence improvised from logs and branches.'



Anon (1861 frontispiece).

Vernon (1909: Figure 50 b. c).

Pulsford (1991: Figure 3.1).

Peterson (1988: 10).

Cockatoo fence stockyard (Kaleski 1910: 62).

Edwards (1987: 14)

Figure 8: Comparison of diagrams of cockatoo fences.

repeated in the glossary (1991:189), but is difficult to visualise.

Peterson's (1988:10) description and interpretative diagram are of a zig-zag fence with added dog-legs stabilising the structure at the bends, and raising the height with the top rail (Figure 8). The fork-and-pole fence of Edwards (1987:14) is flimsy like Kaleski's stockyard cockatoo fence, and incorporates dog-legs.

Summing up, there are multiple descriptions, illustrations and interpretations of a cockatoo fence, with no real way of determining which has historical priority, which was the most widespread, and indeed, if all these structures were termed 'cockatoo' by the builders and their contemporaries. The exceptions is Kaleski's photograph from 1910, and Anon's (1861:frontispiece, 13) engraving and description of entirely different structures. The examples show that many cockatoo fences incorporated dog-legs to either increase the height of the fence or to stabilise it. This suggests that fence builders adapted designs for what are now unclear reasons, but were most likely available materials and budgets

CONCLUSIONS

Dog-legs are vertical fencing components performing a similar function to posts: they support horizontal components – logs, poles or rails – to form the barrier of the fence. They can be used with a range of basic structures, including dry stone walls, to stabilise and increase the height of the fence. Consequently, a dog-leg fence should not be interpreted to mean a zig-zag (snake, Virginia, or worm) fence. Rather, it is a fence of various forms with pairs of dog-legs arranged across the fence, with a log or logs resting in the crutch where they cross. Historically, almost any fence with them was often referred to as a dog-leg fence regardless of the predominant structure of the fence (log, chock-and-log, brush, etc.).

Based on the various descriptions, cockatoo fence was a generally derisive term for any rough fence erected by impecunious or thrifty small settlers or cockatoo farmers. This is the sense of Morris' (1898:93) definition: 'fence erected by small farmers'. Such fences could include several forms of log and brush fences, various combinations of forks and poles, etc., but not the more permanent and expensive post-and-rail and chock-and-log fences. Some may be better described as dog-leg fences. In any event, cockatoo fence is merely a generic term for these rough fences rather than a specific structure. Like dog-leg fence, the term has its origins in colonial Australia.

Dog-leg and cockatoo fences were widespread and common in the initial stages of developing farms. They are recorded from most colonies and were used into the early years of the twentieth century. However, while dog-legs were accepted as components of fencing improvements under NSW lands legislation, cockatoo fences were not. Apparently they were regarded as too expedient and too impermanent.

Without expanded descriptions, interpreting early use of both terms is problematic. Although dog-legs were used with several basic structures, the term generally described any fence with crossed poles supporting a higher rail. If a more precise description is available, then this should be used. Cockatoo fences encompass a wider range of structures, including some with dog-legs. As before, more precise descriptions are better. In any event, modern readers should be cautious in assigning a specific structure to the term 'cockatoo fence'.

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REFERENCES

ANONYMOUS 1861 *Australian Settler's Hand Book. The Farm, being Practical Hints for the Inexperienced on the most Simple and Profitable Method of Cultivating their Land. Being the Result of many Years Experience in the Colony*, James W. Waugh, Sydney.

ARMSTRONG, A.S. and G.O. CAMPBELL 1882 *Australian Sheep Husbandry: A Handbook of the Breeding and Treatment of Sheep and Station Management. With Concise Instructions for Tank and Well-sinking, Fencing, Dam-making etc*., George Robertson, Melbourne.

BEVERIDGE, M.K. 1863 *Gatherings among the Gum-Trees*, James Reid, Melbourne.

BOLDREWOOD, Rolf, [Thomas Alexander Browne] 1890 *A Colonial Reformer*, Volume 1, Macmillan and Co., London.

BRANDE, W.T. and G.W. COX (eds) 1867 *A Dictionary of Science, Literature, & Art: comprising the Definitions and Derivations of the Scientific Terms in General Use, together with the History and Descriptions of the Scientific Principles of nearly every Branch of Human Knowledge*, Volume III Poles – Zymotic, Longmans, Green & Co., London.

BULEY, E.C. 1905 *Australian Life in Town and Country*, George Newnes Limited, London.

COCKBURN, R. 1925 *Pastoral Pioneers of South Australia*, Publishers Limited, Adelaide.

EDWARDS, R. 1987 *Bushcraft 3. Making Do in the Bush*, The Rams Skull Press, Kuranda.

FURLONG, C. 1982 *The Settler in Tasmania 1873 -1879*, Sullivan's Cove, Adelaide.

GORDON, P.R. 1865 'Sheep Farming. No. III', *The Brisbane Courier* (7 December 1865):3.

GORDON, P.R. 1867 *Fencing as a Means of Improving our Pasture Lands and its Advantages to the Stock-owners and the Colony, with Suggestions for a Fencing Bill, and the Improvement of Pasture by Means of Sapping*, William Maddock, Sydney.

HARGREAVES, R.P. 1965 'Farm Fences in Pioneer New Zealand', *New Zealand Geographer* 21:144-155.

HILL, R. and F. HILL 1875 *What We Saw in Australia*, Macmillan & Company, London.

JUMBUCK [Patrick R. Gordon] '1868 Fencing', *The Brisbane Courier* (17 October 1868):6.

KALESKI, R. 1910 *The Australian Settler's Guide*, Anthony Hordern & Sons, Sydney.

KARNEY, M. 1991 *No Rugged Landscape*, Loch Haven Books, Dromana.

LEWIS, M. 2003 Australian Building: a Cultural Investigation. Section 2.1 Bark. Online, http://mileslewis.net/australian-building

LOUDON, J.C. 1825 *An Encyclopaedia of Agriculture; Comprising the Theory and Practice of the Valuation, Transfer, Laying out, Improvement, and Management of Landed Property; and the Cultivation and Economy of the Animal and Vegetable Productions of Agriculture, including all the Latest Improvements; a General History of Agriculture in all Countries; and a Statistical View of its Present State, with Suggestions for its Future Progress in the British Isles*, Longman, Hurst, Rees, Orme, Brown, and Green, London.

LYTH [Kathleen Lambert] 1890 *The Golden South. Memories of Australian Home Life from 1843 to 1888*, Ward & Downey, London.

MARTIN, G.A. 1892 *Fences, Gates and Bridges. A Practical Manual*, Orange Judd Company, New York.

MEREDITH, M.J. 1951 'The Nomenclature of American Pioneer Fences', *Southern Folklore Quarterly* 15:109-151.

MERRITT, A. and C. O'BRIEN 1985 *The Striding Years. Squatters and Selectors in 19th Century Australia*, CCH Australia Limited, North Ryde, New South Wales.

MORRIS, E.E. 1898 *Austral English. A Dictionary of Australasian Words Phrases and Usages with those Aboriginal-Australian and Maori Words which have become Incorporated in the Language and the Commoner Scientific Words that have had their Origin in Australasia*, Macmillan and Co, London.

NEW SOUTH WALES 1887 'Crown Lands Act of 1884. (Classes of Fencing and Amended Regulations Nos. 97, 33, and 134)', *Journal of the Legislative Council of New South Wales* 1887 (Second Session) (1):471.

PALMER, H. 1961 *Fencing Australia*, Longmans, Melbourne.

PETERSON, R. 1988 *Fences and Gates c. 1840–1925*, National Trust of Australia (Victoria), Melbourne.

PICKARD, J. 2007 'Australian Rural Fences: Heritage Challenges for Conserving the Unconservable', *International Journal of Heritage Studies* 13 (6):489-510.

PICKARD, J. 2010 Lines across the landscape: History, impact and heritage of Australian rural fences, PhD thesis, Department of Environment and Geography, Macquarie University, Sydney, Australia.

PICKARD, J. (submitted) 'Fencing with *Saltbush Bill*: An Assessment of Historical Information in Eric Jolliffe's Cartoons', *Australasian Journal of Popular Culture*.

PULSFORD, I.F. 1991 History of disturbance in the White Cypress Pine (*Callitris glaucophylla*) forests of the lower Snowy River Valley, Kosciusko National Park, M.Sc. thesis. Department of Forestry, Australian National University, Canberra, Australia.

RAMSON, W.S. 1998 *The Australian National Dictionary: A Dictionary of Australianisms on Historical Principles*, Oxford University Press, Melbourne.

ROLLS, E.C. 1984 *A Million Wild Acres*, Penguin Books, Ringwood, Victoria.

SALAMAN, R.A. 1975 *Dictionary of Woodworking Tools c. 1700–1970 and Tools of Allied Trades*, Unwin Hyman, London.

SHAW, W. 1854 *The Land of Promise; or, my Impressions of Australia. By the Author of 'Golden dreams and waking realities'*, Simpkin, Marshall, & Co., London.

SHERRARD, J.M. 1966 *Kaikoura. A History of the District*, Kaikoura County Council, Kaikoura.

STEPHENSON, H. 1980 *Cattlemen and Huts of the High Plains*, H. Stephenson, Armadale.

STONE, D.I. and D.S. GARDEN 1984 *Squatters and Settlers*, Popular Books, Frenchs Forest, New South Wales.

TOURLE, T. 1839–1841 *Letterbooks 1839–1841*. Manuscript reference no. NLA MS 18. National Library of Australia, Canberra.

WRIGHT, J. (ed.) 1900 *The English Dialect Dictionary, being the Complete Vocabulary of all Dialect Words Still in Use, or Known to have been in Use during the Last Two Hundred Years: Founded on the Publications of the English Dialect Society and on a Large Amount of Material Never Before Printed*, Volume 2, D–G, Henry Frowde, London.

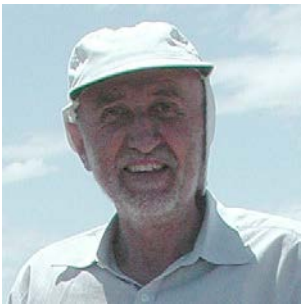
WRIGHT, J. (ed.) 1905 *The English Dialect Dictionary, being the Complete Vocabulary of all Dialect Words Still in Use, or Known to have been in Use during the Last Two Hundred Years: Founded on the Publications of the English Dialect Society and on a Large Amount of Material Never Before Printed*, Volume 5, R–S, Henry Frowde, London.

VERNON, A. 1909 *Estate Fences: Their Choice, Construction and Cost*, Spon, London.

JOHN PICKARD BScAgr MSc PhD PhD

BRIEF CURRICULUM VITAE

1. ADDRESS



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2. SUMMARY OF BACKGROUND AND SKILLS RELEVANT TO HISTORICAL GEOGRAPHY, HISTORIC HERITAGE AND ARCHIVAL RESEARCH

- Almost 30 years experience of research into European impact on Australian landscapes,
- Over 10 years experience studying rural fences in Australia, and internationally
- Experience in all aspects of historical geography (field work, field interviews, archival research of documents, legislation, plans, images, etc.)
- Extended research field work over many years to most parts of Australia
- Excellent knowledge of rural history and development of Australia.
- Deep understanding of inter-relations of social, legislative and environmental components of landscape history.

3. SPECIFIC EXPERIENCE OF HISTORIC HERITAGE, HISTORICAL GEOGRAPHY, ETC.

- Australia
    - Studying changes in arid and semi-arid landscapes after European colonisation (including considerable archival research to understand changes in land tenure and land management)
    - Studying legislation and attitudes to trespass in early colonial NSW
    - Studying fences in the broad context of Australian history, changes in technology, land management, etc.
    - Consultancies on historic geography, and using fences to locate old boundaries.
- Antarctica Re-examining research by Griffith Taylor 1911

4. RELEVANT FIELD EXPERIENCE

- Australia: Extensive field research across all states.
- Antarctica: Vestfold Hills, Framnes Mountains 1978-1979, 1979-1981 (including winter 1980), 2002. Visits as guide on tourist ship 1995, 1996, 1997.
- Argentina: Patagonia and southern Andes 1983, 2007-2008, central Argentina 1995.
- Chile: Patagonia and southern Chile 1996, 1997.
- USA: Colorado, Utah, New Mexico, California 1983; Colorado, New Mexico 1990, 1993, Arizona 1991, 1993, Texas 2001

- Mexico: Yucatan 1991; Sonora 1993.

5. RESEARCH EXPERIENCE

My knowledge base for historical consulting comes from over 30 years research primarily directed at understanding landscape changes. A major component of my research has focussed on European impact on Australian landscapes. This necessarily involved all the approaches of historical geography. More recently, my research on Australian rural fences is firmly based in settlement history, the history of technology, changes in legislation and land tenure.

My experience at senior / executive levels of government, provides me with deep understanding of legislation and policies which have affected land settlement and land use / management in Australia. Linking these with archival and field research allows me to present integrated and coherent explanations of landscape in a wide range of environments and locations.

In the broadest sense, my research has focussed on landscape evolution in semi-arid Australia and Antarctica. To understand the nature of the present landscape, it is necessary to study many aspects (geology, vegetation, climate change, legislation, geomorphology, history of land settlement, changes in technology) and then integrate these into coherent explanations. Consequently, my relevant research can be grouped into three main classes:

- Land use and management in semi-arid Australia.
- Landscape evolution in semi-arid Australia.
- Fencing rural Australia

6. COMMUNICATION EXPERIENCE

I have considerable experience at public speaking to professional groups, international congresses and symposia, meetings of professional societies, government committees, local community groups (business, farming and conservation), and primary and secondary schools. I am skilled in preparing and delivering enjoyable and educational presentations using a variety of media (slides, overheads, PowerPoint), or no aids on site in the field.

I designed, convened and taught a range of post-graduate environmental units at Macquarie University, including classes in Communication.

I have conducted numerous live and pre-recorded radio and television interviews on both local and national programs.

7. EDUCATION

PhD (Macquarie University) 2010 Thesis: *Lines across the landscape: history, impact and heritage of Australian rural fences*

PhD (Macquarie University) 1986 Thesis: *Landscape development and vegetation in the Vestfold Hills, east Antarctica*

MSc (University of Sydney) 1978 Thesis: *Vegetation of Lord Howe Island*

BScSAgr (University of Sydney) 1969 Major: Plant ecology. Thesis: *Aspects of the ecology of the Cronulla sand dunes*

Leaving Certificate 1962 (Fort Street Boys High School)

7. EMPLOYMENT HISTORY

2010 to present

Macquarie University Honorary Fellow, Department of Environmental Science.
Teach various undergraduate and post-graduate units in land use and management, and undergraduate units in geomorphology.
Continuing fence research with strong focus on history of fences

2003-2010

Macquarie University Higher Degree Research Student (Department of Physical Geography) PhD thesis topic: *Lines across the landscape^{TM}: fencing rural Australia*

2002-2003

Macquarie University Visiting Fellow, Graduate School of the Environment
Volunteer field project leader in Antarctica
Leading field team undertaking geomorphological field work in remote area

2000-2002

NSW National Parks and Wildlife Service Manager, Conservation Programs and Planning, Western Directorate
Developing and implementing environmental polices, determining properties to buy for new parks, assessing environmental impacts of activities both on- and off-park, oversighting NSW Kangaroo Management Program

1995-1997

Quark Expeditions Ecotourism guide, Antarctic cruises
Lecturing on ship, and on-shore on geology, geomorphology, ice / snow, vegetation and biogeography during five cruises

1989-2000

Macquarie University Senior Lecturer in Environmental Planning
Teach environmental management to post-graduate students; including organising and running multi-day teaching field trips

1986-1989

Western Lands Commission Assistant Commissioner
Developing and implementing environmental policies in semi-arid New South Wales; including organising and running multi-day education tours for conservation organisations

1984-1985

University of Alberta Killam Postdoctoral Scholar
Research on glaciers and vegetation in Yukon Territory

1982-1984

Macquarie University Postgraduate Student
Completing PhD on Antarctic research

1978-1981

Australian Antarctic Division Biologist
Field-based research at Davis Station on geomorphology and vegetation

1977-1978

New South Wales Premier's Department Senior Plant Ecologist
Developing policies on conservation of natural and agricultural areas in New South Wales

1969-1978

National Herbarium of New South Wales Senior Plant Ecologist

Mapping vegetation on Lord Howe Island and western New South Wales

Explaining the heritage value and historical land management significance of three parallel fences ranging in age from 1880 to 1980 to post-graduate students and landholder, White Cliffs July 2002

9. RESEARCH PUBLICATIONS

I have published over 130 papers (including two books) on a range of subjects relevant to understanding environments in Australia and Antarctica. A full list is attached.

PUBLICATIONS OF JOHN PICKARD

REFEREED PAPERS IN JOURNALS

Pickard, J. (2013) Dog-legs and cockatoos: clarifying two confused and confusing early Australian fencing terms. *Australasian Historical Archaeology* 31: 33-41.

Pickard, J. (2010) Wire fences in colonial Australia: technology transfer and adaptation 1842 - 1900. *Rural History* 21 (1), 1-32.

Pickard, J. (2008). Shepherding in colonial Australia. *Rural History* 19 (1): 55-80.

Pickard, J. (2007). The transition from shepherding to fencing in colonial Australia. *Rural History* 20 (2): 1-20.

Pickard, J. (2007). Railway fences: thousands of kilometres of (almost) unknown heritage. *Historic Environment* 20 (2): 5-11.

Pickard, J. (2007). Australian rural fences: heritage challenges for conserving the unconservable. *International Journal of Heritage Studies* 13 (6): 489-510.

Mackintosh, A., White, D., Fink, D., Gore, D.B., Pickard, J. & Fanning, P.C. (2007) Exposure ages from mountain dipsticks in Mac.Robertson Land, East Antarctica, indicate little change in ice-sheet thickness since the Late Glacial Maximum. *Geology* 35 (6), 551-554

Pickard, J. (2005) Post and rail fences. Derivation, development, and demise of rural technology in colonial Australia. *Agricultural History* 79 (1), 27-49

Pickard, J. (2002) Assessing vegetation change over a century using repeat photography. *Australian Journal of Botany* 50, 409-414.

Gore, D., Brierley, G., Pickard, J. & Janzen, J. (2000) Anatomy of a floodout in semi-arid eastern Australia. *Zeitschrift für Geomorphologie Suppl. Bd.* 122, 113-139

Pickard, J. (1999) Tunnel erosion initiated by feral rabbits in gypsum, semi-arid New South Wales, Australia. *Zeitschrift für Geomorphologie* 43, 155-166.

Pickard, J (1999) The first fences: fencing the colony of New South Wales, 1788-1823. *Agricultural History* 73, 46-69.

Kimani, K. & Pickard, J. (1998) Recent trends and implications of group ranch sub-division and fragmentation in Kajaido District, Kenya. *The Geographical Journal* 164, 202-213.

Pickard, J (1998) Trespass, common law, government regulations, and fences in colonial New South Wales, 1788-1828. *Journal of the Royal Australian Historical Society* 84, 131-139.

Gore, D.B. & Pickard, J. (1998) Proglacial hydrology and drainage, southeastern Vestfold Hills, East Antarctica. *Proceedings of the Linnean Society of New South Wales* 119, 181-196.

Pickard, J. (1997) Rural fences: perhaps the most common, (and most commonly neglected) component of European cultural landscapes in Australia. *Historic Environment* 13 (3 & 4), 19-22.

Pickard, J. & Selkirk, J. M. (1997) An improved hand core sampler for peat. *Palynology* 21, 209-211

Pickard, J. (1997) Griffith Taylor's 'palimpsest theory' of the Dry Valleys of Victoria Land, Antarctica. *Australian Geographer* 28, 53-67.

Symanski, R. & Pickard, J. (1996) Rules by which we judge one another. *Progress in Human Geography* 20, 175-182.

Gore, D.B., Pickard, J., Baird, A.S. & Webb, J.A. (1996) Glacial Crooked Lake, Vestfold Hills, East Antarctica. *Polar Record* 32, 19-24.

Pickard, J. & Norris, E.H. (1994) The natural vegetation of north-western New South Wales: notes to acompany the 1: 1 000 000 vegetation map sheet. *Cunninghamia*. 3, 423-464.

Eldridge, D.J. & Pickard, J. (1994) Effects of ants on sandy soils in semi-arid Australia. II. Relocation of nest entrances and consequences for bioturbation. *Australian Journal of Soil Research* 32, 323-333.

Pickard, J. (1993) Western New South Wales - increased rainfall not a miracle, leads to recovery. *Australian Journal of Soil and Water Conservation* 6(4), 4-9.

Pickard, J. (1993) European pastoral heritage in western New South Wales: technological change in fences. *The Rangeland Journal* 14, 190-204.

Gaull, B.A., Adamson, D.A.& Pickard, J. (1992) Seismicity associated with icebergs calving from glaciers near Mawson, East Antarctica. *Australian Journal of Earth Sciences* 39, 473-480.

Pickard, J. (1991) Land management in semi-arid environments of New South Wales. *Vegetatio* 91, 191-208.

Pickard, J. (1990) Analysis of stocking records from 1884 to 1988 during the subdivision of *Momba*, the largest property in semi-arid New South Wales. *Proceedings of the Ecological Society of Australia* 16, 245-253.

Pickard, J., Adamson, D.A., Harwood, D.M., Miller, G.H., Quilty, P.G.,& Dell, R.K. (1988) Early Pliocene marine sediments, coastline and climate of East Antarctica. *Geology* 16 (2), 158-161.

Vitt, D.H., Horton, D.G. & Pickard J. (1987) An annotated list of the bryophytes of Keele Peak, Yukon - an isolated granitic mountain. *Memoirs of the New York Botanical Garden* 45, 198-210.

Pickard, J., Adamson, D.A., Harwood, D.M., Miller, G.H., Quilty, P.G .& Dell, R.K. (1986) Early Pliocene marine sediments in the Vestfold Hills, East Antarctic: implications for coastline, ice sheet and climate. *South African Journal of Science* 82, 520-521.

Pickard, J., Adamson, D.A. & Heath, C.W. (1986) The evolution of Watts Lake, Vestfold Hills, East Antarctica, from marine inlet to freshwater lake. *Palaeogeography, Palaeoclimatology, Palaeoecology* 53, 271-288.

Pickard, J. (1985) The Holocene fossil marine macrofauna of the Vestfold Hills, East Antarctica. *Boreas* 14 (2), 189-202.

Pickard, J. (1984) Comment on "Wastage of the Klutlan ice-cored moraines, Yukon Territory, Canada" by Driscoll (1980) *Quaternary Research* 22, 259.

Pickard, J. & Seppelt, R.D. (1984) Holocene occurrence of the moss *Bryum algens* Card. in the Vestfold Hills, Antarctica. *Journal of Bryology* 13, 209-217.

Pickard, J. (1984) Exotic plants on Lord Howe Island: distribution in space and time, 1853-1981. *Journal of Biogeography* 11, 181-208.

Pickard, J. & Seppelt, R.D. (1984) Phytogeography of Antarctica. *Journal of Biogeography* 11, 83-102.

Adamson, D.A., Pickard, J., Bird, G.A. & Foley, C. (1984) Audible wind-generated shock waves in Antarctica. *Polar Record* 22, 186-189.

Pickard, J. (1984) Retreat of ice scarps on an ice-cored moraine, Vestfold Hill, Antarctica. *Zeitschrift fur Geomorphologie* 28, 443-453.

Pickard, J. (1983) Surface lowering of ice-cored moraines by wandering lakes. *Journal of Glaciology* 29, 338-342.

Pickard, J. (1983) Rare or threatened plants on Lord Howe Island. *Biological Conservation* 27, 125-139

Pickard, J. (1983) Pingos in Antarctica. *Quaternary Research* 20, 105-109.

Rodd, A.N .& Pickard, J. (1983) Census of the vascular flora of Lord Howe Island. *Cunninghamia* 1, 267-280.

Pickard, J. (1983) Vegetation of Lord Howe Island. *Cunninghamia* 1, 133-265.

Pickard, J. (1982) A willy-willy in Antarctica. *Meteorology Australia* 2, 16.

Pickard, J. (1982) Holocene winds of the Vestfold Hills, Antarctica. *New Zealand Journal of Geology and Geophysics* 25, 353-358.

Pickard, J. (1982) Catastrophic disturbance and vegetation on Little Slope, Lord Howe Island. *Australian Journal of Ecology* 7, 169-178.

Pickard, J. (1982) The vegetation of the Vestfold Hills, a progress report. *Journal of the Hattori Botanical Laboratory* 52, 295-297.

Brophy, J.J., Flynn, T.M., Lassak, E.V. & Pickard, J. (1982) The volatile herb oil of *Kippistia suaedifolia*. *Phytochemistry* 21, 812-814.

Everitt, D.A., Poore, G.C.B. & Pickard, J. (1980) Marine benthos from Davis Station, eastern Antarctica. *Australian Journal of Marine and Freshwater Research* 31 (6), 829-836.

Beeston, G.R., Walker, P.J., Purdie, R. & Pickard, J. (1980) Plant communities of the Poplar Box (*Eucalyptus populnea*) lands of eastern Australia. *Australian Rangeland Journal* 2 (1), 1-16.

Pickard, J. (1980) The palm seed industry of Lord Howe Island. *Principes* 24, 3-13.

Hutchings, P.A., Recher, H.F., Pickard, J. & Weate, P.A. (1977) A survey of mangroves at Brooklyn, Hawkesbury River, New South Wales. *Operculum* 5, 105-112.

Pickard, J. (1976) Contamination of rumen samples during washing. *Journal of Range Management* 29, 438.

Pickard, J. (1976) The effect of feral goats (*Capra hircus* L.) on the vegetation of Lord Howe Island. *Australian Journal of Ecology* 1, 103-114.

Pickard, J. (1973) An annotated botanical bibliography of Lord Howe Island. *Contributions from the National Herbarium of New South Wales* 4, 470-491.

Pickard, J. (1972) Annotated bibliography of floristic lists of New South Wales. *Contributions from the National Herbarium of New South Wales* 4, 291-317.

Pickard, J. (1972) Rate of movement of transgressive sand dunes at Cronulla, New South Wales. *Journal of the Geological Society of Australia* 19, 213-216.

REFEREED PAPER "IN PRESS"

Pickard, J. (in press) Stone walls near Jindabyne NSW: European fences, not Aboriginal stone arrangements. *Australasian Historical Archaeology* (accepted for publication 6 February 2015)

REFEREED PAPERS IN BOOKS OR CONFERENCE PROCEEDINGS

Pickard, J. (2007). Predator-proof fences for biodiversity conservation: some lessons from dingo fences. Pp. 197-207 *in* Dickman, C., Lunney, D. and Bergin, S. (eds) (2007) *Animals of arid Australia: out on their own*. Royal Zoological Society of New South Wales, Sydney.

Pickard, J. (2001) Safe carrying capacity and sustainable grazing: how much have we learnt in semi-arid Australia in the last 170 years? pp. 275-289 *in* Conacher, A.J. (ed) (2001) *Land degradation.* Kluwer, Dortrecht.

Pickard, J. (1994) Fences: ordinary objects integrating the history of ordinary landscapes. *Proceedings of 1994 Annual Conference of Royal Australian Historical Society,* pp. 7-23.

Pickard, J. (1994) Land degradation and conservation in the semi-arid zone of Australia: grazing is the problem...and the cure. pp. 131-137 in Moritz, C. & Kikkawa, J. (eds) (1994) *Conservation biology in Australia and Oceania* Surrey Beatty, Chipping Norton.

Pickard, J. (1994) Do old survey plans help us discover what happened to western New South Wales when Europeans arrived? Chapter 6, pp. 65-74 in Lunney, D., Hand, S., Reed, P. & Butcher, D. (eds) (1994) *Future of the fauna of western New South Wales.* Royal Zoological Society of New South Wales, Mosman.

Pickard, J. (1994) Post-European changes in creeks of semi-arid rangelands, "Polpah Station", New South Wales. pp. 271-283 in Millington, A.C. & Pye, K. (eds) (1994) *Environmental change in drylands. Biogeographical and geomorphological perspectives*. John Wiley, London.

Pickard, J. (1991) Land management in semi-arid environments of New South Wales. pp. 191-208 in Henderson-Sellers, A. & Pitman, A.J. (eds) (1991) *Vegetation and climate interactions in semi-arid regions*. Kluwer Academic Publishers, Dordrecht.

Pickard, J. (1990) The use of mallee lands for pastoral purposes, plant products and minerals. pp. 271-275 in Noble, J.C., Joss, P.J. & Jones, G.K. (eds) 1990 *The mallee lands, a conservation perspective*. CSIRO, Melbourne.

Seppelt, R.D., Broady, P.A., Pickard, J. & Adamson, D.A. (1988) Plants and landscape in the Vestfold Hills, Antarctica. pp. 185-196 in Ferris, J.M., Burton, H.R., Johnstone, G.W. & Bayley, I.A.E. (eds) (1988*) Biology of the Vestfold Hills, Antarctica*. Developments in Hydrobiology, 34, (Kluwer, Dordrecht)

Pickard, J. (1986) Antarctic oases, Davis Station and the Vestfold Hills. pp. 1-20 in Pickard, J. (ed) (1986*) Antarctic oasis. Terrestrial environments and history of the Vestfold Hills.* Academic Press, Sydney.

Adamson, D.A. & Pickard, J. (1986) Cainozoic history of the Vestfold Hills. pp. 63-98 in Pickard, J. (ed) (1986) *Antarctic oasis. Terrestrial environments and history of the Vestfold Hills*. Academic Press, Sydney.

Adamson, D.A. & Pickard, J. (1986) Physiography and geomorphology of the Vestfold Hills. pp. 99-140 in Pickard, J. (ed) (1986) *Antarctic oasis. Terrestrial environments and history of the Vestfold Hills*. Academic Press, Sydney.

Pickard, J. (1986) Spatial relations of the vegetation of the Vestfold Hills. pp. 275-308 in Pickard, J. (ed) (1986) *Antarctic oasis. Terrestrial environments and history of the Vestfold Hills.* Academic Press, Sydney.

Pickard, J. (1986) The Vestfold Hills: a window on Antarctica. pp. 333-351 in Pickard, J. (ed) (1986) *Antarctic oasis. Terrestrial environments and history of the Vestfold Hills*. Academic Press, Sydney.

Pickard, J., Selkirk, P.M. & Selkirk, D.R. (1984) Late Quaternary climates of the Vestfold Hills, Antarctica, and Macquarie Island. pp. 173-192 in Vogel, J.C (ed) *Late Cainozoic palaeoclimates of the Southern Hemisphere.* AA Balkema, Rotterdam.

Pickard, J., & Jacobs, S.W.L. (1984) Vegetation patterns on the Sassafras Plateau, New South Wales. pp. 54-66 in Young, R.W. & Nanson, G.C. (eds) (1984) *Topics in Australian sandstone environments*. Department of Geography, University of Wollongong, Wollongong.

Pickard, J. & Adamson, D.A.. (1983) Perennially frozen lakes at glacier/rock margins, east Antarctica. pp. 470-472 in Oliver, R.L., James, P.R. & Jago, J.B. (eds) (1983) *Antarctic earth sciences* Australian Academy of Sciences, Canberra

Adamson, D.A. & Pickard, J. (1983) Late Quaternary ice movement across the Vestfold Hills, Antarctica. pp. 465-469 in Oliver, R.L., James, P.R. & Jago, J.B. (eds) (1983) *Antarctic earth sciences* Australian Academy of Sciences, Canberra

Pickard, J. & Boyland, D.E.. (1981) Comparison of three small-scale (1: 1M) vegetation mapping techniques. pp. 86-96 in Gillison, A.N. & Anderson, D.J. (eds) (1981) *Vegetation classification in Australia*. Australian National University Press, Canberra.

BOOKS

Pickard, J. (ed) (1986) *Antarctic oasis. Terrestrial environments and history of the Vestfold Hills*. Academic Press, Sydney.

Jacobs, S.W.L. & Pickard, J. (1981) *Plants of New South Wales, A census of the cycads, conifers and angiosperms.* New South Wales Government Printer, Sydney.

CHAPTERS OR CONTRIBUTIONS TO BOOKS

Pickard, J. (2006) Fences for biodiversity conservation in the arid zone: some lessons from history. pp. 329-332 *in* Erklenz, P. (ed) 2006 *The cutting edge. Conference papers, 14th Biennial Conference of the Australian Rangelands Society*, Renmark, South Australia, September 2006.

Pickard, J. (1991) Quaternary studies and land rehabilitation in semi-arid New South Wales; or when is a scald not a scald? pp. 109-117 in Brierley, G. & Chappell, J. (eds) (1991) *Applied Quaternary studies*. Australian National University, Canberra.

Pickard, J. (1988) Impact of recent legislation on the Western Division of New South Wales. *Working papers, 5th Biennial Conference of the Australian Rangelands Society, Longreach, Queensland*. pp 103-106.

Pickard, J. & Adamson, D.A.. (1983) Holocene marine deposits and ice retreat, Vestfold Hills, Antarctica. p. 110 in Chappell, J.M.A. & Grindrod, A. (eds) (1983) *Proceedings of the first CLIMANZ Conference. Department of Biogeography and Geomorphology, Australian National University, Canberra.*

Pickard, J. & Adamson, D.A. (1983) Probable late Pleistocene marine deposits in the Vestfold Hills, Antarctica. pp. 20-21 in Chappell, J.M.A. & Grindrod, A. (eds) (1983) *Proceedings of the first CLIMANZ Conference. Department of Biogeography and Geomorphology, Australian National University, Canberra.*

Pickard, J. (1982) Vegetation of the Budawang range. pp. 241-249 in Anon. (ed) (1982) *Pigeon House and beyond.* Budawang Committee, Eastwood.

Pickard, J. (1977) [Beyond the Divide, and other material] *Scenic wonders of Australia*. Readers Digest, Sydney.

Pickard, J. (1977) The use of fire in management of small reserves. pp. 7-20 in Anon. (ed) (1977) *Ecofire*. National Parks Association of New South Wales, Sydney.

Recher, H.F. & Pickard, J. (1977) Five years later. pp. 40-41 in Smith, N. (ed) (1977) *Lord Howe Island*. The Australian Museum, Sydney.

Clark, S.S. & Pickard, J. (1977) Vegetation and environment. pp. 19-22 in Smith, N. (ed) (1977) *Lord Howe Island*. The Australian Museum, Sydney.

Pickard, J. (1977) Botanical bibliography. Appendix 1, pp. 81-82 in Recher, H.F. & Clark, S.S.. (eds) (1977) *Environmental survey of Lord Howe Island.* New South Wales Government Printer, Sydney.

Pickard, J & Clark, S.S.. (1977) Lord Howe Island weeds. Appendix H, pp. 77-80 in Recher, H.F. & Clark, S.S. (eds) (1977) *Environmental survey of Lord Howe Island*. New South Wales Government Printer, Sydney.

Pickard, J. (1977) Vegetation map and notes. Appendix C, pp. 27-36 in Recher, H.F. & Clark, S.S. (eds) (1977) *Environmental survey of Lord Howe Island*. New South Wales Government Printer, Sydney.

MISCELLANEOUS

Pickard, J. (1998) A 19th century vernacular horizontal sundial from outback Australia. *Bulletin of the British Sundial Society* 98.1, 26-29.

Pickard, J. (1997) Discovering a new species: *Acacia pickardii* Tindale. *Newsletter of the Alice Springs Branch of the Society for Growing Australian Plants* August 1997, 3-4.

Pickard, J. (1993) *Vegetation and geomorphology of MOMBA*. Final report National Estate research grant from Department of Planning.

Pickard, J. (1992) Genealogy of maps of Lord Howe Island, 1788-1988. *The Globe* (37) III.80-III.84.

Pickard, J. (1992) *Artesian springs in the Western Division of New South Wales*. Working Paper 9202, Graduate School of the Environment, Macquarie University.

Pickard, J. (1992) Constructing exclosures for rangelands research. Some lessons learned the hard way. *Range Management Newsletter* March 1992, 6-8.

Pickard, J. (1991) Diet of diprotodons: a mystery solved. *Quaternary Australasia* 9 (2), 29-30.

Pickard, J. (1991) Sheep and rabbits: the biological chainsaws. *Search* 22, 48-50.

Pickard, J. (1990) Diet of diprotodons, a mystery of the sands. *Quaternary Australasia* 8(2), 25.

Pickard, J. (1990) Attitudes and environmental use in the forgotten seventy percent of Australia. *Australian Zoologist* 26, 54-58.

Pickard, J. (1988) Kangaroos on western lands leases: the Western Lands Commission view. *Australian Zoologist* 24, 151-153

Pickard, J. (1987) *Mallee management strategy*. Western Lands Commission, Sydney.

Aharon, P, Pickard, J & Adamson, D.A. (1987) Documentation of an ice-melting event during isotope stage 3 related to the East Antarctic ice cap. *INQUA Abstracts.*

Pickard, J. (1981) Vegetation of the Vestfold Hills, Antarctica. *Abstracts of the XIII International Botanical Congress* p. 149.

Recher, H.F., Douglas, I., Gentle, W., Hitchcock, P.P., Pickard, J., Scott, M.E. & Somerville, J.G. (1978) *The definition of key environmental problems in land conservation*. Final report of the Land Conservation Study Group, Premier's Department, Sydney.

Anon [Pickard, J.] (1977) *Red data sheets for* Charmichaelia exsul, Marratia salicina *and* Passiflora herbertiana *ssp*.insulae-howei. IUCN Threatened Plants Committee, London.

Pickard, J. (1976) Lord Howe Island. Letter to the editor, *New Scientist* 22 April 1976, pp. 195-196.

Johnson, L.A.S., Fraser, H., Gentle, S.W., Gillard, R., Hartigan, D.J., Humphries, F.R., Mullins, M.G., Murphy, M.P., Neuhaus, J.W., Pickard, J., Pitman, M.G., Ralph, C., Scheltema, H., Seymour, S., Tomkins, J. & Watson, W.R.. (1975) *Report from the Committee on the Deterioration of Norfolk Island Pines on Metropolitan Beaches*.Premier's Department, Sydney

Clark, S.S. & Pickard, J. (1974) Vegetation and environment. *Australian Natural History* 18, 56-59.

THESES

Pickard, J. (2010) *Lines across the landscape: history, impact and heritage of Australian rural fences.* PhD thesis, Department of Environment and Geography, Macquarie University.

Pickard, J. (1984) *Landscape development and vegetation of the Vestfold Hills, East Antarctica.* PhD thesis, School of Biological Sciences, Macquarie University.

Pickard, J. (1978) *Vegetation of Lord Howe Island.* MSc thesis, Department of Botany, University of Sydney.

Pickard, J. (1968) *Aspects of the ecology of the Cronulla sand dunes*. BScAgr thesis, Faculty of Agriculture, University of Sydney.

PAPERS GIVEN AT CONFERENCES

Fanning, P., Salemme, M., Pickard, J., Santiago, F. & Oria, J. (2008) People and sheep, wind and water: geomorphic processes and human impacts in Tierra del Fuego, Argentina, and consequences for the archaeological record. *Australian and New Zealand Geomorphological Group Conference, Queenstown Tasmania, 10-15 February 2008.*

Pickard, J. (2007). Syphilis and Australian colonial shepherds: literary connections over four centuries. *Australian and New Zealand Society of the History of Medicine Conference 10th Biennial Conference, Australian National University July 2007.*

Pickard, J. (2007). Big numbers are better: interpreting rural heritage fences. *New Ground: Australasian Archaeology Conference 2007, University of Sydney, Department of Archaeology, School of Philosophical & Historical Inquiry, The University of Sydney.*

Pickard, J. (2007). Up in smoke: wildfires and heritage fences. *Australia ICOMOS 2007 eXtreme heritage, Cairns, July 2007, Australia ICOMOS.*

Pickard, J. (2006) Fences for biodiversity conservation in the arid zone: some lessons from history. *Paper presented at 14th Biennial Conference of the Australian Rangelands Society, Renmark, South Australia, September 2006.*

Pickard, J. (2005) Railway fences: thousands of kilometres of unknown heritage. *Paper presented to National Railway Heritage Conference, Tamworth, 28 September 2005.*

Pickard, J. (2005) More than just wood and steel: rural and barrier fences. *Invited presentation to National barrier Fence Administrators' Conference, Warwick, 17 May 2005.*

Pickard, J. (2004) Which side of the fence are you on? Technology, history, fences and the future of the Australian arid zone. *Paper presented to Arid Zone Forum, Royal Zoological Society of NSW, Sydney, 23 October 2004.*

Pickard, J. (2004) Rural fences: geographic objects in Australian landscapes. *Paper presented to Institute of Australian Geographers Conference, Adelaide.*

Pickard, J. (2004) Fences, land management, historic heritage and the future of rangelands. *Poster presented at 13th Biennial Conference of Australian Rangeland Society, Alice Springs, July 2004.*

Pickard, J. (2004) *MOMBA*: from pastoralism to conservation 1857 – 2004. *Presentation to Royal Australian Historical Society, Sydney, 3 March 2004.*

Pickard, J. (2003) Fences, historic heritage, land management and the future in semi-arid NSW. *Paper presented at Environment Institute of Australia and New Zealand Outback Summit, Broken Hill, October 2003.*

Pickard, J. (2003) Rural fences: more than just wood and steel. *Poster presented at Environment Institute of Australia and New Zealand Outback Summit, Broken Hill, October 2003.*

Fanning, P.F., Pickard, J., Gore, D., Crighton, P. & Adamson, D.A. (2003) Valley floor gullies in western New South wales, Australia: processes and histories. *Poster at XVI INQUA Congress, Reno Program with Abstracts, July 2003.*

Pickard, J., Fanning, P., Gore, D., Crighton, P. & Adamson, D.A. (2002) Post-European landscape change in semi-arid NSW: a review of evidence from process monitoring, absolute dating and artefacts. *Paper presented at Australian and New Zealand Geomorphological Group Conference, Kalgoorlie, October 2002.*

Pickard, J. (2002) How accurate are stocking rates in advertisements for grazing properties in semi-arid western New South Wales? *Poster presented at Australian Rangeland Society Conference, Kalgoorlie, September 2002*

Pickard, J. (1999) Safe carrying capacity and sustainable grazing: how much have we learnt in the last 170 years? *Paper presented at International Meeting of Commission on Land Degradation, Perth, September 1999.*

Pickard, J. (1999) Stocking rates in advertisements for semi-arid leasehold grazing properties in the Western Division of New South Wales, 1984-1993. *Paper presented at International Meeting of Commission on Land Degradation, Perth, September 1999.*

Fanning, P. & Pickard, J. (1999) Desertification by water erosion and sedimentation in semi-arid western New South Wales, Australia. *Paper presented at International Meeting of Commission on Land Degradation, Perth, September 1999.*

Pickard, J. (1997) Oral history of the floods of the lower Paroo River. *Paper presented at Paroo River Scientific Workshop, Hungerford Queensland, 7-9 July 1997.*

Pickard, J. (1996) Rural fences: perhaps the most common, (and most commonly neglected) component of European cultural landscapes in Australia. *Paper presented at Australian ICOMOS Cultural Landscapes Conference, Robertson, 6-8 November 1996.*

Pickard, J. (1995) Fences in the view: landscape history using invisible objects. *Paper presented at Combined Annual Conference of Australian Institute of Marine Archaeology and Australasian Society for Historical Archaeology, Hobart, October 1995.*

Pickard, J. (1994) Lines across the landscape: fences in the view. *Invited paper presented at Annual Conference of the Royal Australian Historical Society* "Knowing places, understanding places. *Sydney, 8-9 October 1994.*

Pickard, J. (1994) Landscape changes on MOMBA STATION: old themes, temporary old ways. *Invited paper presented at 22nd Annual Conference of The Australian Map Circle, Macquarie University, January 1994.*

Pickard, J. (1992) Western lands lease rentals: reasonable, ripoff or rort? *Biennial conference of the Australian Rangelands Society, Cobar, October 1992.*

Pickard, J. (1992) Small-scale karst initiated by rabbits in gypsum deposits, semi-arid western New South Wales. *5th Meeting of the Australia/New Zealand Geomorphology Research Group. Port Macquarie, April 1992.*

Eldridge, D.J. & Pickard, J. (1992) Role of invertebrates in soils of semi-arid rangelands. *British Geomorphological Research Group Conference "Effects of environmental change on geomorphic processes and biota in arid and semi-arid environments", Swansea, Wales, January 1992.*

Pickard, J. (1992) Post-European changes in creeks of semi-arid rangelands, "Polpah Station", New South Wales. *British Geomorphological Research Group Conference "Effects of environmental change on geomorphic processes and biota in arid and semi-arid environments", Swansea, Wales, January 1992.*

Pickard, J. (1991) Genealogy of maps of Lord Howe Island, 1788-1990. *"Unfolding Australia" Conference of International Map Collectors Society and Australian Map Circle, Sydney, November 1991.*

Pickard, J. (1991) Semi-arid conservation: grazing is the problem...and the solution. *Invited address, "Conservation biology in Australia and Oceania" Conference, University of Queensland, Brisbane, October 1991.*

Pickard, J. (1991) What happened to western New South Wales when Europeans arrived? *Symposium of Royal Zoological Society of New South Wales "The future of native fauna in western New South Wales." University of New South Wales, Kensington, March 1991.*

Pickard, J. (1991) Colonisation after Little Ice Age glaciers in the Yukon: plants don't walk uphill. *Annual Conference of the Australasian Quaternary Association, Mallacoota, Victoria, February 1991.*

Pickard, J. (1990) Despite the dire predictions of the equilibrium theory of island biogeography, small isolated and disturbed populations of plants can and do survive. *Open Forum, Biennial Conference of the Ecological Society of Australia, University of Melbourne*.

Pickard, J. (1990) Quaternary studies applied to land degradation in semi-arid NSW, the "Momba" project. *Applied Quaternary Studies Workshop, Australian National University, July 1990*

Pickard, J. (1990) Floods on the lower Paroo River, western New South Wales. *Fifth Australia-New Zealand Climate Forum, Macquarie University, 1-2 February 1990.*

Pickard, J. (1990) Land management in semi-arid environments of New South Wales. *Invited Keynote Address, Conference on Degradation of Vegetation in Semi-arid Regions: Climate Impact and Implications, Macquarie University.*

Pickard, J. (1989) Analysis of stocking records from 1884 to 1988 during the subdivision of Momba, the largest property in semi-arid New South Wales. *Bicentennial Symposium of the Ecological Society of Australia, Geraldton.*

Pickard, J. (1989) The use of mallee lands for pastoral purposes, plant products and minerals. *National Mallee Conference, Adelaide, May 1989.*

Pickard, J. (1988) Impact of recent legislation on the Western Division of New South Wales. *Biennial Conference of the Australian Rangelands Society, Longreach.*

Pickard, J. (1988) Kangaroos on western lands leases: the Western Lands Commission view. *Royal Zoological Society of New South Wales Symposium on Harvesting Kangaroos, University of New South Wales.*

Pickard, J. (1988) Can an ethnic plant ever become Australian? *Youth ANZAAS, University of Sydney.*

Aharon, P., Pickard, J. & Adamson, D.A. (1987) Documentation of an ice-melting event during isotope stage 3 related to the east Antarctic ice cap. *International Quaternary Association Conference, Montreal.*

Pickard, J. (1982) Fire and weeds in an inner suburban bushland. *ANZAAS, Macquarie University.*

Pickard, J. (1981) Vegetation of the Vestfold Hills, Antarctica. *XIII International Botanical Congress, University of Sydney.*

Pickard, J. (1979) Vegetation of the Vestfold Hills, Australian Antarctic Territory. *Ecological Society of Australia Conference, Griffith University*.

CONTRACT RESEARCH AND CONSULTANCY REPORTS

Pickard, J. (2009) *Illustrated glossary of Australian rural fence terms*. Heritage Branch, NSW Department of Planning, Sydney. http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/IllustratedglossaryofAustralianruralfenceterms2009.pdf)

Pickard, J. (2006) *History and present status of freehold on Tillenbury Station*. Unpublished consultancy report for Buckworth Keady Lawyers.

Pickard, J. (2006) *Conservation Management Plan. Osage Orange hedge. Peats Crater, Muogamarra Nature Reserve.* Contract report to National Parks and Wildlife Division, NSW Department of Environment and Conservation. http://www.environment.nsw.gov.au/resources/parks/PickardOsageOrangeCmp.pdf

Pickard, J. (2005) *Report on flora and vegetation: ARTC Matakana and Kinalung crossing loop modifications*. Unpublished contract report to Countrywide Ecological Services.

Pickard, J. (1999) *Supplementary report on flora and vegetation of ACI Tanilba Northern Dune White Silica Sand proposal.* Unpublished contract report to Countrywide Ecological Services.

Pickard, J. (1999) *Fences at* Joorilands, *upper Wollondilly River*. Unpublished consultancy report to Hartley Historic Site, NSW NPWS.

Pickard, J. (1998) *Specifying sustainable grazing*. Unpublished consultancy report for Land and Vegetation (Access) Unit, Department of Land and Water Conservation.

Pickard, J. (1998) *History and present status of freehold on* Momba. Unpublished report to Buckworth, Keady and Chalker.

Pickard, J. (1998) *History and present status of freehold on* Polpah. Unpublished report to Buckworth, Keady and Chalker.

Pickard, J. (1998) *Addendum re access [on western lands leases]*. Unpublished report to Buckworth, Keady and Chalker.

Pickard, J. (1998) *Historical observations on the Western Lands Act 1901 and its progenitors.* Unpublished report to Buckworth, Keady and Chalker.

Pickard, J. (1997) *Report on flora and vegetation of ACI Tanilba Northern Dune White Silica Sand proposal.* Unpublished contract report to Countrywide Ecological Services.

Pickard, J. (1995) *Final report on vegetation survey Darling Farms jojoba development.* Contract report to Hassall & Associates, Sydney.

Pickard, J. (1995) *Environmental impact statment: quarry licence application Peery Station, White Cliffs.* Contract report to G & K Barlow, White Cliffs.

Pickard, J. (1994) *Rents for grazing leases, Western Division, spatial and temporal patterns 1949 – 1993*. Unpublished consultancy report for Western Lands Commission.

Pickard, J. (1992) *Recovery plan research phase. Acacia curranii*. Final report on contract with NSW National Parks and Wildlife Service.

Pickard, J. (1992) *Conservation recovery plan, management phase. Acacia curranii.* Final report on contract with NSW National Parks and Wildlife Service.

Pickard, J. (1992) *Conservation research statement. Acacia curranii*. Final report on contract with NSW National Parks and Wildlife Service.

Pickard, J. (1992) *Recovery plan research phase. Eriocaulon carsonii*. Final report on contract with NSW National Parks and Wildlife Service.

Pickard, J. (1992) *Conservation recovery plan, management phase. Eriocaulon carsonii*. Final report on contract with NSW National Parks and Wildlife Service.

Pickard, J. (1992) *Conservation research statement. Eriocaulon carsonii*. Final report on contract with NSW National Parks and Wildlife Service.

BOOK REVIEWS

Pickard, J. (2008) Book review Gaynor, A. (2006) *Harvest of the suburbs: and environmental history of growing food in Australian cities.* University of Western Australia Press, Crawley. *Agricultural History* 82 (2) , 238-239.

Pickard, J. (1999) Book review Noble J.C. (1997) *The delicate and noxious scrub. CSIRO studies on native tree and shrub proliferation in the semi-arid woodlands of eastern Australia.* CSIRO Wildlife and Ecology, Lyneham. *The Rangeland Journal* 21 (2), 260-261

Pickard, J. (1994) Book review: Symanski, R. (1990) *Outback rambling*. University of Arizona Press, Tucson. *The Rangeland Journal*. 16, 333-334

Pickard, J. (1994) Book review: Cocks, D. (1992) *Use with care. Managing Australia's natural resources in the twenty first century.* New South Wales University Press, Kensington. *Australian Journal of Ecology* 19, 474-476.

Pickard, J. (1994) Book review. Rathje, W. & Murphy, C. (1992) *Rubbish! The archaeology of garbage.* HarperCollins, New York. *Australian Journal of Ecology*.19, 236-237.

Pickard, J. (1992) Book review: Grainger, A. (1990*) The threatening desert. Controlling desertification.* Earthscan Publications, London. *The Rangeland Journal* 14, 57-58.

Pickard, J. (1992) Book review: Causton, D.R. (1988) *Introduction to vegetation analysis*. Unwin Hyman, London. *Australian Journal of Ecology* 17, 356-357.

Pickard, J. (1992) Book review: Luken, J.O. (1990) *Directing ecological succession*. Chapman and Hall, London. *Australian Journal of Ecology* 17, 238-239.

Pickard, J. (1991) Book review: Benson, D & Howell, J. (1990) *Taken for granted. The bushland of Sydney and its suburbs.* Royal Botanic Gardens / Kangaroo Press, Kenthurst. *Australian Journal of Ecology* 16, 265-266.

Pickard, J. (1991) Book review Galaty, J.G. & Johnson, D.L. (eds) (1990) *The world of pastoralism. Herding systems in comparative perspective*. Guildford Press, New York. *The Rangeland Journal* 13, 131-132. (1991)

Pickard, J. (1991) Book review Cremer, K.W. (ed) (1990) *Trees for rural Australia*. Inkata Press, Melbourne. *Search* 22, 215. (1991)

Pickard, J. (1991) Book review Friday, L & Laskey, R. (eds) (1989) *The fragile environment. The Darwin College Lectures*. Cambridge University Press, Cambridge. *Australian Journal of Ecology* 16, 265-266.

Pickard, J. (1985) Book review Knapp, R. (1984) *Sampling methods and taxon analysis in vegetation science*. Junk Publishers, The Hague. *Australian Journal of Ecology* 10, 201-202.

Pickard, J. (1982) Book review Rolls, E. (1981) *A million wild acres*. Nelson, Melbourne. *Australian Natural History* 20, 427-428.

Pickard, J. (1969) Book review Brown, A. & Hall, N. (1969) *Growing trees on Australian farms*. Forestry & Timber Bureau, Canberra. *Agricultural Gazette* 80, 685.