

Sawmills and Timber Tramways in South East Queensland: An Overview

Development of the Saw

The sawmill is a comparatively recent phenomenon, a product of technological change. The use of stone and the manufacture of bricks for building were more highly developed before logs could be efficiently converted to dressed timber. Effective use of trees required more sophisticated tools than other building materials. The use of timber advanced slowly from fuel consumption to building construction. As tools and skills developed, logs were no longer used simply in their round debarked state, but were squared, split and sawn.

The long transition has been recorded succinctly in a conference paper by Hiram Hallock.¹

Saws have been used by people for ten or hundreds of thousand years. Next to flint spear and arrow points, saws are believed to be the oldest human invention and to have made possible the development of wheels. The early ones were made of flint and black obsidian lava. These prehistoric saws, generally in the range of 3 to 20 centimetres in length, remained in use into the bronze age to some 6000 years before the present. They were mostly used to cut bone, wood and horn for ornaments. The saws were thick and easily became wedged in the cutting groove. This problem proved insoluble before the age of metals although saws have been found of flint or obsidian chips set in a grooved wooden or stag handle with natural asphalt. Island communities used shark's teeth and the snout of saw fish for saws.

The first Egyptian metal saws were made of copper, bronze and rarely iron. One very early one was found in Iraq in the area which produced the earliest obsidian saws. The earliest hardened copper saws have been dated at 4900 BC but the technology used to produce hardened copper has been lost. These saws were usually convexly curved and the teeth were neither raked nor set.

Consequently the saws cut on both the push and pull stroke. A major early use was cutting coffin boards.

By around 4000 BC the Egyptians had saws 2.5 metres long of two types, for cutting wood and for stone. It appears that wedges were used to force open the cut and reduce the binding as the saw penetrated deeper into the cut.

The Bible has references to saws in the period around 1000 BC. In 2 Samuel 12, David conquered the town of Rabbah and "took its inhabitants and set them to work with saws and other iron tools, sharp and toothed, and made them work in the brick kilns", a technique reportedly used in all the cities of the Ammonites. King Solomon, in building his own palace, used heavy blocks of stone "hewn to measure and trimmed with the saw on the inner and outer sides." The construction of the temple records extensive use of cedar, cut to specifications and also carved.²

The use of iron and steel was a major advance, introduced between the ninth and fifth centuries BC. The Romans led in the development of the Iron Age from about 500 BC to 80 AD. The iron saws had teeth raked towards the handle so that the saw cut only on the pull stroke although crosscut saws continued to be unraked. The setting of teeth wider than the blade to overcome the binding problem was introduced. Some smaller saws were made to taper to the back to help overcome the problem of pinching. The early metals were soft compared with today's steels. The frame saw was developed to reduce the problems with the blades bending and buckling. The first saws just had a handle at one or both ends.

Technology of the Sawmill

Hand-sawing Methods

The sawmill is a comparatively recent development. The traditional procedure for converting logs to lumber was by pit sawing. In its simplest form, a pit was dug about 1.8 metres deep, a metre wide and slightly longer than the felled log. A number of small support timbers were placed across the pit and the log rolled on the timbers over the pit. Two men worked the saw. The top man or top dog sawyer stood above the log and pulled the saw up after each down stroke. The lower man, or underdog, pulled the saw down on the cutting stroke and became covered in sawdust and, in warm countries, endured hot and sweaty working conditions. When the saw reached each of the supporting timbers, it had to be moved lengthwise before cutting resumed.

This method of handling logs minimised the difficulty of transporting heavy logs. The waste was left in the forest, and the pitsaw was an efficient method when all sawing was manual. Sawpits coexisted with sawmills and supplied local needs where there was no convenient sawmill. Variations of sawpit design included the use of elevated platforms, usually on a hill side. In another form the log was propped up at about 45 degrees over a support and the saw was used more or less parallel to the ground. These variations and the adoption of sawing frames improved working conditions and saved digging.

The First Power Sawing

The earliest sawmill dates from around 1200 AD. The term is commonly used to distinguish enterprises with powered saws rather than just hand saws for cutting. In the first sawmills, the power came from water, wind or treadmills, worked by animals or by human effort. The earliest known sawmills include one near Augsburg, Germany and mills established by the Portuguese on the island of Madeira. Norwegians were building sawmills in 1500 and Swedes were building them by 1650. Most of the early mills had a single saw in a frame although a gang-type frame with

multiple saws was built in Holland about 1575.

The mechanisation of sawing naturally produced opposition from sawyers who feared a loss of jobs. Violence was used by pit sawyers to prevent a Dutchman from starting a mill near London in 1663. In the United States in 1803, a steam-powered sawmill was destroyed by sawyers despite a severe labour shortage at the time.

The first sawmill in the United States was built in Maine in the 1620s. Sawmills spread rapidly and soon every town acquired a mill. Sawmills followed the frontier. By 1810 there were 2541 sawmills in the United States and over 20,000 in 1860. Queensland, by then, had just four steam sawmills.

Development of the Log Carriage

Sawmill mechanics developed from the middle ages. The log carriage and its fittings soon became almost as important as the saw. The log carriage was essential for controlling the position of the log, and ensuring it was fed smoothly and steadily and to ensure the cut had the required degree of accuracy. The length of the carriage, the stability of its track and the ability to precisely and firmly position each log were just as limiting in the quality of cutting as the saw itself. In the 19th century, the horizontal carriage which held the log, moved along the mill floor with rack and pinion drive by using ratchet wheels driven by the motion of the saw frame. The carriage commonly was fitted with flanged cast iron wheels and ran on iron or steel rails. Advances in this area have transformed sawmills from producing rough boards, which originally compared unfavourably with the output of skilled pit sawyers, to computer-controlled precision. The computer calculates the positions of the whole set of cuts for each log individually to minimise waste and maximise the value of timber products extracted from each log.

From Reciprocal to Continuous Sawing and Replaceable Teeth

The original mechanical saws were of reciprocating action, reproducing the movement of the hand saw. The development of the circular saw was a major advance. Its inventor is unknown although a patent was issued to Samuel Miller in England in 1777. There is, however, no evidence that he ever made a circular saw, but the idea was soon taken up. Walter Taylor was using a circular saw in 1781 to fill a contract with the Royal Navy to produce parts for ship construction. The engineer and inventor, Sir Marc Brunel designed and patented many sawing machines for ship timbers as warfare again spurred technology. One invention was the log cutoff saw, a circular saw which travelled around a log, and thus could cut a log with a diameter almost as large as the saw, instead of being limited to cutting logs less than half their diameter.

Manufacturing and tempering thin steel discs and making high speed bearings were major problems in the 19th century. The rim speeds of 4000 feet per minute, although less than half that of modern saws, were very fast for these poorly balanced untensioned heavy plate discs with roughly punched teeth.

The tensioning of saws was developed in the early 1800s along with grinding equipment to produce saw plates with a smooth surface and even thickness which greatly improved circular saw performance. By the 1860s circular saw technology had developed enormously. Teeth wear remained a major problem. Each sharpening reduced the diameter of the saw and hence the maximum size of timber that could be cut. The obvious solution was to design replaceable teeth. Although the first patent dated from 1824, a practical, economical and safe solution took half a century of trial and error. The first successful invention was by Warren Miller of Brooklyn, USA. He sold it to Robert Hoe and the idea was patented in 1878. This invention was rapidly adopted and used the single circle pattern, now known as the Hoe pattern. The other type, also the basis of designs in use today, was patented by George Simonds of

Massachusetts in 1885 and has parts of two circles which are not quite concentric. In both designs the teeth are held in by compression and in the Simonds design, by a cam action due to the offset in the centres of the circles as well.

The invention of the bandsaw, comprising an endless loop of steel fitted with teeth, dates from 1808, and is credited to William Newberry of London. It was very effective in cutting but its main problem lay in the technology used to join the two ends to form the continuous band. Forge welding was used at first. The life of these band saws was uneconomically short as the join could not stand the constant flexing at high speed. In the 1860s joining by a long scarf joint became practicable. The band saw was widely adopted in the 1870s and 1880s and its use rapidly spread. It was particularly valuable in cutting old logs with large diameters. The problem of fracturing bands was reduced by an 1858 invention which enabled one of the wheels to float on springs. This coped with the expansion and contraction of the band while cutting.

Steam power was the key to high production volumes and productivity. It underpinned the rise and importance of sawmills in the 19th century, especially in the United States. With so many large virgin forests awaiting exploitation, timber became a cheap and abundant building material. The demand stimulated great advances in sawmilling technology. By 1900 there were several mills in the United States cutting a million board feet or more daily with fast and accurate equipment. Once the major problems had been overcome, there was little pressure to improve on this level of performance. There were few major changes in technology from the late 19th century until after World War II. Then, increasing labour costs brought about the need for change to improve productivity and, as log values increased, to reduce waste.³

Steam-powered sawmills were well-developed by the time gold discoveries gave Australia its major economic surge and population growth. Until then hand-sawing was the rule and power sawing the exception.

It took more development before the early sawmills and especially the band saw was developed to deal effectively with Australian hardwoods. It is only in the last half-century that widespread use of kiln drying has removed the prejudice resulting from the warping characteristics of air-dried hardwoods. These factors combined to place heavy pressure on the softwood forests.

Basic Layout of the Sawmill

Commonly the sawmill was built in a long shed with a single peaked roof running the length of the shed. Usually the roof was supported on upright round posts with no walls or cladding in many small mills. Sometimes one side of the sawmill was extended by a lean-to increasing the width of the mill to provide room for an extra sawbench or storage or dressing machinery.

The length of the sawmill at minimum is twice the length of the longest logs handled by the mill. Alongside one half of one long side is usually a log storage area and gently sloping ramp along which each log can be rolled onto the log carriage running on tramway rails and fitted with devices varying from simple to sophisticated to hold the log firm as it is drawn into the main circular saw in the centre of that side of the mill which performs the initial breaking down. This circular saw was the largest in the mill, larger enough to make this primary cut in the largest log. Larger or newer mills with a band saw here were able to cut the largest logs.

On the opposite side of the main or No.1 sawbench was usually a second log carriage running on tramway rails to accommodate the cut log. From here there were usually a series of skids, slightly sloping as required, across which half logs could be stored and pushed onto the carriage leading to the next sawbench. This could be another single saw or often a gang saw with a series of adjustable reciprocating saws cutting up the log into a series of boards of the desired thickness or thicknesses. This bench also had a vehicle running on tram rails to take the sawn boards and possibly leading to further skids and possibly another tramway leading to a bench

for trimming the boards to the desired width. The remaining space was used for storage or other small benches for cutting into required lengths or preparing waste timber for the furnace.

Because of the risk of fire, the main boiler and engine were often separated at least to a degree from the main sawmill shed. The engine was commonly equipped with a large flywheel, the energy stored in the flywheel enabling the saws to make major cuts with a minimum loss of speed. Power from the engine was transmitted by belting to a main axle fitted with a number of pulleys from which belts were used to drive the individual saws. Clutches were provided to enable saws to be disengaged. Often the main pulleys were a roof height but in other designs they were arranged to be below floor level, a safer arrangement because of the danger from contact with belts moving at high speed.

Commonly there was provision to remove the sawdust collected under the saws and take it to a central point away from the mill. It was a difficult commodity, generally without a market, difficult to burn and yet always liable to ignite especially if mixed with air.

Australian Resources and the Convict Era

The timber resources of the Australian continent were fashioned by its origins in the break-up of the original Gondwana land, as it broke off from Antarctica. Australia was left behind by drift northwards of Europe and Asia and separated from Africa and the Americas. After New Zealand broke free its plate pushing under eastern Australia formed the Great Dividing Range which is a major factor in rainfall and hence in forest distribution. Australia became the major home of eucalypts although significant amounts of native pines also flourished. Before annexation by Britain, Aboriginal burning practices had promoted the survival of fire resistant trees, reduced the size and variety of forests, and producing open parkland which increased the yield of game animals. Ice-age climate cycles were responsible for both the retreat of rainforest

and its replacement by eucalypt savanna, and for the reversal of this sequence.⁴

Centuries of increasing exploitation of its timber reserves saw Britain, and other European colonising powers, looking to the New World to provide timber supplies. The need for timber, particularly for the expanding navy, was a factor in the settlement of Australia.

Although this need was not particularly met by the Australian colonies, exploitation - and needless destruction of timber - started almost immediately each colony was founded, largely for local needs. The Norfolk Island pines proved not to be the rich resources for masts expected and the harsh convict settlement there was actually abandoned for a period.

As timber provided an effective means of rapid construction, priorities were placed on exploration of the timber resources and then experimentation to put them to effective use. The major problem encountered around Sydney was the difficulty of cutting the readily available red gums. Instead, she-oaks were used as bush timber to frame simple huts. Cabbage tree palms provided long even slabs that covered huts quickly. The she-oaks were easily split for roofing shingles. These timbers had only a short life. Blue gum was sound for construction purposes and ironbark and stringy-bark were readily split and durable, although the problems of cracking, shrinking and twisting as the timber dried were problems awaiting solutions.

Settlers used axes, mauls and wedges to cut slabs for their huts. They used broad axes for splitting shingles for roofing, and palings for walls and fences.

A most significant discovery was made in 1790, possibly by Tench, when he identified stands of red cedar along the Hawkesbury River. Further stands of this ideal Australian timber were discovered along other coastal rivers. It was durable and easily worked, and useful for the whole range including joinery, fittings and furniture. The early settlement of Van Dieman's Land, now Tasmania, led to the

discovery of Huon Pine, another useful timber which was particularly adapted for boat building.

Convicts provided the labour supply needed before steam sawmills became common while at the same time felling, hauling and working timber provided a means of imposing the discipline of hard labour on convicts. Valuable resources were squandered.

The convict labour force was employed to fell trees with axes, cut the logs into lengths and roll, draw and even carry them to sawpits. These first sawpits were substantial, centrally located, and provided timber for public buildings in the new convict colonies. As the distances for dragging logs grew, the emphasis changed to building more numerous but less elaborate sawpits. As punishment was integral to the convict regime, there was no incentive to reduce effort, although increasing production was important.

Convicts who had sawing skills tried to hide that fact. The sawpits were designed for hard labour. The more recalcitrant prisoners were sent, at various times, to Norfolk Island, Newcastle, Macquarie Harbour, Port Arthur and Moreton Bay where they could be kept hard at work.⁵

The discovery of new stands of cedar propelled the spread of settlement north and south of Sydney. The pioneering free and enterprising sawyers were the first white settlers in many areas of the north coast of New South Wales and later Queensland. The importance of cedar to the colony and its rapid exhaustion in areas near Sydney stimulated the first regulation of timber getting. A General Order in 1802 forbade its cutting without permission of the governor. The penalties included seizure of any illegally cut logs. For the next half century, there were a succession of moves to control the trade, which, in private hands, also produced valuable export income. A number of timber merchants sent sawyers far beyond the limits of government infrastructure, engaging or purchasing their own ships to bring the logs to their mills. They hired and despatched gangs of sawyers to cut, saw and cart the

timber to accessible loading places for ships awaiting cargoes.

While the *Sydney Morning Herald* was lamenting the wholesale plunder of cedar by more than 200 sawyers on the Macleay River, more had been discovered on the Nambucca, Bellinger and Richmond Rivers.⁶ Cedar getting soon extended into what is now Queensland.

The First Australian Sawmills

Peter Degraives, born in England in 1788, decided to emigrate in 1820. In partnership with his brother-in-law Hugh McIntosh, he imported Australia's first sawmill, reaching Hobart, after lengthy delays, in April 1824. He selected a site at the Cascades on the south eastern slopes of Mount Wellington, now a part of suburban Hobart. He began operating the mill in August 1825, having timber close at hand, a nearby market and adequate water power to drive the mill.⁷

The mill imported to Western Australia by J.H. Monger in 1833, only four years after the foundation of the Swan River Colony, appears to have been Australia's first steam sawmill.⁸ It was a multi-purpose mill, used for both crushing corn and sawing logs. As the steam boiler and steam engine were then major capital items, it was not uncommon to have a single power plant used for multiple purposes. (Several decades later, a number of sugar mills also had saw milling equipment used to cut timber in the off-season, thus providing an extra income while clearing the land for more cane.)

The first New South Wales sawmill was a steam mill erected in Bathurst Street, Sydney, and operating in 1838.⁹

Monger and Hurlstone, builders, set up the first Victorian sawmill in Melbourne - in 1839 or 1840 - but it may have been powered manually. In this case, John Manton's sawmill was the first steam sawmill. He used a second-hand steam engine purchased from the Van Dieman's Land Company at Stanley in northern Tasmania. He opened his sawmill in January 1841. Alison & Knight imported a

steam engine from England in 1840 and had their sawmill working in central Melbourne a few months later.¹⁰

The first sawmill was operating in South Australia in 1848, despite its limited forest resources.¹¹

Although timber supplies near the capital cities were quickly depleted, the ability to bring logs by ship, and later by rail, maintained the concentration of mills in the capital cities for many decades. They were soon supplemented by rural mills. Possibly the first one was on Dr. Gaunt's property, near Launceston, powered by a high pressure steam engine. Its vertical saws and circular saws were used to cut cedar.¹² As Launceston long rivalled Hobart as the major centre for Tasmania, it was scarcely rural. By contrast the mill erected by William Robertson by Barringo Creek in the Macedon Ranges north west of Melbourne, was rural. It was driven by water power, apparently commissioned in 1844 and operated until 1875.¹³

When Pettigrew's steam sawmill began operating in Brisbane in 1853, the Moreton Bay settlement was still a part of New South Wales. Sawmill development in Queensland, although lagging behind the other states, developed rapidly in line with its population. The early mills relied on water transport to provide raw materials and in many cases to transport their output.

The Moreton Bay Settlement

On 1 December 1823 John Oxley sailed up the Pine River (naming it Deception River) and observed stands of hoop pine which he called cypress. Next day he entered the Brisbane River and saw more hoop pine, from 30 to 40 metres high. Away from the river flats he noted open grazing country which he assessed as having useful stands of good timber. Based on Oxley's encouraging report, the new convict settlement was established in September 1824, first at Humpybong (Redcliffe), moving to what became Brisbane in May 1825. Timber-getting was one of the earliest activities at the settlement, with a party of convicts cutting bloodwood up the

Pine River but also taking blood, when a guard shot an Aborigine to assert the coloniser's right to exploit the timber resources.¹⁴ The first commandant's house erected at Redcliffe was brought from Sydney ready-cut, although the absence of key pieces had to be remedied by using the sawyers to cut "weather boards, scantling and rafters from the blue gum of these forests."¹⁵

The official settlement had been preceded by three castaway timber getters, Thomas Pamphlet and John Finnegan, and Richard Parsons. The first convict party sent north in 1824 included three sawyers, Thomas Warwick and William Francis both classed as volunteers, and Robert Humphries, recorded in an alternative source merely as a labourer.¹⁶

One of the earliest activities at the Brisbane settlement was the creation of a lumber yard, initially used to protect supplies of timber sent from Sydney. One was established in the block now bounded by North Quay, Queen, George and Adelaide Streets after the military barracks were moved in 1831. Some remains were located and partially excavated in 1997.¹⁷

To exploit local timber, large saw pits were erected a little upstream from the lumber yards, beside the river on what is now North Quay in the vicinity of today's Turbot Street. The pits were 50 feet long, 24 feet wide and had a thatched roof to give protection from the sun. Logs appear to have been brought there by water transport. It was in operation by 1826 and the sawyers William Francis, Thomas Warwick, John Brierton and William Smith were sawing both pine and hardwood for public use.¹⁸

As the timber close to hand was cut out, gangs of convicts were soon employed cutting cedar along the Brisbane, Logan and Tweed Rivers for shipment to Sydney. Logs were floated down river but as well sawpits were established. Timber was the principal material for most of the buildings in the settlement. Sheets of bark, which Aborigines were skilled at harvesting, often served as cheap roofing material, kept in position by saplings. The

opening of Brisbane to free settlement in 1842 expanded the opportunities for exploiting and exporting timber. Although sawing was no longer used as punishment, the basic methods remained those of manual labour in felling and sawing. Sawn timber was, however, also imported from Sydney.¹⁹

William Pettigrew, born at Burton, Ayrshire in 1825, and trained in surveying, arrived in Brisbane on the *Fortitude* in January 1849 as an employee of J.D. Lang's Cooksland Colonisation Company. After the company collapsed, he worked for Stephen Simpson of Woogaroo, as a surveyor. Following a disagreement, he left Simpson at the end of 1851, and bought land beside the river in William Street, Brisbane. With £200 advanced by his brother, Robert, he began erecting a sawmill, first building a shed 80 feet long and 24 feet wide to house it. He also built his own wharf. These works occupied most of 1852.

After preparing to erect a chimney 40 feet high, and studying available literature on sawmills, Pettigrew went to Sydney in February 1853. He visited local sawmills while waiting for his own sawmill. It arrived in Sydney in March. Pettigrew travelled north with the machinery, which was insured for £1300. It was landed from the *Palermo* on 25 April 1853 and sawing commenced at the new mill on 28 June. Pettigrew had bought a bullock team of his own and contracted with bullock drivers to bring timber to the mill. The timber came from Seventeen Mile Rocks, around Woogaroo (Wacol-Goodna), Moggill and from as far as Wivenhoe. The river would have been used for the greater part of the haul to the sawmill.²⁰ Despite setbacks, including destruction by fire, the sawmill operated for more than 40 years, and provided much of the timber used in early Brisbane buildings.

Moreton Bay's second sawmill was constructed by Cox and Robert and Walter Birley, on the south side of the river, at Kangaroo Point. It commenced work in 1857. Cox retired from the partnership in 1865. This mill likewise operated for decades.²¹

Near Ipswich, in the Bundamba area, and fronting the Bremer River, Joseph Fleming established an industrial complex in the mid-1850s, comprising a steam flour mill, steam saw mill, boiling down works, brick works, wharf and cottages for 300 workers. Construction was supervised by David Rodger from Sydney. The flour mill was reportedly commissioned in 1856, and possibly the sawmill at the same time. The saw mill adjoined the flour mill and had a vertical saw frame able to cut logs four feet (1.2 metres) diameter and two circular saw benches plus turning lathes, all driven by a 25 horsepower steam engine.²²

These three mills supplied local needs until separation on 10 December 1859. The number of mills expanded substantially in the 1860s, with several new mills built at Maryborough, and at other coastal localities with good access to the sea. The exception was the Darling Downs where there was a substantial local market close to standing timber. In the main, sawmills were located with good water access and close to the market rather than close to the raw resource. This continued to be the practice for more than half a century, with shipping and then rail transport the chief means of bringing logs from the forest to the saw mill.

Development in Queensland post Separation

The population of Queensland expanded rapidly after separation in 1859, doubling and redoubling at less than ten year intervals for the rest of the century. Timber was abundant and the major building material. The mild climate in most of the colony provided little stimulus for building in stone and brick. Timber, and then timber and iron in conjunction, were the main building materials. The timber industry developed to meet the growing demand. The sawpit continued to provide a substantial portion of building timber. Only as sawmills gradually spread throughout Queensland did the use of sawpits decline and end. Sawyers continued to cut up logs in this manner until machine sawn timber was more competitive after adding the cost of transport to the point of consumption.

Given the relatively high cost of transport relative to the market value of the timber, it was natural that pit-sawing remained in vogue on the edge of settlement for some decades.

The export of significant volumes of logs to the southern colonies, through to the 1880s, represented a loss in terms of retarding the development of sawmilling in Queensland. Cedar, hoop pine and other rain forest species went south, especially to Victoria. Some was direct exploitation, with Victorian entrepreneurs financing teams to cut and raft cedar and chartering ships responsible for taking much of the cedar from the Daintree in the 1870s.

William Pettigrew expanded his Brisbane sawmilling interests and as a result, his mill and to a lesser extent Birley Brothers mill supplied the bulk of the growing market in the Brisbane area. Gladwell and Greathead opened the first steam sawmill at Maryborough in 1861. Within a year Pettigrew moved to establish his own Dundathu mill and village downstream. Maryborough quickly became a major sawmilling centre. Water access enabled logs from a wide area of forest including Fraser Island to be brought to these mills and then exported as sawn timber to the rapidly growing north Queensland market. This saved Maryborough from an early decline. Although J.D. Johnston established a sawmill near Rockhampton in the early 1860s, the comparatively small resource ensured that south-east Queensland, and particularly the Maryborough sawmills, continued to supply a substantial portion of the central and northern Queensland markets. Although the Pettigrew empire collapsed in the 1890s, the Maryborough sawmillers Wilson Hart and especially the later established Hyne sawmilling enterprise came to be major components of Queensland industry. Although, from the 1880s, sawmilling in the Cairns district reduced dependence on the Maryborough district, the far north remained a major importer as well as exporter of timber products.

In the late 1860s, sawmilling was one major factor in the rapid early growth of Bundaberg (the others being mining and sugar). Sam

Johnston established his Waterview sawmill in 1868; it later became a sugar mill. The combination of sawmilling and sugar milling in the same enterprise came to be common in Queensland in the early years, until the land around the mill was gradually cleared of timber. The timber industry quickly moved to the Gladstone area, and like Brisbane, Ipswich, Maryborough and Bundaberg, the emphasis was on sites located close to water.

The Logan Steam Sawmills, established in the early 1860s, likewise utilised the Logan and Albert Rivers. Despite the financial collapse of this mill in the economic depression of the late 1860s, the district subsequently became one of the state's major timber regions. It was dominated by the sawmills erected by the Lahey Brothers. In the 1860s the local market was small and the Logan mill would not have been able to sell sawn timber in Brisbane as cheaply as Brisbane mills which rafted timber from the Logan and Albert rivers. The liquidator advertised the mills for sale in 1866, and unable to find a buyer, closed by mill by 1868. A year later the mill burnt down.²³

Where there was a substantial local market sawmills developed successfully away from the major rivers. The rapid rise of gold mining at Gympie led to establishment of a sawmill by Luya, McGhie, Goodchap and Woodburn on the banks of Lake Cootharaba in 1869. It was heavily dependant on water transport and its output largely went to Brisbane. Gympie gold's major role was in providing capital for the initial investment. At the same time, however, William Ferguson, who had worked for Pettigrew in Brisbane, established the Union Sawmills in Gympie in conjunction with Dath, Bartholomew and later Henderson, all to become significant figures in the industry. Their sawmill quickly became a successful and long-lasting enterprise. The natural resources of Gympie, the local market and the ability to supply more distant markets with the building of the railway from Maryborough (opened in 1881) and from Brisbane (opened in 1891), gave the Gympie district a growing role in the Queensland industry. As the railways

expanded the importance of a waterside location diminished.

Likewise, and before the discovery of the Gympie goldfields, the local market and resources of the Darling Downs stimulated the development of a number of sawmills. The waterwheel used to pioneer the industry on the Downs near today's Killarney, quickly gave way to the steam sawmill. In 1858 James Taylor purchased a steam sawmill, apparently from Redbank between Brisbane and Ipswich, and rapidly established steam sawing on the Downs. John Affleck built a steam sawmill on upper Swan Creek near Warwick in 1862. Although neither had a long time involvement in timber, Edward W. Pechey did. He was a partner in the Highfields Steam Saw Mills which erected a mill at Highfields, 24 kilometres north of Toowoomba in the early 1860s. This mill was burnt down in 1865, but a new mill was built a short distance further north near today's Crows Nest. The Albert Mill at what was soon called Pechey, continued to operate until 1924. Although it closed, the machinery was sold, relocated and reused, the common reason for the paucity of relics at most former sawmill sites.

The needs of the Downs also provided the stimulus for cutting down the timber reserves, particularly Bunya pine, in the Bunya Mountains, starting with the Great Bunya Sawmills established in 1882. The near collapse of Aboriginal culture provided a justification for removing the prohibition on this species.

Although some enterprises grew and expanded, development of sawmilling within Queensland was mainly the province of the family business. As the basic equipment became more affordable, minor capitalists and family businesses dominated the industry. This may be seen more clearly in the regional overviews. A small minority of mills were controlled by women, usually subsequent to the death of their husband. The comparatively small size and distributed nature of the Queensland market encouraged this trend. Most mills were first established either in the forest or by rivers at places to which logs

could be rafted or brought by ship. Increasingly, where railed transport was available, sawmills were established near railways, not infrequently on leased railway land and a number had their own siding. Local demand ensured that small family mills could sell sawn timber profitably, minimising overheads and transport costs.

Fire

The largest, unpredictable but almost inevitable cause of major loss to sawmillers was from fire. Many sawmills burnt down more than once. Steam powered mills were the norm for many decades. As boiler fires were banked overnight rather than doused, fire was an ever present hazard. Firefighters generally concentrated on saving timber stocks as most fires were too far advanced before detection for serving the mill to be an option.

Insurance was an expensive option, the annual premiums representing several per cent of the mill's value. Under-insurance was the norm and fire losses by proprietors heavy. In 1885 in an optimistic but regrettably doomed attempt to improve the situation, several of the colony's chief sawmillers jointly invested to float the Queensland United Saw Mills Mutual Fire Insurance Company Limited. The inaugural directors were William Pettigrew, Henry Jordan, Abraham Fleetwood Luya, Josias Hancock, Robert Dath, Richard Seymour and Andrew Heron Wilson, major millers from Brisbane, Ipswich and Maryborough. Little more than six years later it was obvious that the company could not trade profitably in view of the claims. Shareholders voted in late 1891 to wind up the company, appointing Pettigrew as liquidator. The debts were paid in full and a small balance returned to shareholders.²⁴

Licensing Harvesting

New South Wales implemented a system of licensing sawyers in the 19th century. These regulations applied at Moreton Bay, and in Queensland on separation in 1859. In 1842, when Moreton Bay was opened to free settlement, it was specially proclaimed that

timber licences were not available for crown lands at the northern end of the Moreton Bay District where Bunya trees were prevalent.²⁵ This limitation on cutting Bunya trees, because of their value and significance to the Aborigines, remained in force for some decades. Queensland's own regulations for timber licences were tabled in parliament on 26 October 1860.²⁶ The licensing system required a minimum of administration and was the government's only source of revenue from the 'sale' of timber resources. Apart from charging a higher rate for a general licence with the right to cut softwoods, compared with one limited to hardwoods, there was no attempt to match the charge with the value of timber removed. Licences were issued for 6 and 12 month periods expiring on 31 December and 30 June. The only limitation on timber removal was inclination and physical ability - each person had to hold a licence. By 1861 there were 121 licensed cutters in the colony. The regulations were modified in 1862 to impose time limits on the removal of cut timber to reduce waste. If not removed within the time allowed, the logs were liable to seizure by government rangers who sold it at auction.²⁷

Special timber licences, which gave exclusive rights to timber in specified areas, were made available under the regulations issued in 1864. This gave a degree of secure access to timber resources, needed to justify capital expenditure on roads and tramways to facilitate removal of logs, or the construction of a dedicated sawmill close to the resource.

In their 1868 version, the licensing regulations applied to the whole colony, and local magistrates were given complete discretion in their issue. The rate charged was increased to £2 per annum for hardwood and £4 for all types of timber. Each licence was restricted to the Police District in which it was issued, unless the local bench of magistrates agreed to its recognition in another district. Three months only were allowed for the removal of cut pine timber, and 12 months for hardwood, logs to be branded when cut. Special Timber licences cost £12 per square mile, and were transferable on payment of a £1 fee. The special licence fee included the licence fees

for the first three men employed on each square mile.²⁸

Although licensing was a crude means of securing a form of royalty to the crown and controlling exploitation, it was tolerably effective while the ability to fell timber depended solely on muscle-power and when regulations requiring the removal of timber within a specified period were enforced. Enforcement was notoriously ineffective in new and especially remote areas from the time of their discovery until the appointment of local rangers. Competition from other cutters provided an added incentive for overcutting and waste.

The land selection system added materially to the waste. Selectors had to make improvements to their land equal in value to the price of the land. Besides permanent fixtures such as fencing and buildings, the entire cost of clearing was counted as a capital improvement, resulting in substantial amounts of timber being burnt. It was not until 1884 that selectors were restrained or even discouraged from such practices. The absence of nearby sawmills, sawpits or markets and the high cost of transport to the nearest market made burning the only option for selectors who needed to clear land so they could generate an income from it, whether from grazing or cultivation.

Timber-getters frequently took up selections. By paying a year's rent, they secured effective monopoly rights over valuable stands of timber, usually for about three years until the process of forfeiture took place. This loophole ensured at least some timber was felled and sawn rather than felled and burnt.

The move towards Forestry Control

A combination of diverse interests put pressure on the government to control the exploitation of timber. It was not just those who valued forests for their aesthetic qualities and their scientific value. Sawmillers had both a substantial amount of capital invested which could be threatened by rapid over-exploitation

and a family and life-time commitment to sustaining the timber industry.

Some of the most rapacious and wasteful exploitation near Brisbane took place in the convict era when there was no public opinion to protest at the rapid denudation of the valuable stands of cedar. Although higher licence fees were charged for private cutters for softwoods, there was no effective control of cedar exploitation until well into the 20th century when it had become rare. The exploitation of cedar in the Daintree in the 1870s and the Atherton Tableland in the 1880s had much in common with the excesses of the convict era. By this time readily accessible cedar had practically disappeared from south east Queensland.

William Pettigrew who, at the time, had the greatest single investment in the timber industry, wrote in 1875 to advocate control of cutting, and particularly to end the gross waste resulting from "freshing" - cutting timber and waiting for a flood to bring it to market. He referred to a party of cedar getters cutting a vast amount of cedar on the Albert River, south of Brisbane, around 1860. Most of the cedar lay in the scrub and was ruined. Some of the surviving logs only reached market in the early 1870s.²⁹ Despite support from a number of influential millers such as Charles Cox of Toowoomba and Robert Hart of Wilson, Bartholomew and Company (later Wilson Hart) at Maryborough, and from public servants in the Lands Department, there were few changes. One of the first, and ultimately unsuccessful responses, was the establishment of a pine tree nursery on Fraser Island where the failure of natural regeneration had led to concern as to the industry's long term future. An inspector of State Forest was appointed in 1882. His first field trip was to inspect the reported waste of cedar in north Queensland.³⁰

Timber reserves were intended chiefly to ensure that timber was effectively harvested before land was opened to selection and cleared. State forests were established with a longer term view in the hope of creating more permanent areas which could be exploited in a natural cycle of harvesting and regrowth. By

1884, 16 state forests had been declared, all but one in the study area, and totalling just over 200,000 acres. At the same time there were 161 timber reserves totalling nearly 1.6 million acres, 80 percent of them by number and over two thirds by area being in the study region.³¹ Area comparisons can be misleading because of the large areas of relatively sparse forest west of the Great Dividing Range, both inside and beyond the study area.

Increasingly the annual reports of the Lands Department drew attention to the inadequacy of the licensing system. The 1896 report recommended that the licence system be replaced by a royalty on timber cut, after pointing out that two men, paying £5 each for a licence, could in a year cut timber worth £2000 to the Crown.³² The timber licence revenue for the whole of 1896 was £6309. The Brisbane district producing the largest proportion, followed by Gympie and Maryborough, the other major contributors.

Each annual report called for a return to the royalty system. The government responded, finally, with the creation of a Forestry branch in the Department of Lands from 1 August 1900. L.G. Board, an experienced Land Commissioner, was appointed Inspector of Forests.³³ The licence system was gradually withdrawn and a series of inspections were undertaken to assess the state's timber resources. This eventually provided a sound basis for investment in softwood plantations to overcome the shortage of naturally regenerating timber. The appointment of N.W. Jolly in 1911 marked the beginning of the era of the professional forester in Queensland.

During 1903 the Lands Minister called a conference of timber industry representatives to discuss how best to conserve timber and maintain a permanent supply for an industry which, without regulation, faced a limited future. At the same time, the state's first national parks were being declared.

Growth in Sawmill Numbers

It is not easy to delineate the growth in sawmill numbers as the statistics published in

the parliamentary papers are not particularly reliable. For instance, from 1879 to 1880 the figures indicate a drop in sawmill numbers from 44 to 23 in a single year. Closer inspection shows that in 1879, 10 were recorded in the Brisbane district but none in 1880. Likewise the Warwick and Toowoomba areas which had 8 and 3 sawmills respectively in 1879, apparently had none in 1880. Other discrepancies are not as extreme, but still suffice to cast doubt on the reliability of the figures. The accompanying table should therefore be read with caution.

The earliest figures for the state, 32 in 1868, demonstrate a rapid growth from Pettigrew's single sawmill in 1853. The drop to 18 in 1870 is partly accounted for by the failure to record any sawmills at Maryborough. Consequently only the broad trends appear to have any reliability. This shows sawmill numbers reaching a hundred in the mid 1880s, the 1880s being a period of rapid growth.

There are other difficulties interpreting the numbers. For example, quite a number of sugar mills also had sawmilling equipment that either operated just for the needs of the proprietors or operated only in the off-season when cane was not being crushed. Inconsistency of inclusion or exclusion of sawmills which were not the principal industry would also have had an impact on the recorded data.

The 1871 census gives the most detailed population breakdown available, and lists population at a number of saw mills and lumberer's camps. These figures included, 39, near Maryborough, Dundathu saw mills on the Darling Downs, Highfields Saw mills 136 and south of Gladstone, Eurimbulah

Tabulated Sawmill Numbers 1868-1885

	1868	1869	1870/72/73	1874	1877	1878	1879	1880	1882	1883	1884	1885
TOTAL	32	31	18	26	22	47	38 .. 44	23	54	74	104	116
Allora	-	-	-	-	-	-	- .. -	-	-	-	-	2
Beenleigh	-	-	-	1	-	-	- .. -	-	-	-	-	-
Bowen	1	-	-	-	-	-	- .. -	-	-	1	2	2
Brisbane	2	2	2	4	5	10	10 .. 10	-	12	13	14	25
Bundaberg	-	-	-	1	1	2	2 ... 3	3	2	-	4	4
Cairns	-	-	-	-	-	-	- .. -	-	-	-	2	-
Cardwell	-	-	-	-	-	-	- .. -	-	1	-	1	-
Charleville	-	-	-	-	-	-	- .. -	-	1	2	2	1
Charters Towers	-	-	-	-	-	2	2 ... 2	2	-	3	4	3
Clermont	-	-	1	-	-	-	- .. -	-	3	2	1	2
Cleveland	1	2	-	-	-	-	- .. -	-	-	1	1	1
Cloncurry	-	-	-	-	-	-	- .. -	-	-	-	-	1
Cook	-	-	-	-	-	-	1 .. -	1	1	1	1	1
Crow's Nest	-	-	-	-	-	-	- .. -	-	-	-	-	1
Dalby	2	2	2	2	-	-	- .. -	-	-	-	2	1
Douglas	-	-	-	-	-	-	- .. -	-	-	-	-	1
Drayton & Toowoomba	6	5	2	1	-	-	- .. -	-	-	-	-	-
Esk	-	-	-	-	-	-	- .. -	-	-	-	-	2
Gatton	-	-	-	-	-	1	- .. -	-	1	2	4	4
Gladstone	1	1	1	2	3	-	2 ... 2	-	1	4	5	-
Goodna	-	-	-	-	2	-	- .. -	-	-	1	-	-
Goondiwindi	-	1	-	-	-	2	- .. -	-	-	-	-	1
Gympie	1	3	1	1	-	1	1 ... 1	-	4	4	5	4
Herberton	-	-	-	-	-	-	- .. -	-	-	-	-	3
Highfields	-	-	-	-	-	-	- .. -	-	-	3	3	-
Hughenden	-	-	-	-	-	-	- .. -	-	-	2	-	1
Ipswich	6	4	3	1	2	6	5 ... 5	4	5	4	6	3
Leyburn	-	-	-	-	-	1	2 .. -	-	-	-	-	-
Logan	2	2	3	-	-	3	5 .. -	4	5	5	14	17
Mackay	-	-	-	-	-	-	- .. -	1	-	-	1	-
Marburg	-	-	-	-	-	-	- .. -	-	-	-	-	2
Maryborough	4	4	-	5	4	6	5 ... 8	8	9	12	11	12
Nanango	-	-	-	-	-	-	- .. -	-	-	-	1	-
Port Douglas	-	-	-	-	-	-	- .. -	-	-	-	1	-
Ravenswood	-	-	-	-	-	-	- .. -	-	-	-	-	-
Rockhampton	-	-	1	1	-	-	- .. -	-	2	2	4	6
Roma	-	2	1	2	1	2	2 ... 2	-	1	2	4	5
Sandgate	1	-	-	-	-	-	- .. -	-	-	-	-	-
St George	-	-	-	1	-	-	- .. -	-	-	1	-	-
Springsure	-	-	-	-	1	-	- .. -	-	-	-	-	-
Tambo	-	-	-	-	-	-	- .. -	-	1	-	2	2
Tenningering	-	-	-	-	-	1	- .. -	-	-	-	2	1
Toowoomba	-	-	-	-	1	9	1 ... 3	-	3	-	-	-
Townsville	1	1	-	-	-	-	- .. -	-	-	3	2	3
Warraba	2	-	-	-	-	-	- .. -	-	-	-	-	-
Warwick	2	-	1	3	-	-	- .. -	-	2	-	-	5
Warwick & Allora	-	-	-	-	2	1	- ... 8	-	-	5	5	-
Woogaroo	1	-	-	1	-	-	- .. -	-	-	-	-	-

(Source: Statistics of Queensland in Votes and Proceedings various years)

saw mills 40. The Gympie district included Tin Can Bay lumberers 35 and Mount Bopple lumberers 50. A number of smaller settlements were also recorded including 7 sawyers at the Bunya Mountains.³⁴

Sawmill numbers were not recorded consistently until the introduction of registration in 1936.

Broadly, sawmill numbers increased steadily from none to around 43 in the late 1870s. The 1880s were a boom time in the Australian colonies. Queensland reflecting this with an estimated 74 sawmills in 1883 and 122 in 1888. The depression of the early 1890s saw a contraction, to 106 in 1893. Again, the surge around the turn of the century produced 150 sawmills by 1902. This figure drifted down with closures until the rapid expansion late in the decade produced 186 in 1909 peaking at 258 in 1912. Numbers fell with reduced local activity during the war.

The industry was volatile, subject to both economic and climatic forces. The 122 mills in 1888 cut 60 million superfeet of timber. The 140 million superfeet cut in 1901 by nearly 150 mills was an exceptional figure, halving to 72 million in 1902, a year when severe drought both reduced economic activity and made it difficult to find feed for animals. Dry conditions could have a more telling impact than wet weather in Queensland. This is in marked contrast to Victoria and Tasmania and helps explain the much smaller dependence on timber tramways.

When registration of sawmills was finally introduced in 1936, the figures appear to have included sawmills which may have actually been closed at the time, but registered to keep them available for operation and for applying for log quotas. Also, some sawmills which were adjuncts to other businesses were counted for the first time. Some 600 sawmills were registered and postwar this rose to 800 in 1951.

After meeting needs deferred from war-time as well as migration, the trend towards larger sawmills, encouraged by efficient road

transport as well as economics, brought about a period of steady decline, falling to 354 in 1988 and 338 in 1996 in a continuing trend.

Government Sawmilling and Depression

Apart from the convict era, the timber industry has been almost totally one of private enterprise. The industry came to be dominated by large numbers of small family businesses, especially when the capital cost of sawmilling equipment fell relative to wages. This trend was well established when the Ryan Labor Government, elected to power in 1915, decided to enter sawmilling as part of its program of state enterprise. Although not a financial success, operational losses were modest. The sawmills were subsequently sold on a depressed market, the experiment lasting for nearly two decades.

The investment was justified on the basis that sawmillers were colluding to keep prices artificially high. Such collusion was not illegal at the time but as some of the most successful collusion was aimed at keeping down the price millers paid for logs from the Forestry Department, the collusion was not necessarily bad for consumers.

In December 1915, the government purchased Raymond and Hossack's (formerly Raymond & Co's) sawmills in Fortitude Valley, Brisbane and at Taromeo near Benarkin in the upper Brisbane Valley. The next year a mill was erected at Imbil largely using spare machinery from the Brisbane mill. Charles Henry Bromiley was appointed General Manager of the State Sawmills and Hossack was appointed to take charge of the Brisbane mill.

The Select Committee appointed by the Legislative Council in 1917 to inquire into State Enterprises, did not favour the concept. It concluded that the government had blundered and had paid too much for the timber in stock at Raymond's mill. Their accountant gave evidence that the mill was losing money at the time of purchase, and there was little likelihood of the continuing

losses being turned around. Furthermore, the government had spent £31,000 on buildings to house the State Joinery Works. This investment was totally unproductive as no machinery had been purchased and the buildings lay empty.³⁵

A fourth government mill came into operation in 1919 at Liverpool Creek south of Innisfail after a favourable report by the manager concerning an application by local settlers who were clearing the area and had little option but to burn the timber. It soon had to be admitted, however, that this mill, known as the Silkwood mill, was badly located, "half a mile from rail, obsolete and not worth shifting."³⁶

As from 1 July 1920, the state sawmilling operation was transferred to Forestry. The primary aim of the new administration was not cash profit but marketing secondary woods not ordinarily saleable as logs. By doing so it would enhance the value of the state's reserves. Public prejudice was based on the experience of warping resulting from inadequate seasoning techniques. Further, the Forestry Department favoured country sawing to save transport costs and thus enhance the value of logs at the stump. The Brisbane sawmill was quickly closed and each of the mills placed on a self-accounting basis, selling their output to the central timber yards in Brisbane. Operations then became profitable.³⁷

In pursuance of the new policy, a small mill was erected in the Injune forest to mill cypress pine for building purposes in western Queensland. It never achieved its potential. The shortage of timber was the result of a short-lived building boom and the time it took private enterprise to respond with extra sawing capacity. In central Queensland the sawmill at Birimgan was acquired and reconstructed, but there was little general market and soon it was chiefly cutting railway sleepers.³⁸

In its 1923 annual report, the Brisbane Timber Merchants' Association pointed out that the

government sawmills sold timber at prices only 2.5 per cent less than its official list (and for which early payment discounts were not uncommon). This, they claimed, reinforced by the closure of the government's Brisbane mill, could be taken as "an admission that the 'vultures' in the timber industry" were only imaginary.³⁹

Rationalisation began in 1923 with closure of the Injune mill while the Birimgan mill was devoted solely to cutting sleepers for the Railway Department. The need to modernise and possibly relocate the Imbil mill was recognised but not acted on. Two major investments, however, substantially increased the investment in sawmilling: the purchase of McKenzie's sawmill and tramway on Fraser Island and the purchase of the Yarraman band sawmilling plant in 1925. McKenzies had been unable to sell its hardwood in Sydney at a profit, especially when forced to use union waterside labour. Meanwhile, the Yarraman mill was operating below capacity through the operation of the sawmilling cartel (to which the Yarraman mill belonged). The cartel, having purchased all the local milling rights offered by the Crown, divided the harvest among its members, resulting in large numbers of logs being railed to Brisbane while Yarraman workers faced unemployment. Under government ownership the mill received all the logs it needed.⁴⁰

The depression of the 1930s and the change of government combined to end government sawmilling. The most efficient mill, at Yarraman, had been burnt down in 1929. It was rebuilt on a modest scale with the insurance money. The Injune, Birimgan and Silkwood mills were sold in the 1931-32 financial year and neither the Taromeo nor Imbil mills operated. A substantial proportion of private sawmills also closed for the duration of the depression.⁴¹

When the loss for the 1931-32 financial year reached £6877, the Minister ordered an investigation. With no prospect of being able to operate profitably, the mills were offered for sale. The timber yards at Newstead, Brisbane together with the mills at Yarraman

and Taromeo were sold to Yarraman Pine Pty Ltd for £16,000 cash. The land and mill at Imbil were sold separately.⁴²

With the closure of milling on Fraser Island in the mid-1930s the experiment of state milling ended. The Department retained sufficient land at Newstead and erected a modern seasoning kiln which was experimental rather than commercial, providing valuable information on timber seasoning. This led to the commercial exploitation of a number of timbers previously rejected for building purposes.⁴³

The Commonwealth Government entered the industry in 1920 through the War Service Homes Commission. On 8 September 1920 the Commission announced the acquisition of Lahey's operations at Canungra (including 10,412 acres of freehold) and from J.F. Brett, his interests at Beaudesert, Blackbutt, Killarney and Samford (totalling 10,271 acres of freehold land). The acquisitions were intended to provide secure supplies for the Commission which did not directly engage in sawmilling.⁴⁴

Emerging from Depression

The substantial fall in building activity during the depression meant that sawmilling was one of the industries most affected. Company mills laid off workers and many family mills closed altogether. Where possible, the assets were retained, and many gradually reopened as the depression lifted. The 1936 legislation requiring the registration of sawmills was intended, at least in part, to help reduce the number of sawmills. Economics, however, remained the driving factor.

The growth of the banana trade in the 1920s and 1930s and fruit production, particularly in the Granite Belt, stimulated demand for cheap pre-cut timber for making fruit cases. Usually the timbers were cut at mills and the fruit cases assembled in the fruit growing districts. Where suitable timber supplies existed in or near fruit-growing districts, numerous case mills sprang up specifically to supply this trade. Using internal combustion engines -

and electricity as it became available - the case mills represented much smaller investments than sawmills supplying the building trade. The mills were able to use small diameter timber logs and tops and help provide a better market for tops than firewood or being left to rot. The case mill almost disappeared during the 1960s and 1970s when cardboard and plastic packaging replaced the fruit case. The market for packing case timber shrank but did not entirely disappear.

Besides adapting to changing markets, sawmills had to adapt to changing resources. Many small mills could be regarded as semi-portable. Until the development of modern heavy lorries, it was easier to relocate a sawmill than incur heavy ongoing transport costs. Such mills generally had fewer than seven employees. In the western cypress pine forests, shifting the mill every decade or so seems to have been the norm rather than the exception. In many cases sale of a sawmill was also the precursor of a move to a site which had greater standing timber resources.

Post-War Resurgence and Rationalisation

Although World War II brought a severe reduction in housing activity, after a short resurgence when the depression lifted, the declaration of war with Japan at the end of 1941 was followed by a huge upsurge of construction for military purposes. As structures were needed quickly and were expected to be temporary, the demand for milled timber grew rapidly. Closed mills reopened and others worked long hours.

Unlike the 1920s, there was no diminution of building activity after the war, with a huge backlog in housing demand resulting in the opening of many new mills and pressure to make more standing timber available for logging.

The comparatively low capital cost of small to moderately sized mills powered electrically or by internal combustion, and availability of finance given the assured returns in the housing industry and buoyant prices, resulted in a large number of new sawmills being

established in small settlements close to the forests, either using private or public timber supplies.

The last quarter century has been marked by amalgamations, closures, takeovers and investment in large modern mills. New products based on wood chipping to use the output of massive and maturing pine plantations, and declining hardwood reserves relative to growing demand, lessened the role of small mills. As local hardwood supplies cut out, some mills closed while others invested in modern logging trucks and equipment and enlarged their mills to gain sufficient economies of scale to enable profitable operation while drawing logs from distances of one, two and three hundred kilometres.

Modern technology reduced the labour content in milling, the new products enabled more use of low grades of timber previously not used for construction purposes, and computer-controlled cutting equipment enabled boards to be cut with much greater precision and optimum cuts to be made to maximise the value of the output.

Technological Development

Queensland, being late to develop its timber industry, and for more than a century being dominated by family concerns, imported technology rather than developing its own. Descriptions of sawmills that have survived usually praise them as incorporating the latest technology. Once imported, that equipment often remained unaltered for decades, apart from local adaptation. The industry world wide remained relatively unchanged once the circular saws, band saws and gang saws had been 'perfected' in the mid to late 19th century, along with the benches feeding them. Fire, although causing losses, often provided the opportunity to replace equipment that had become dated with more modern machinery.⁴⁵

Throughout the nineteenth century the steam engine was the principal source of mechanical power. Every steam sawmill had its boiler.

Although pressure boilers were in common use wherever mechanical power was needed, the timber industry became notorious after a sequence of fatal explosions in 1872 and 1873. An explosion on 6 August 1872 at the Union Sawmills, operated by Pettigrew and Sim, and owned by John Meiklejohn, eventually took seven lives. Only a month later there was an explosion at the Calliope sawmill near Gladstone. After a further fatal explosion in July 1873 at the sawmill beside Lake Cootharaba, a government inquiry was ordered.⁴⁶

Statistics in the subsequent report showed only 27 boilers at sawmills compared with 41 on the goldfields and 211 on farms and station properties. The report found that simple shell boilers were least likely to explode. The more modern multitubular boiler was less likely to explode although the explosion of two in railway locomotives in 1898 was to have major ramifications for the government railways. It was the flue type boiler which most commonly exploded. When the water level dropped below the safe level, most likely when the boiler was temporarily unattended, the area above the flue became exceedingly hot and weakened. An explosion could then be expected when steam was drawn off, for example, after a meal break. This disturbed the remaining water inside the boiler which on contacting the top of the flue was instantly turned to steam, causing a rapid increase in pressure far beyond the capacity of the safety valve.⁴⁷ Better supervision, regular inspection by government inspectors and a system of issuing ticket to boiler attendants after qualification by examination, overcame the problem.

Felling timber changed little until after World War II. Especially in pine, the crosscut saw operated by two men was the preferred method, and the use of axes was not encouraged and was rejected as causing waste.

The development of portable saws after the 1940s increased productivity enormously. Chain saws appeared on the local market after

the war, the heavy two man versions being quickly followed by one-man versions which have steadily become lighter, safer, more reliable and more productive.

There is no simple universal classification of sawmills. While there is the broad division into softwood and hardwood mills, many mills handled both by suitable change of saw blades, or converted from one mode to the other as supplies altered. The case mills were a distinct category, many only cutting case timber and closing when their market evaporated. Those that survived were adapted to specialist or other markets.

Tramway versus Road Haulage

Snigging logs to a road or tramway was the preserve of bullock teams for decades. Bullocks were often preferred to horses both for strength and for their ability to survive on feed grown in paddocks in or near the forests. Unlike Victoria, there has been little use of high wire systems to remove timber from rugged terrain. Early this century, Lahey Brothers used an electrically-driven wire system to feed logs to their Canungra tramway, but it was not regarded as economically successful. In the 1920s, Lars Anderson employed a number of wire systems, generally referred to as flying foxes, but the multiple handling led to their replacement after new owners acquired the operation. Such systems were generally adopted in Queensland where land transport was impossible because of the terrain. Only in recent decades has a wide range of specialised mechanically-powered equipment been used to fell and recover logs and draw them to and load them onto road transport. Heavy tractors and bulldozers were scarcely available until the disposal sales by military authorities after World War II.

The first use of motor trucks dates from about 1919. Although trucks were available before this, their limited capacity meant they were used more for farm work and light usually high-value goods transport rather than heavy duty log haulage. The introduction of the half-tracked Linn tractors by T.H. Spencer to the

Goomeri area in 1928 provided the first effective reliable mechanical means of log recovery. Linn, the United States manufacturer, visited Goomeri to ensure the units were working effectively. In more level terrain with a trailer they could haul as many as 13 logs or 9500 super feet.⁴⁸ Subsequently Linn tractors were used by Hancocks in the Fassifern Valley and the Mount Mistake area at the head of the Laidley Valley and elsewhere but less than a handful of these pioneering machines were brought to Queensland.

The versatility of both tractor and motor truck and their successful introduction would appear to have ended any thought of retaining timber tramways. Subject to further study, the use of timber tramways in the transport of logs would appear to have ended in the mid 1930s. By comparison, some were still in use in Victoria and Tasmania after World War II. Queensland had no area of dense networks of tramways found in those two states.

Transport and its effect on Sawmilling

There have been three phases - water, rail and road - in the transport of logs and sawn timber, each shaping the sawmilling industry. The industry emerged when there was little transport infrastructure and water transport provided the most cost efficient method of transport. Although navigable rivers were extremely limited, the widespread timber resource and the comparatively small population enabled demands to be met easily from supplies readily exploited by shipping and rafting. Substantial amounts of softwood timber, lighter than water, were floated down streams in flood time and then rafted to the mill. This substantially increased the amount of timber accessible to water transport. Some rafting grounds were used for a number of years, and are perpetuated in local names, such as the rafting ground marked by Rafting Ground Road in the Kenmore-Brookfield area of today's suburban Brisbane. Rafting from the South [Gold] Coast to Brisbane took a number of days, and small shelters were often erected as temporary living quarters on the

rafts as they crossed the bay and were towed up river.

The development of railways substantially expanded the amount of timber that could be economically exploited, at a time when the population was rapidly expanding and the coastal timber resource was shrinking. Shipping was not displaced by rail since sea-transport was cheaper, but it expanded the range of timber available for logging and provided a more reliable year round supply than that provided by waiting for floods or freshes in non-navigable rivers to deliver logs.

Although the first railways were constructed to bring wool from the Darling Downs to Ipswich and expanded to serve the main grazing regions of western Queensland and then the mining and agricultural districts, it was not long before log and sawn timber became an important commodity. The Maryborough to Gympie and Bundaberg to Mount Perry railways, built in the early 1880s, were both built to serve mining communities. Light standards were adopted and soon proved inadequate, largely because of the large volumes of log timber being hauled to mills at Maryborough and Bundaberg. This trade had not been expected to be significant when the lines were built. Timber became a major commodity on many subsequent extensions.

The realisation that timber provided a substantial and profitable commodity for the railways led to the availability of timber reserves being one main reason to promote the rapid extension of the rail network throughout Queensland, financed by capital borrowed overseas. For the extension of the Brisbane Valley line from Esk to Yarraman and the Kilkivan branch through Goomeri and Murgon to Kingaroy and Nanango, the revenue from the timber industry provided the chief justification for railway construction. As depletion of timber reserves was frequently followed by cultivation, new traffic developed as the timber traffic fell. Where this did not take place, the early years were often the most profitable in the line's history.

The Manumbar State Forest, with 200 million of the state's 1070 million super feet of standing pine in 1925, was described as an El Dorado to a state facing rapidly dwindling softwood reserves (until the situation was remedied by maturing largely government-planted pine plantations). Although a 33 mile long railway was surveyed from Goomeri to Coothing, capital expenditure on roads was by then drawing funds away from railways and it was realised that the timber freight on the branch could never pay back the £200,000 or more the line would cost. There was no prospect of permanent closer settlement or agriculture. Motor transport feeding the railway was examined as well as a Forestry-owned tramway. A third option was adopted, establishing new mills in the forest and trucking the output to rail.⁴⁹ This avoided heavy capital expenditure, and trucking of sawn timber rather than logs became Forest policy, on the basis that the more efficient harvesting and milling was, the more the government could secure in royalty or stumpage charges for logs without making the local industry uncompetitive.

Although road transport has now largely displaced rail, this transition, in itself, has not resulted in major change. The industry initially was located in the large towns, close to the market not so much for economy but because sawmills were initially a major capital investment with technology that was relatively new. Because of the substantial capital investment, there was a tendency to locate mills near the resource only where there was an assurance that supplies would not be exhausted during the life of the investment.

Even at the height of the rail age, log hauling, by bullocks, horses and traction engines, was of considerable importance. The heavy loads and the effects of narrow steel rimmed wooden wheeled wagons on road surfaces led many local authorities to impose wheel taxes. These were resisted by industries as were the restrictions imposed by local authorities on traction engines which had a tendency to damage and destroy bridges constructed with

horse-hauled loads in mind. On the other hand, sawmillers were also prepared, at times, to pay for road works which would facilitate log hauling and which were not justified or unlikely to be made from rate revenue alone.

William Chippindall, chairman of the Widgee Divisional Board centred on Gympie, told the Local Government Royal Commission (of which he was a member in 1896), of the difficulties local authorities had. Timber getting contributed to the revenue of the Lands Department but left local authorities paying for the roads. He wanted the government to pay for roads from licence fees.⁵⁰ The wheel-taxes imposed by local authorities reduced as the width of the tyre on the wagon increased, thus encouraging the use of wagons causing less damage to local roads.

As the importance of the capital investment declined, and family sawmills became the norm, the expansion of the rail network lessened the need to locate mills near the resource to remain cost competitive. It took active efforts by the Forestry Department to make bush sawmilling the focus. This was facilitated with the development of cheap and reliable internal combustion engines which displaced the steam engine from small family mills and subsequently from the larger mills. Electric power availability initially favoured town based mills.

The role of tramways and short distance transport

Transport of the felled logs to a road was and often remains a separate phase of transport to the mill. Bullocks were widely used. Various sledge devices were used, to raise the front of the log so it did not dig into the ground, and to reduce the number of stones embedded in the log.

Where timber was being brought from high country, chutes were employed in a number of areas, particularly in the Bunya Mountains. The more elaborate ones were fully lined with timber but quite commonly only the top was lined, or they were not lined at all. This

increased the problem of stones becoming embedded in the logs. They had to be removed before debarking and mechanical saws could be used. On lined chutes, speeds were higher and frictional forces created great heat. The process was hazardous. Logs sometimes jammed part way down the slope, especially unlined chutes. A dump area was provided at the bottom to cushion the deceleration at the end of the chute and reduce damage to logs.

Tramways were used in a number of areas, although in Queensland it was generally only the larger proprietors who had sufficient capital to invest in them. Compared with Victoria and Tasmania, there were substantial periods of relatively dry weather that made road haulage of timber from forest to mill and from mill to railway or port much more feasible. Consequently only a small proportion of mills had an associated bush tramway (as distinct from the use of short lengths of tramway within the mill to assist in sawing and stacking). Most of the tramways were used to bring logs to the mill.

Tramways to take sawn timber from mill to rail head, common in southern Australia, were rare in Queensland, Neranwood being an unprofitable example. Incline tramways, which were used to lower logs with more control and without the damage from chutes, were uncommon, and are chiefly associated with Lars Anderson. Pettigrew's Cooloola tramway of the 1870s, a pioneering tramway in the Australian context, was unusual in that the wire rope system was used to raise and lower logs up and over a ridge. The common incline tramway, with a common centre rail except where the rising and descending trucks passed halfway, used the weight of the empty truck as counterbalance to the weight of loaded truck, and necessitated braking as well to steady the descent. Only Lahey's tramway system south from Canungra was a major network comparable to larger systems in Victoria and its use of a substantial tunnel gave it an unusual feature. It shared with Munro's Tramway north of Toowoomba the use of geared locomotives which were a common feature of the North American

timber industry, enabling tramways to use grades twice as severe as on conventional railways without the added capital cost of rack-type railways or the inconvenience of the transition to wire rope systems.

Most of the tramway systems had a comparatively short life and were superseded early in the age of motor transport, or when the resource was exhausted.

The longest single route tramway was built by the government railway department, to carry sleepers for major railway construction in western Queensland. It was built from Chinchilla to Barakula, west of the study area, and was more comparable in standard to the logging tramways in Western Australia. It utilised conventional railway department locomotives and rolling stock, although built to cheaper standards than any of the officially authorised railways. It lasted for nearly 60 years. A similar tramway in Central Queensland, where one third the length, lasted for little more than half this length of time.

Belated Modernisation

The depression did not produce many wholesale failures because many family sawmills had little or no debt. The failure to invest in new equipment aided business survival at a time of declining wages and surplus labour in the 1930s. Postwar, the upsurge in demand promoted the establishment of many small bush mills. Buoyant conditions and a seller's market meant there was little pressure to modernise or increase productivity. Even the large increases in labour costs could be passed on with tariffs and quota regulating the flow of imports.

While sawmilling technology remained relatively static, sawmills numbers remained high or proliferated in response to demand. Only in recent years have labour cost pressures, combined with the need to adopt technological advances to remain competitive, forced a new wave of centralisation to provide access to the necessary capital. This process has been aided by the development of

road transport which facilitated a greater centralisation of sawmilling. These forces together have resulted in the development of a small number of major computer-controlled mills now responsible for a large proportion of the state's total output. Such enterprises as Hyne and Son, the Northcoast Sawmilling Company and Brandons are treated in more detail in the regional overview.

Endnotes

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3. Hallock, loc.cit.
4. Peter Taylor, *Growing Up: Forestry in Queensland* (*place, Allen & Unwin, 1994).
5. John Dargavel, Chapter 1, "Convicts and Commercial Cutters" in John Dargavel ed., *Sawing, Selling & Sons* (Canberra, Centre for Resource and Environmental Studies, 1988)
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7. Cecil Allport, *Degraves and the first sawmill in Van Dieman's Land* in John Dargavel ed., op.cit. pp. 23-8.
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9. *ibid.*
10. Norman Houghton, "Melbourne's pioneer sawmill" in John Dargavel ed., op.cit., pp. 29-30.
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16. *ibid.* pp. 7-9.
17. *ibid.* p. 47, 86 and plan 59, 75.
18. *ibid.* p. 56, 54; location inferred from plate 68 cf p. 178 and the footnote.
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21. WF Morrison, *The Aldine History of Queensland* (Sydney, Aldine Publishing Company, 1888) Vol.2, unpagged section on industries.
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26. V&P 1861 pp.3-4.
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