



Australian Government

Department of Infrastructure and Regional Development

Bureau of Infrastructure, Transport and Regional Economics



Freightline 5 – Australian cotton freight transport

The *Freightline* series is intended to provide information about where freight moves in Australia. This issue focusses on the transport of cotton lint in Australia. It provides a picture of cotton movements in 2015–16.

At a glance

- Australian total cotton lint production—the raw cotton fibre—totalled 550.9 kilotonnes in 2015–16, which is an increase of about 32 per cent over 2014–15. Of the total raw cotton produced, over 99 per cent is exported.
- Cotton is grown predominantly in Queensland and New South Wales, which produce approximately one-third and two-thirds of Australia’s cotton, respectively. Western Australia permits production of genetically-modified cotton varieties in the Ord River Irrigation Area, although this typically accounts for less than 0.01 per cent of total Australian cotton lint production.
- In New South Wales, there was an increase in cotton lint production of 43 per cent from 2014–15 to 2015–16.
- The total area of cotton planting also increased by 43 per cent from 2014–15 to 2015–16.
- The gross value of cotton exports in 2015–16 was \$1.3 billion, which is an increase of 42 per cent over 2014–15.
- Brisbane, Sydney and Melbourne are the main export ports for cotton, with approximately 48 per cent, 28 per cent and 23 per cent of exports, by weight, respectively.

BITRE estimates that the total cotton transport task was approximately 389 million tonne kilometres in 2015–16, with approximately 67 per cent of this transported via road.

Introduction

Increased policy focus on freight, and the adequacy of infrastructure to support Australia's growing freight task, is increasing the demand for more detailed information on where and how freight moves. Detailed data on freight movements, however, is either expensive to collect, owing to the breadth and diversity of the task, or, where it involves a small number of companies (e.g. rail), availability is restricted by confidentiality concerns. As a consequence, there is generally little current data available.

Information on the size and scope of rural and agricultural commodity transport tasks is particularly lacking. This limits the information base for infrastructure planning, both in terms of understanding current transport flows and in assessing infrastructure bottlenecks (RIRDC 2011), and inhibits governments' ability to develop appropriate policy responses and assess competing infrastructure needs. The lack of adequate information and timely investment can ultimately affect costs faced by agricultural producers who face increasing input costs, as well as seasonal and climatic challenges.

This issue of *Freightline* focuses on where and how Australia's raw cotton harvest is transported from farms to export ports, including focussing on key elements of the cotton supply chain—ginning, warehousing and export. Estimates of cotton freight movements for 2015–16 are presented.

The cotton transport task considered in this paper only examines cotton lint – the raw cotton fibre. Cotton by-products including cottonseed, cotton linters—the fine fibres that remain on the cottonseed after processing—and the trash products of the ginning process—e.g. stalks and seed hulls which can be used as mulch, in products to clean up oil spills and in ethanol manufacturing—are not considered in this issue.

Australian cotton transport

Cotton production

Over the past two decades, Australia has, on average, produced approximately 550 kilotonnes of raw cotton lint per annum. Output varies from year to year depending on prevailing environmental conditions, particularly rainfall, from as much as 1200 kilotonnes in 2011–12 to as little as 330 kilotonnes in 2008–09. In 2015–16, Australian cotton lint production totalled approximately 550.9 kilotonnes (ABS 2017a). Over 99 per cent of Australian total raw cotton production is exported (Cotton Australia 2013a), where it is first processed (spun) into cotton thread prior to subsequent production.¹

¹ Australia has no significant domestic cotton spinning facilities—the last major domestic cotton spinning company having closed in 2003 (Catalano 2003).

Table 1 shows cotton production between 2008–09 and 2015–16. This data is presented by crop year, which spans from August to the following July.

Table 1: Australian cotton lint production 2008–09 to 2015–16 crop year^a

Area	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16
New South Wales								
Total area planted (<i>ha</i>)	88.0	123.8	347.7	358.1	284.0	256.0	124.0	163.0
Lint production (<i>kt</i>)	178.2	255.9	587.2	753.1	671.0	587.6	334.0	362.8
Yield (<i>t/ha</i>)	2.02	2.07	1.69	2.10	2.36	2.30	2.70	2.23
Queensland								
Total area planted (<i>ha</i>)	76.0	84.5	242.5	241.1	159.0	136.0	73.0	107.0
Lint production (<i>kt</i>)	151.0	130.9	338.5	470.2	346.0	297.5	193.8	188.1
Yield (<i>t/ha</i>)	1.99	1.55	1.40	1.95	2.18	2.19	2.66	1.76
Australia								
Total area planted (<i>ha</i>)	164.0	208.3	590.2	600.0	443.0	392.0	197.0	270.0
Lint production (<i>kt</i>)	329.2	386.8	925.7	1224.6	1017.0	885.1	527.8	550.9
Yield (<i>t/ha</i>)	2.01	1.86	1.57	2.04	2.30	2.26	2.68	2.04

a. August – July crop year.

Sources: ABARES (2017) and ABS (2017a).

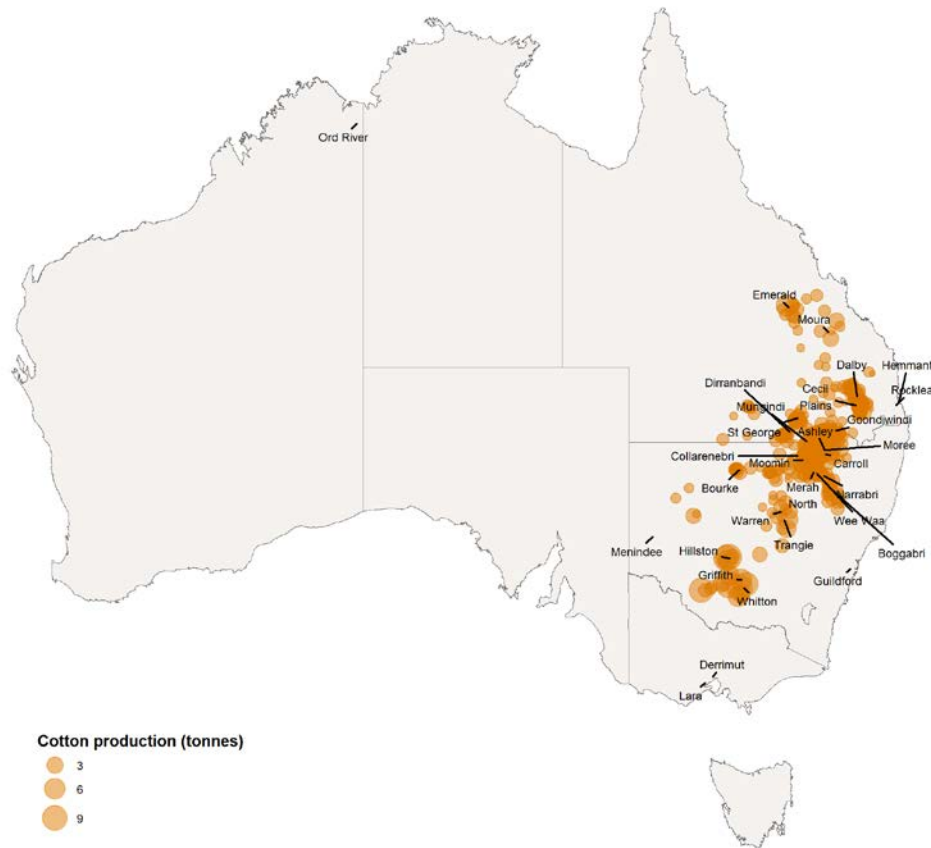
Compared to the world's top cotton producers—China, India and the United States—Australian cotton production is relatively small (Cotton Australia 2013b). However, Australia is the fourth largest exporter of cotton, behind the United States, India and Uzbekistan (Cotton Australia 2013a), and Australian cotton yields are around two and a half times the global average (Cotton Australia 2013a). China, Indonesia and Vietnam are the largest importers of Australian cotton, with China purchasing approximately 50 per cent of cotton exports (ABARES 2017).

Australian cotton is predominately grown in New South Wales and Queensland (see Figure 1). Small amounts of several genetically-modified cotton varieties are also presently being trialled in the Ord River Irrigation Area of Western Australia to assess their commercial potential, although this represents less than 0.01 per cent of the national total and is not examined in this paper (ABS 2013a)². New South Wales produces approximately 65 per cent of Australia's cotton, with Queensland producing 34 per cent (ABS 2017a). In Queensland, most cotton is grown in the Darling Downs, St George, Dirranbandi and Macintyre Valley regions. The remainder is grown near Emerald, Theodore and Biloela in Central Queensland. In New South Wales, cotton production stretches from the Macintyre River, along the Queensland border, covering the Gwydir, Namoi and

² According to Brann (2017), 'Cotton was last grown commercially in the Ord Valley back in 2011, when 800 hectares were planted during a period of extremely high cotton prices.' The cotton was trucked to the Queensland town of Dalby for processing (Brann 2017).

Macquarie Valleys. Cotton is also grown in the west along the Barwon and Darling Rivers, and in the south along the Lachlan and Murrumbidgee Rivers.

Figure 1: Cotton growing areas, Australia, 2015–16

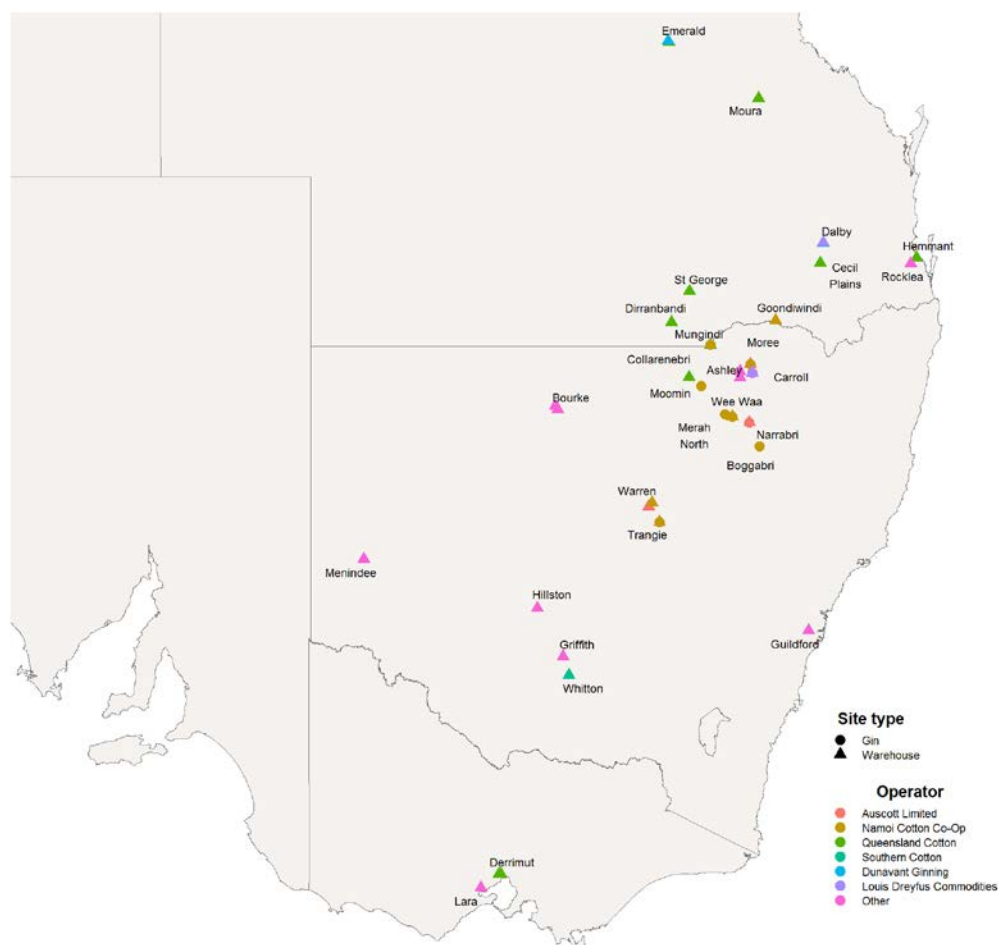


Source: ABS (2017a) and BITRE estimates.

Cotton is an annual, summer crop. Beginning in August, soil is prepared for planting. From September to November, cottonseed is planted and the growing season lasts from November through to February. It takes approximately four months for the cotton bolls to split open. From March to May, cotton is picked and transported to gins for processing, before classing—the grading of cotton fibre based on quality—and marketing activities are undertaken from May to August.

Once picked, cotton is pressed into large rectangular modules or round bales on the farm. The bales and modules are then transported to a cotton gin for the first stage of processing. Cotton gin factories separate cotton lint—the raw cotton fibre—from the cottonseed and trash—stalks and seed hulls. Large mechanical saws strip the cotton lint from the seeds, and blowers remove as much trash as possible. The lint is then pressed into cotton bales for sale. Each cotton bale weighs 227 kilograms (Cotton Australia 2013c). Gins are located in regional areas where cotton is grown. Figure 2 shows the location of Australia’s cotton gins and warehouses.

Figure 2: Location of cotton gins and warehouses, Australia



Source: Cotton ginning and marketing companies.

Cotton exports

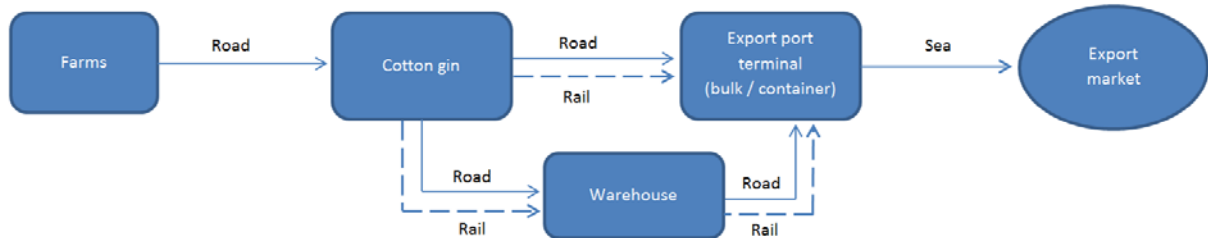
Cotton lint exports totalled approximately 550.9 kilotonnes in 2015–16 (BITRE estimates based on ABS 2017a) and a gross export value of \$1.3 billion, which is an increase of 42 per cent over exports in 2014–15 (ABS 2017b). The main ports for Australian unmanufactured cotton exports are Brisbane, Sydney, and Melbourne. The Port of Brisbane is the largest cotton export port, with approximately 260.1 kilotonnes in 2015–16. Sydney exported approximately 156.1 kilotonnes and the Port of Melbourne exported approximately 123.2 kilotonnes of cotton in 2015–16 (see Table 2).

Cotton transport, storage and marketing

Where and how cotton is moved depends on a number of factors, including prices, market volumes, transport costs and transport capacity. Cotton transport arrangements are influenced by the location of ginning and storage facilities, and nearby transport links. Transport of Australia's cotton harvest is currently handled by a mix of road and rail transport modes. Movement of cotton from farm to gins is almost entirely handled by road transport. The estimated proportion of road and rail movements to various ports is listed in Table 2. BITRE estimates with approximately 67 per cent of transportation of raw and processed cotton by weight is via road.

Cotton bales are warehoused until they are sold and ready to be shipped. Cotton growers sell their cotton to one of a number of cotton merchants, who then on-sell the cotton into overseas markets (Cotton Australia 2013c). Figure 3 provides a simple schematic diagram of the Australian raw cotton supply chain.

Figure 3: Simplified cotton supply chain



Major cotton marketing companies in Australia include:

- Namoi Cotton
- Cargill
- Auscott
- Queensland Cotton
- Twynam Agricultural Group
- Louis Dreyfus Commodities
- Econom Commodities
- Plexus Cotton Ltd.

Many of these marketing companies are involved throughout the cotton supply chain, providing ginning, marketing, warehousing and shipping services.

Cotton transport patterns and freight volumes

The purpose of the *Freightline* series is to illustrate where and how freight moves. Figure 4 provides an illustration of the size and scope of cotton freight movements across Australia in 2015–16. It has been derived by modelling flows between areas of production to export ports. The modelled results illustrate the flow of harvested cotton (including cotton lint, seed and trash) from farm to cotton gin, and then on from gin (lint-only) to warehouses and ports for export, by transport mode.

Transportation by road currently dominates the supply chain of cotton in Australia. For this purpose, road haulers use articulated semi-trailer, B-double or A-double road vehicles for transport of cotton. Rail transportation of cotton is not as prevalent, with one of the possible reasons being that very few gins have direct access to rail sidings (THLG 2014). Figure 4 shows volumes for transportation from areas of production to ports via road and rail, and Figure 5 separately shows the road (Panel a) and rail (Panel b) cotton freight movements. Overall, BITRE

estimates total rail movements of cotton were approximately 99.6 million tonne kilometres in 2015–16 with total road freight movements estimated to have been 289.5 million tonne kilometres (see Table 3).

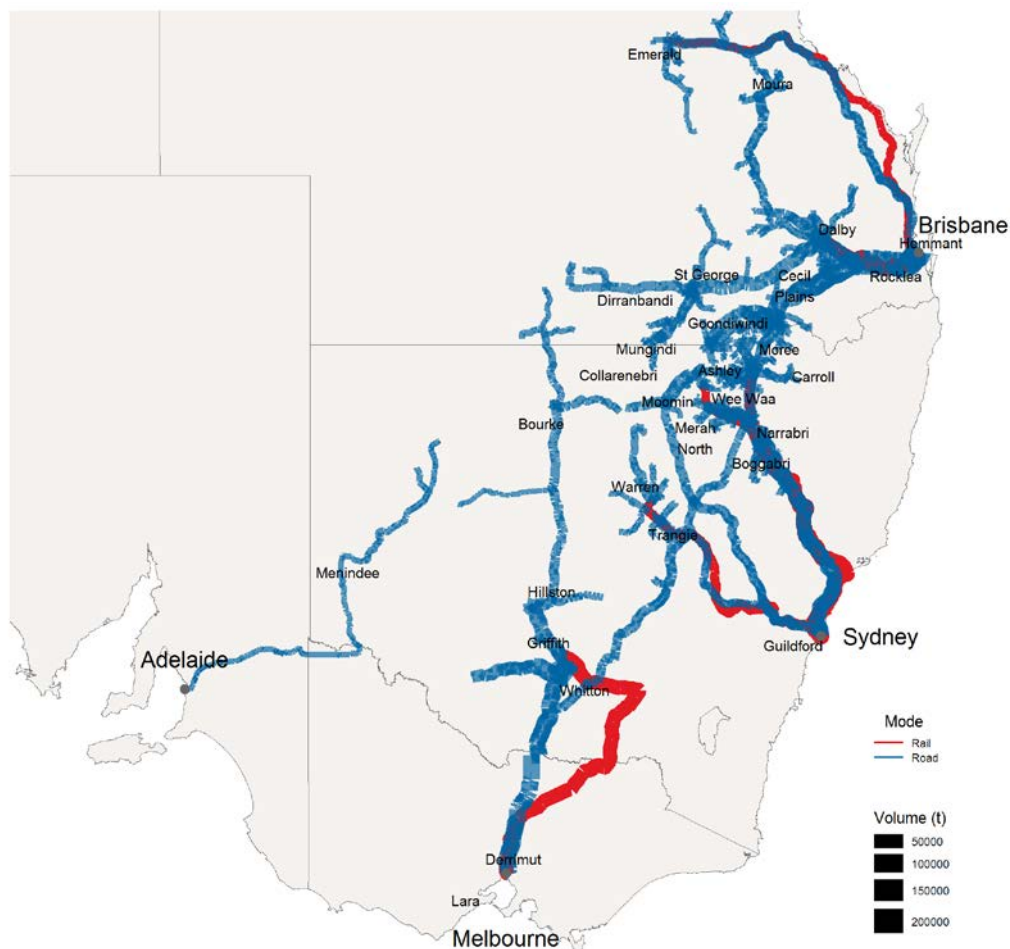
Table 2 shows estimated cotton transport flows (in kilotonnes) to various ports and transport mode.

Table 2: Estimated Australian cotton lint exports, by delivery mode, 2015–16

Port	Mode			Mode		
	Road	Rail	Total	Road	Rail	Total
	<i>(kilotonnes)</i>			<i>(per cent)</i>		
Brisbane	206.3	54.6	260.9	79.1	20.9	47.7
Sydney	81.7	75.4	157.1	52.0	48.0	28.7
Melbourne	77.7	50.5	128.2	60.6	39.4	23.4
Adelaide	1.2	0	1.2	100	0	0.2
Total	366.9	180.5	547.4	67.0	33.0	100

Source: BITRE estimates.

Figure 4: Cotton transport volumes, by mode, 2015–16



Source: BITRE estimates.

Table 3: Estimated cotton transport flows, by jurisdiction and transport mode^a

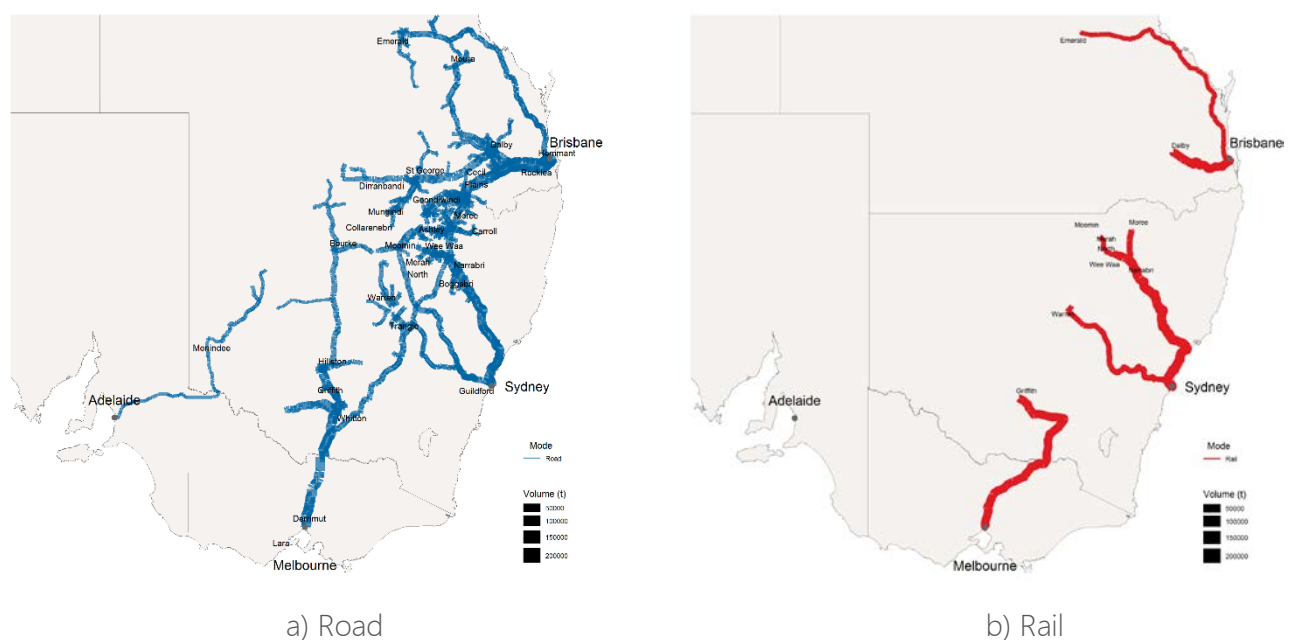
Jurisdiction	Road	Rail	Total	Road	Rail	Total
	<i>(million tkm)</i>			<i>(kilotonnes)^b</i>		
New South Wales	143.2	65.1	208.3	57 886	14 070	71 957
Queensland	126.3	18.9	145.2	54 530	5 692	60 222
Victoria	20.0	15.5	35.6	11 630	2 829	14 460
Total	289.5	99.6	389.0	124 046	22 591	146 638

a. Figures may not add to total due to rounding.

b. Total tonnage presented on uplift/discharge basis

Source: BITRE estimates.

Figure 5: Cotton transport volumes, separated by mode, 2015–16



Source: BITRE estimates.

Other issues

Other issues that can impact on cotton transport arrangements, not covered in this overview, include the seasonal nature of cotton transport and inter-seasonal variability. As an annual summer crop, demand for cotton transport services peak from March to May. During this time, the cotton is picked and transported to gins for processing before being transported to ports for sale and export. Seasonal variation in cotton freight volumes also affects the nature of the cotton freight task. Cotton production varies from year to year depending on environmental factors such as drought. The estimates of cotton flows presented earlier are based on annual cotton lint production and exports in 2015–16 and do not take into account variation in demand for transport services and transport infrastructure capacity across different years or different parts of the year.

Concluding remarks

This *Freightline* issue attempts to provide information about cotton freight movements in Australia. The estimates presented in the paper are based on modelled cotton lint flows—from farm to export port — based on assumptions about the proximity of sites, transport costs and transport service availability. Consequently, the flows are indicative estimates of likely freight movements and may not reflect the actual modal pattern and volume of raw cotton movements. Nonetheless, these estimates are, as far as BITRE is aware, the most up-to-date publicly-available estimates of Australian cotton lint supply chain transport volumes.

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Abbreviations

tkm tonne kilometres (equivalent to one tonne moved one kilometre)

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