

Australian and New Zealand Logging Tramways - Differences from North American Practice

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Introduction

The purpose of this presentation is to highlight differences between logging railway operations in Australia and North America, particularly those which would affect modellers.

This presentation is limited to the movement of logs by rail from the bush towards the sawmill. Transport of sawn timber, and firewood, is not covered.

As I delved into this subject, it became clear that logging tramway operations in the four eastern states of Australia, and in New Zealand; followed much the same practices; varying mainly in intensity. The further north you move, the less intense the operations become.

South Australia is easy, there were no logging tramways there that I know of. Western Australia had an intense logging industry in the south-west, but their methods of operation were so much different (and better engineered) than those in the east, that I have had to treat them as a separate area.

In the case of North America, there was also a significant difference between the operations in the east and on the west coast. Again the operations on the west coast were much better engineered than in the east, due to the volume of logs to be moved. On the west coast of North America, the further north you go the more intense the operations become (until you get into areas too cold to grow decent sized trees). As a result, most of the logging railroads in Oregon and Washington were standard gauge, and almost all of those in British Columbia were standard gauge.

Conclusion

On the following pages I have summarised operational differences under various headings. Because the subject covers a wide area, these are generalisations, and there will be exceptions; some of which are noted in the text.

The modeller is presented with great challenges in realistically producing the essential characteristics of the logging tramways of eastern Australia and New Zealand. In a nutshell, they differed from those in Western Australia and North America by being rougher, cruder, less permanent, more weird and eccentric, less safe, and more badly maintained. They were the results of the efforts of clever, innovative, hard-working people, who had little capital and little formal training in what they were attempting to achieve. And they were working in a business environment where they were often barely able to make a profit.

Australia - East, and New Zealand

Gauges

Queensland

Mostly 3 ft 6 in and 3 ft. Munro's Hampton Tramway was 2 ft 6 in.

New South Wales

Mostly 3 ft 6 in and 3 ft. Others included 4 ft 8½ in and 4 ft 2 in.

Victoria

Mostly 3 ft 6 in and 3 ft. Also 2 ft, 2 ft 6 in, 4 ft and 5 ft 3 in, and minor variations on those gauges.

Tasmania

Mostly 3 ft 6 in and 3 ft. Others included 2 ft, 2 ft 6 in and 4 ft 8½ in.

New Zealand

Almost entirely 3 ft 6 in. A few were 3 ft. There may have been others.

Locomotives

Weird home-made steam and internal-combustion locomotives used in all eastern states and New Zealand.

Two-truck Shay and B class Climax locos used in all eastern states of Australia.

A class Climax used in Queensland, New South Wales and Tasmania.

Two truck Climax and Heisler locos used in New Zealand.

Locally built geared steam locos used in Tasmania and Victoria.

In New Zealand about 80 locally built geared steam locos were used, including 16-wheelers which appear to be unique to NZ.

Small conventional steam locos were used in all eastern states and New Zealand, mostly of English manufacture.

The locomotives were smaller, and lighter than those used on most North American logging railways after about 1910. Compared to North American operations they generally also looked much more battered and poorly maintained (though there were exceptions on both sides of the Pacific).

Rolling Stock

The most important item of rolling stock was the log bogie (known as "buggie" in New Zealand). Almost universal throughout eastern Australia and New Zealand was the primitive unsprung, inside-framed wooden log bogie, with curly-spoked cast-iron wheels, with deep flanges and usually with wide treads. Most had bell-shaped wooden brake-blocks between the wheels.

The brakes were operated by ropes. One log bogie was placed at each end of the log (or logs), with the log forming the link between the two bogies.

There was often close integration of horse-drawn and locomotive-hauled tramways, which favoured the use of this type of bogie. It could be used on very rough track including wooden-railed horse tramways. They were lighter than any other type, but rugged and cheap to repair or replace when they ran off bridges into rivers, or hurtled uncontrollably down inclines.

The most expensive part of these bogies were the wheels and axles, together with various other iron fittings - bearings, brake rigging, link and pin couplings etc - which were bought in by the mills; and the timber parts constructed on site. Although built locally, the style varied very little, irrespective of location or track gauge. The wheels varied in diameter, but seemed to be within the range 18 inch to 24 inch, with the smaller ones more common.

Straight-spoked wheels were not unknown. They seem to have been more common in the nineteenth century, and can be seen in a number of illustrations in *Settlers and Sawmillers*.

A variation on the bell brake block was the board brake. The board brake seems to have been developed in New Zealand, and was considered to be more effective on locomotive-hauled tramways where the brakes were being constantly applied and released. The most notable user of board brakes in Australia was Victoria's Powelltown tramway, where they were almost certainly introduced as the result of the influence of a New Zealand manager who came to the operation in 1915. (Note: In photographs, inside-framed timber bogie fitted with board brakes can at first sight be mistaken for outside-framed timber bogies.)

Typical example of inside-framed timber bogie used widely in the eastern states of Australia, and New Zealand. These are 3 ft 4½ in gauge at Rubicon, Victoria.



Exceptions

Laheys' Tramway at Canungra in Queensland was notable in not using these crude timber bogies. They used much more sophisticated steel-framed logging trucks, most of which seem to have come from the Climax Manufacturing Company in the USA. This type of vehicle would have been considered grossly over-engineered on most Australian timber tramways, due to cost, inability to cope with major gauge variations (especially on wooden rails), and unnecessary weight.

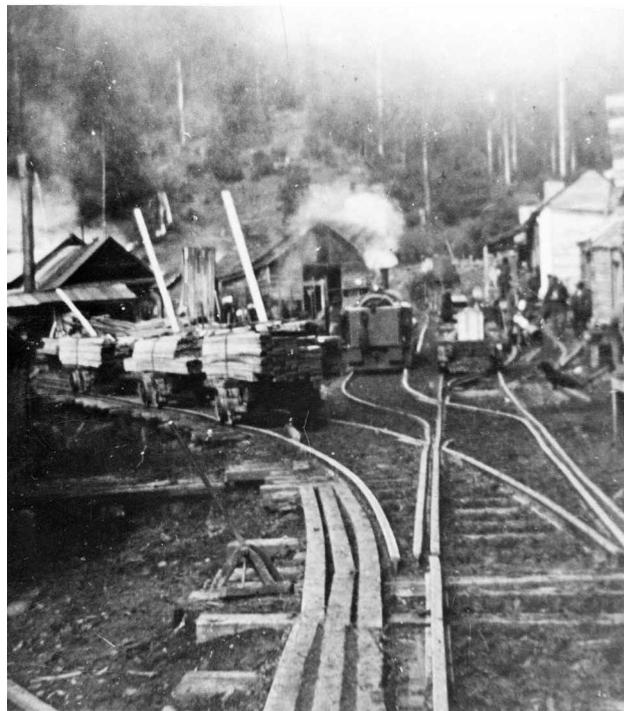
Another notable exception, in its first year or so of operation, was the Powelltown tramway. It used conventional railway-style four-wheel flat-top bolster wagons, with sprung outside axle-boxes and chopper couplings. This was undoubtedly a result of its Western Australian management. After about 1915 these bolster wagons were not used for log transport, but were confined to the tramway's "main-line" for sawn timber and general freight transport.

Unsprung, outside-framed timber bogies of a type used widely in Western Australia, were also used on some tramways in the east. The Powelltown tramway was using them prior to about 1920, though they seem to have been greatly outnumbered by the inside-framed type. They were also used on the 3 ft 6 in gauge tramways at Simmsville in NSW. This was Western Australian influence again, as the mill and tramway were built by Millars Timber & Trading Co. Ltd, one of the biggest WA timber companies. Similar bogies were used on other tramways in the east, and in New Zealand, but they were definitely not typical.

Other rolling stock

Individual tramways had other rolling stock, such as railcars, or passenger cars for timber workers, but they were always built locally, and therefore unique to each operation.

Track



Track was usually rough, and often weird. This 3 ft 6 in gauge 3-way stub point was at Henry's No.1 Mill, Forrest, Victoria.

Track was usually very light and very rough. Sleepers not very uniform in shape or size or spacing. Ballasted with earth or packed with extra timber between sleepers. A few tramways were ballasted with gravel. Wooden rails were very common, and almost all steel-railed lines had connections to

wooden-railed branches. Second-hand iron or steel rails were often very light, and rail weights could vary wildly. Pointwork was crude and often weird. Stub points were very common, including three-way stub points.

There were exceptions, for example the Victorian Tyers Valley and Powelltown Tramways both used track to Victorian Railways narrow-gauge standards, but their spur lines were often unbelievably bad.

Buildings

Judging by many photographs, the style of buildings used in the timber industry in eastern Australia and New Zealand was not greatly different from those used in Western Australia and North America up to about 1910. From around that time the quality of buildings markedly improved everywhere but in eastern Australia and New Zealand.

Buildings were normally very rough and of a minimalist nature. This poses a challenge in models to reproduce the roughness. Even the best were somewhat rough, and poorly maintained.

With few exceptions sawmills were open sided sheds, generally smaller than those in Western Australia or North America. Shingle rooves were almost universal in the nineteenth century, and during World War I when corrugated iron was unavailable. In the twentieth century, excepting the first world war period, corrugated iron was almost universally used for roofing. Large wooden chimneys were a common feature on huts and houses, they were lined inside with iron to reduce the chance of catching alight.

Topography/Environment

Usually fairly mountainous and rugged, needing lots of bridges of mostly modest size. Long, low bridges over swampy ground were fairly common. Sawmills and settlements were often built on the side of steep hills due to the lack of level ground.

Era of operation

Queensland:	1870s - 1930s
New South Wales:	1870s (?) - 1930s (?)
Victoria:	1850s - 1960s (only one tramway survived after about 1950)
Tasmania:	1870s (?) - 1960s
New Zealand:	1860s - 1960s

Where they ran

Queensland:	South-east coastal area; and Atherton tableland in north. Not very extensive.
New South Wales:	North coast around Casino, Grafton, Coffs Harbour, Wauchope, Taree, and Dorrigo Plateau. South coast in Ulladulla area and around Batemans Bay.

- Victoria: Mount Macedon; Trentham - Daylesford area, the Otways (south of Colac and Birregurra); Gippsland (west of Moe); south of Yea and Alexandra; south of Mansfield;
- Tasmania: Very extensive, with areas of concentration in the north-west; in the Derwent Valley; and south of Hobart.
- New Zealand: Widespread throughout both islands.

Location of mills

In almost all cases tramways brought logs directly to a sawmill. Most sawmills were located in the bush, with tramways taking the sawn timber to a railway. Temporary settlements were built around the mills. In some cases sawmills were located in established towns, or resulted in permanent towns being established (e.g. Powelltown, Canungra).

Logging machinery

Many small steam winches used to haul logs from bush to tramway. Most were of local manufacture with small horizontal boilers. High Lead and Skyline logging systems were used in Victoria, Tasmania and New Zealand. Small number of Washington winches were used.

In Australia, hand winches, crow bars, and Trewhella jacks were generally used to load logs. This contrasted to North America, where steam powered log loaders were widely used to transfer logs from the end of the winch line onto the rail trucks.

Inclines

Were used in all eastern states and New Zealand. Widely used in Victoria, probably due to easy availability of used cable-tram cable. In terms of length and steepness they were comparable to those in North America, but the Australian and New Zealand ones were very rough.

Bridges

Bridges were very widely used. Some tramways consisted of a succession of bridges, e.g. about 11 in one mile on Powelltown Tramway's Ada No. 1 Mill branch.

In the Australian eastern states, bridges were generally of the trestle type, wherever possible using timber in the round, with flat surfaces adzed into the timber where necessary. Where sawn timber was used, it usually had the appearance of being cut very roughly. Crib or pigsty bridges were also used, as well as bridges using a combination of both methods. Trestle bridges were rarely higher than about 60 ft.

In New Zealand substantial trestle bridges were common. Many were made of squared timber. There were a number of very large bridges of unique

types, including a suspension bridge (which fell down). One line forded a wide river bed - track was laid directly on the clean shingle river bed.

Western Australia

Gauges

Entirely or almost entirely 3 ft 6 in

Locomotives

Although there were some small tank locos and a few home-made locos, generally locomotives were bigger than those used in eastern Australia and New Zealand. The most predominant types were 2-6-0 and 4-6-0 tender locos like the WAGR G class, which were designed by Beyer Peacock. Others included Baldwin 2-4-2 ST and tender locomotives, a Baldwin 4-6-2 tender loco weighing 61 tons. Apart from three 4-wheel traction engine type locomotives, only two geared locomotives were used, a 20 ton Shay and a 40 ton Shay.

With few exceptions, locomotives were well maintained and well cared for, in marked contrast to eastern Australia and New Zealand.

Rolling Stock

Very little use of the traditional Australian log bogie. It was used on a few horse-drawn lines, but unlike in the east, horse-drawn lines were not integrated with locomotive-hauled lines.

Conventional four-wheel bolster wagons were widely used, with outside axleboxes and springs, relatively sophisticated hand brakes, and chopper couplings (for examples see *Rails through the Bush*, pages 2, 46, 48, 52, 71, 80, and 151.) The 3-ton bolster wagons used on Victoria's Powelltown tramway were similar, and almost certainly were copied from a Western Australian design, with only the gauge being changed.

Outside-framed log bogies were used on many lines (for examples see *Rails through the Bush*, pages 36, 41, 113, 123, 130, 141, 148, and 157). These had wheels of narrower tread than the traditional Australian log bogie, and were much closer in style to the wooden-framed disconnected logging truck used on the smaller logging railways in the USA.

There was some use of bogie flat wagons (for examples see *Rails through the Bush*, pages 126, and 128).

Track

As the locomotives were heavier than those in the east, the track had to be of better standard. Rails tended to be heavier and more uniform in weight, sleepers more uniform in appearance, visible kinks and gauge variations rare. Stub points were not nearly as common as in the east or in north America.

Buildings

Tended to be better quality than in the east. Large companies with more capital built things to last longer. Sawmills were bigger and more centralised, with settlements of a more permanent nature around them. Many of the bush camps were made of portable buildings, but were still well built. (Typical buildings in the east would have collapsed if attempts had been made to move them).

Topography/Environment

Flatter and less rugged than in the east. This suited long trains and conventional locos. Needed fewer bridges than in the east. There were a large number of temporary tracks to bring the railway as close as possible to the area of logging.

Era of operation

1850s - 1960s

Where they ran

South western corner of state, from around Perth in the north to Albany in the south.

Location of mills

As in the east, in almost all cases the tramways brought logs directly to the mill, but mills were bigger than those in the east.

Logging machinery

Simple logging winches were used. Topography did not necessitate widespread use of high-lead or skyline logging.

Inclines

There were a few inclines, but they were not widespread. On the other hand, zig-zags were quite common.

Bridges

There were less bridges needed than in the east. Trestle bridges and pig-sty bridges were both used. There was more use of sawn timber in bridges than in the east, giving bridges a more professional appearance.

North America

Gauges

3 ft, 3 ft 6 in, and 4 ft 8½ in.

5 ft, 6 ft and 7 ft gauge pole roads.

On west coast, especially in Oregon and Washington, most were 4 ft 8½ in. In British Columbia (BC) they were almost entirely 4 ft 8½ in. The biggest narrow gauge operation in BC was Ross River Lumber Co. which had 12 miles of 3 ft 6 in gauge and two Shay locos.

Standard gauge was preferred on the west coast because it was better able to handle large volumes of large logs.

Locomotives

Initially small tank locos and home-made locos of many weird types. Cast-offs from normal railroads were used in the early years, including traditional 4-4-0s of both 3 ft and 4 ft 8½ in gauge. As tram systems in cities changed from steam to electric propulsion in the 1890s, many steam tram motors found their way onto logging railroads.

From the 1880s geared steam locos began to be developed, of the Shay, Climax, and (somewhat later) Heisler types.

Up to around the turn of the century these were small operations, not much different to those in Australia. Then they started getting much bigger, especially in the west, and needed bigger locos. 70 ton (63 tonne) three-truck Shay and Climax locos became popular, with a lesser number of Heislars. Heislars were considerably faster than the Shay. The Climax was the slowest, but the most powerful for its weight.

On the west coast large conventional locos came into use on mainlines. These included 2-6-Ts, 2-8-2Ts, 2-4-4-2Ts, 2-6-6-2Ts, 2-6-2s, and 2-8-2s. Most were standard gauge. Geared locos were used on feeders.

The "Gripwheel" or "Walking Dudley" was a most unusual type of locomotive used around the turn of the century. It consisted of a boiler (often vertical) and a winch. The locomotive would wind itself along a cable, hauling a load of logs behind. These were capable of climbing 1 in 4 grades. At least one hurtled to its destruction, when due to bad driving, it wound itself off the cable. As far as I know there were no Gripwheel locos in Australia, but there may have been one or two in NZ.

Rolling Stock

Initially wooden outside-frame unsprung disconnected logging trucks were used. These were heavier than the inside-framed ones used in Australia, and had narrower wheel treads, hence could not be used on rough wooden-railed track. These (or many of them) had more sophisticated brakes than those used

in eastern Australia, some even having brake wheels on vertical brake columns. These trucks used link and pin couplings.

The trucks were made locally with only the iron and steel parts bought in. Later they gradually gave way to much more sophisticated disconnected logging trucks, made of steel, some of which were sprung. These allowed longer, and heavier trains than the wooden-framed trucks.

The next development was the skeleton car, which basically consisted of two disconnected logging trucks which were no longer disconnected - they were permanently fixed together with a longitudinal beam. These had the disadvantage over disconnected logging trucks that their length could not be adjusted to suit the length of the log. The log had to be cut to the length of the car. But they were much safer, especially in long heavy trains. Since air brakes could not be fitted to disconnected logging trucks, skeleton cars gradually took their place in all the larger operations.

In British Columbia the logging railroads were under the control of the Department of Railways. When that Department decreed that air brakes were mandatory, the disconnected logging trucks went out of use.

Bogie flat cars were also used on some lines. They were heavier than the skeleton cars, which was a disadvantage, but they were well suited to carrying large numbers of small diameter logs.

Track

Early lines were built with wooden rails, in some cases of 8 in x 8 in section, which was a much larger size than used in Australia, probably to compensate for a poorer quality timber. Pole roads, built of peeled poles, were also used, generally with wide gauges - 6 ft and 7 ft. Small Shay and Climax locos were built to operate on these. (In Australia pole roads seem to have been confined to Tasmania, where they were fairly widely used, often in combination with wooden and steel rails on the same tramway).

In the twentieth century track was generally heavier, often much heavier, than that used in Australia and New Zealand. The sleepers were more uniform in size, the track better maintained, with few visible track gauge variations and kinks. Although stub points were widely used, really weird track formations were much less common than in eastern Australia.

Buildings

In the nineteenth century there was not much difference between the rough buildings used in North America, and the equally rough buildings used in Australia and New Zealand.

In the early twentieth century much bigger companies developed in North America, with more capital. They built larger mills and bigger more permanent logging camps. The buildings were bigger and of better quality. Many logging camps consisted of portable buildings, but they were still of high quality compared to those in Australia.

Topography/Environment

Extremely rugged and mountainous in the west, requiring much bigger bridges than those in Australia and New Zealand.

Era of operation

1870s to 1960s.

On Vancouver Island there is still one diesel-hauled standard-gauge logging railway in operation.

Where they ran

USA: (Not necessarily complete list):

Arkansas, California, Florida, Georgia, Idaho, Kentucky, Louisiana, Maine, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Mexico, New York, North Carolina, Oregon, Pennsylvania, Tennessee, Vermont, Virginia, Washington, West Virginia, Wisconsin,

Canada: (Not necessarily complete list):

Nfoundland, Nova Scotia, Ontario, Quebec, British Columbia.

Location of mills

On the west coast the sawmills were often remote from the logging railway. The logs were brought to a river, or to the coast, tossed into the water, and made up into rafts. They were then floated to very large sawmills. From there the timber was taken away by conventional railway (as well as road and water transport).

Logging machinery

In the nineteenth century small logging winches were developed, to haul logs across the ground. Similar winches were widely used in Australia. In the 1890s these winches began to get bigger and more complex, and the high-lead logging system made its first appearance. In the twentieth century machines with up to four engines and 16 drums were developed, some with their own built-in steel towers (which could be used as an alternative to spar trees). These multi-engined machines were used for log loading, guy-wire tightening, and spotting rail-cars, as well as hauling logs across country. The main example of this type of machine was the Lidgerwood skidder, others were made by Willamette and Washington. I know of no machines of this size being used in Australia.

In some cases where flat top trucks were used to carry logs, a steam-powered log loader (e.g. the Barnhart loader) was carried on the train, and could run on rails down the full length of the train to unload it car by car. This was one of the few advantages that flat top trucks offered over skeleton cars. Nothing like this was used in Australia or New Zealand, and in North America they may have been confined to standard gauge operations.

(*Logging by Rail*, pages 149-163 has an extensive description of logging winches, loaders, skidders, and log hauling systems.)

Inclines

Inclines were widely used, especially on the west coast. From those examples illustrated in *Railroads in the Woods*, they were much better built than those in Australia in terms of consistency of sleeper size and shape, consistency of gauge, and evenness of alignment. No doubt they were also much safer as a result of this better construction.

Inclines in North America do not appear to have been longer or steeper than those in Australia.

Bridges

Bridges varied widely in style and quality. Trestle bridges were often huge on the west coast (e.g. Weyerhaeuser's Baird Creek 1130 ft long, and 235 ft high). Bridges of this length were not unknown in Australia, (e.g. Powelltown Tramway south of Ada No.2 Mill) but they were low.

Trestle bridges were often built of squared timber. In Australia the timber was almost always left in the round, with flats adzed into the top and bottom surfaces where necessary.

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(Also many issues of *Light Railways*, especially No.100 "Logging Tramways of the Dorrigo Plateau", No.113 "Simsville and the Jarrah Mill", and Nos 128 & 151 "An Introduction to the Timber Tramways of the NSW Far South Coast".)

Video

Logging by Rail in Algonquin Park: The Fassett Lumber Corporation's Fossmill, Ontario Operation Circa 1930: Past Forward Heritage, Toronto, Ontario.

Related web sites

Light Railway Research Society of Australia - <http://www.lrrsa.org.au>
especially http://www.lrrsa.org.au/LRR_TT.htm

New Zealand Geared Locomotives -
<http://www.trainweb.org/nzgearedlocomotives/index.htm>
(has links to other geared locomotive sites)

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