

The trade routes vital to Australia's economic security



DAVID UREN

MARCH 2024

Special Report

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Acknowledgements

The preparation of this study was assisted by the Bureau of Infrastructure and Transport Research Economics, the Australian Steel Association, Shipping Australia and discussions with representatives of several shipping lines and consultancies, for which the author expresses his thanks. The permission of VesselFinder.com to reproduce its maps of shipping routes is appreciated. The author expresses gratitude to all reviewers including ASPI staff, Lieutenant Commander Dr Mark Bailey, RAN, for his insights and review and to two anonymous external reviewers.

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Funding

No specific funding was received to produce this report.

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First published March 2024

Published in Australia by the Australian Strategic Policy Institute

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Executive summary

A recurrent theme in Australia's defence strategy has been our reliance on and need to defend Australia's trade routes in a globalised world. The vulnerability of Australia's limited stockpiles of critical goods and its concentrated sources of supply have driven military capability and planning for decades and remain a justification for strategic investments.

The 2023 Defence Strategic Review argued that the danger of any power threatening to invade the Australian continent was remote, but that an adversary could implement military coercion at a distance with threats against our trade and supply routes.¹ With limited resources and finite defence capability, yet vast interests at sea, it's important that Australian security and economic planning is trained on the most critical pain points in our sea lines of communication. Strategy and planning must derive from up-to-date and accurate data about what we trade, via which routes, and to and from which specific locations.

We also need to understand the factors that contribute to our resilience. They include the depth of supply options, the availability of alternative routes and the sheer strength in numbers which our shipping enjoys when it enters the mighty flow of commerce through the waters of our Asian trading partners. This report explores our trading routes in peace-time. Any conflict would bring sharper focus on what shipping and what trade is truly necessary and on what can be done to secure it. However, the strengths and vulnerabilities of our linkages to the world are evident now and are the focus of this report.

Concerns have been sharpened by the assaults by Houthi militias on commercial shipping through the Bab al-Mandab Strait at the entrance to the Red Sea and the Suez Canal, disrupting the 12% of global trade that passes through those waters.² In addition, drought has slashed the capacity of the Panama Canal, which in normal seasons handles a further 5% of world trade.³

Surprisingly, the course and operation (who is moving what) of Australia's trade routes has received extraordinarily little analysis. The last significant public paper on the topic was conducted by the Bureau of

Transport and Regional Economics (now the Bureau of Infrastructure and Transport Research Economics, BITRE) in 2007 and was based on data from 2001 to 2004.⁴ The profile of Australia's trade has changed radically since then. This report makes five key policy recommendations (see page 6) and the first of these is that the government fund BITRE to update its 2007 study of trade routes so that Defence can make assessments of how best to secure Australia's trade routes.

A dangerous combination of complacency and tolerance could be born of a view that conflicts are in faraway locations. The reality is that few saw either of the current wars as imminent when they started, and we mustn't make the same mistake in our region. A central finding in this report is that the greatest risk to the security of our trade routes lies relatively close to home, in the narrow channels through the Indonesian archipelago through which more than half Australia's maritime trade must pass. Another strong conclusion is that trade has a surprising resilience in the face of conflict: it is important to understand the sources of that strength and develop plans to maximise it.

This report is broken up into four main sections. The first section explains how the forces of globalisation have made trade so much more important to Australia and its defence. Australia has become the premier global supplier of minerals and energy; however, our manufacturing industry has contracted. Australia has become much more dependent on imports of consumer goods, industrial equipment, chemicals and basic materials. Both imports and exports are a much larger share of the Australian economy than they were in the 1980s and 1990s. As a result, defending trade routes has become a much higher priority.

The second section identifies Australia's key maritime trade routes and provides estimates of the flow of maritime trade through the main points of entry to Australian waters, which are principally the Indonesian archipelagic sea lanes and around the east coast of PNG (a detailed table on estimated trade flows is included as an appendix). This section identifies the choke-points, or narrow straits, where shipping would be most vulnerable in a conflict.

The third section examines the resilience of trade and the threats to it in the face of scenarios for conflict affecting Australia's trade routes. It notes that almost half Australia's maritime exports are to China and that it could be expected that this trade would cease in the event of a conflict between the United States and China. Among the scenarios is the idea of a distant blockade of China, in which the US would seek to interdict commercial shipping with China through the Indonesian archipelago. A significant share of world shipping could be diverted around the south of Australia in the event of routes through Indonesia connecting the Indian and Pacific oceans being closed.

The fourth section of the report examines how the risks to trade routes should be managed. While the emerging plans for Australia to develop a 'strategic fleet' would provide some security to coastal shipping, Australia would remain dependent on the global shipping industry to carry its international trade in any conflict. The depth of shipping supply varies across trade sectors, with particular vulnerabilities for the supply of the container shipping that carries the bulk of Australia's imports. This section canvasses steps the Australian government could take to help manage the risks to its trade routes, with contingency planning for shipping charters and providing war-risk insurance.

Appendix 1 in this report details the variety of routes taken by individual ships trading with Australia, using the navigational tool VesselFinder, which is based on the real-time monitoring signals from ships' Automatic Identification System (AIS) positioning. Appendix 2 outlines Australia's trade patterns during World War II, showing that trade continued, but not with regions controlled by adversaries. Appendix 3 presents detailed tables on the direction of Australia's maritime trade covered in section 2, spelling out the assumptions supporting the analysis.

Key findings and recommendations

This paper draws several key insights that offer an important dataset for military, economic and diplomatic strategy and planning:

- The sea lanes through the Indonesian archipelago are of the utmost importance both to Australia

and globally. They carry a large share of Australia's trade with North and Southeast Asia, as well as with Europe and the Middle East. In the absence of any official statistics, this study estimates that about two-thirds of Australia's maritime exports and 40% of our imports pass through Indonesia's archipelagic sea lanes. Including the Malacca Strait between Indonesia and Malaysia, they're vital globally as the main conduit between Asia in the east and Europe and the Middle East to the west.

- The entry points to the Indonesian sea lanes are obvious choke-points and are relatively close to the Australian mainland. China is highly dependent on the passage of shipping through those waters, so they could become the focus of a US blockade in any conflict between the two powers.
- The major alternative route to the Indonesian sea lanes is to the east of Papua New Guinea (PNG). This is the major route for trade from the east coast of Australia with North Asia—particularly Australia's imports of manufactured goods. In the event of any disruption to sea traffic through Indonesian waters, a significant share of global shipping with Asia would be diverted around the south of Australia, going north to the east of PNG.
- The South China Sea, which is often presented as a likely flashpoint for conflict between China and the US, is relatively easily avoided. Ships can travel through the Makassar Strait and to the east of the Philippines.
- There's evidence that trade is resilient to disruption. While the Houthi attacks on shipping through the Red Sea are adding to costs, and traffic through the Suez Canal has dropped by half, there's been little reduction in overall trade volumes as ships take alternative routes. Ukraine has similarly been successful in maintaining its trade through the Black Sea in the face of Russian threats and attacks.
- Trade can be expected to halt between adversaries and, in the event of any conflict between China and the US, that would have a huge global and Australian economic impact. However, World War II also showed trade continuing among allied countries in the face of German and Japanese threats to merchant shipping.

- In addition to the support provided by defence forces, the key factors providing resilience to trade are:
 - the availability of alternative routes
 - competition between shipping operators
 - the provision of war-risk insurance
 - a widely accepted legal framework governing international shipping.

Australia is a major global participant in the shipping of bulk commodities and liquefied natural gas, and competition for its business among shipping lines would continue in the face of significant disruption. The oil tanker business is also highly competitive, with alternative sources of the refined oil product supplies on which Australia depends.

The supply of container shipping could be more difficult in the face of conflict. There are fewer operators, and Australia is a high-cost destination, from which a large share of containers leave the country empty.

There's an emerging debate about the conversion of merchant vessels to military use. This makes it important for Australia to understand the nationality of the ships visiting Australian ports.

This report makes the following policy recommendations to the Australian Government.

1. As an immediate step, fund BITRE to update its 2007 study of trade routes to provide a firm empirical base from which Defence can make assessments of how best to secure Australia's trade routes. This should include the identification of the nationality of the ships carrying Australia's trade and the security of container shipping supply, particularly in the context of a crisis. In the event of a major international conflict, there would be a role for government in chartering the necessary shipping to meet essential needs.
2. Consider how and in what circumstances the government should or would support maritime war-risk insurance. The government should review the experience of other countries and potentially codify its intent to underwrite war-risk insurance for strategically important maritime shipping.

3. Commission a study to identify the consequences of disruption to Australia's shipping lanes for our trading partners, recognising the need for a sharper understanding of the strategic importance of Australia's exports to its key trading partners.
4. Examine whether the provisions of the *Defence Act 1903* for requisitioning commercial assets are fit for purpose in the 21st century and consider alternative contracting options. Defence could provide initial advice. Any review should encompass consideration of the workforce and personnel requirements to give effect to the powers under the Act.
5. Continue to support the international rules-based order by consistently calling out breaches of international law of the sea (under the UN Convention on the Law of the Sea, UNCLOS) to ensure that the norms and rules that have served our supply so well since World War II are not undermined.

The importance of trade

Australia's maritime connections with the region and the world are intrinsic to our way of life and welfare. The question of how we would live without them seems unanswerable, so dependent on trade have we become. And yet the lesson of history is that the interdiction of maritime commerce is a standard geostrategic weapon, and Russia's current blockade of Ukrainian shipping in the Black Sea and the Houthi militia's assaults on shipping through the Red Sea are live examples.

The 2023 Defence Strategic Review noted that Australia's economy had become more interconnected with the world over recent decades of globalisation and growth. It continued:

This means Australia has a fundamental interest in protecting our connection to the world and in the global rules-based order upon which international trade depends.

While there is at present only a remote possibility of any power contemplating an invasion of our continent, the threat of the use of military force or coercion against Australia does not require invasion. More countries are able to project combat power across greater ranges, including against our trade and supply routes, which are vital for Australia's economic prosperity.⁵

Defence Minister Richard Marles commented that trade had become a larger proportion of Australia's economy and its national wealth:

What that means is our national security is as much defined by the maintenance of the rules of the road and by the collective security of the region, as it is the continent and the border of the continent.

A lot of damage can be done to Australia without anyone ever having to set foot upon our shore, so national security lies much further from Australia.⁶

In an address to parliament, Marles cited the example of energy:

In the 1990s, we had eight oil refineries which were producing most of our liquid fuel needs on shore.

Today, we have just two. Most of our liquid fuels we import. Indeed, most of what we use we import from one country: Singapore.

One doesn't have to think hard to see what the impact would be if just this one trade route was disrupted by an adversary.⁷

In the 1980s, before the forces of globalisation gathered strength, Australia's defence planners were confident in Australia's ability to withstand any blockage to our merchandise trade. The 1987 Defence White Paper, prepared when Kim Beazley was Defence Minister and articulating a strategy of 'self-reliance', commented that 'Australia enjoys a high degree of economic self-sufficiency. We are a net exporter of energy and self-sufficient in food,' it said, going on to note:

Australia could survive significant disruption of overseas trade in the event of global war, though at a cost to our standard of living. Most of the essential needs of the civil community could be met without external supply if appropriate measures of conservation and rationing were introduced.

Those essential items that are imported (including defence equipment and spare parts, industrial machinery, transport equipment, lubricants and rubber) could be stockpiled or alternative sources arranged—even if at higher cost—if there is any change in our current judgement about the remote prospect of global conflict.⁸

Globalisation's influence

Globalisation has transformed the nature and intensity of Australia's connections to the world. The resources sector has risen in importance, as Australia has become the biggest single supplier of resources and energy to the world.

At the same time, domestic manufacturing has contracted with the closure of many industries, from motor vehicles, whitegoods, clothing, textiles and footwear through to basic materials such as stainless steel and flat aluminium. Instead, Australia has become

reliant on manufactured imports. World Bank statistics show that manufacturing produced just 5.6% of Australia's GDP in 2020, ranking it 147th among the 219 nations for which the bank has data.⁹

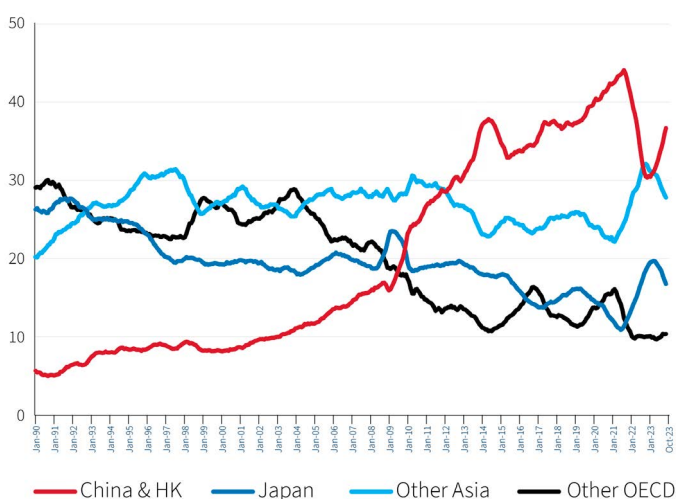
An Australia Institute report found that Australia had the lowest self-sufficiency in manufacturing in the Organisation for Economic Co-operation and Development.¹⁰ Imports supplied almost half of domestic consumption of manufactured goods and were 2.8 times higher than manufacturing exports, placing Australia at the bottom of advanced-country rankings.

Both imports and exports have risen in their importance to the economy. In 1990, just 11% of total domestic demand was supplied by imports. By 2020, that was up to 22%, reflecting the loss of domestic manufacturing capacity and the increased range of imported goods.¹¹ The resources and agriculture sectors have always relied on export markets. In 1990, exports accounted for 19% of Australian economic activity. By 2020, that was up to 32%, reflecting the impact of the resources boom and the rise of China.

New patterns of trade

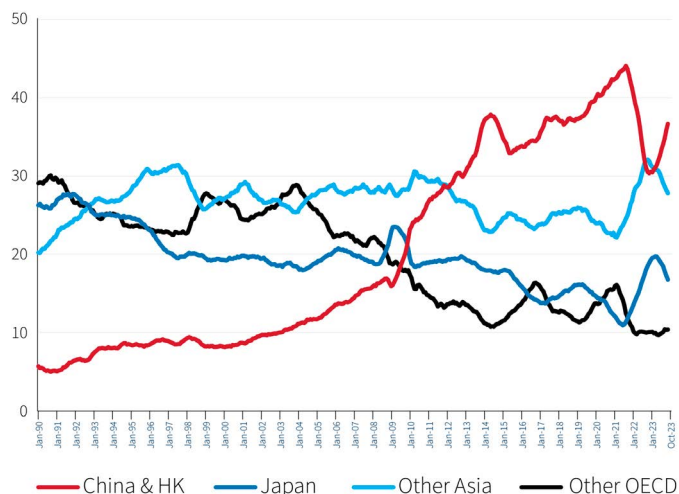
Globalisation has transformed the patterns of Australia's trade (figures 1 and 2). The growth of China's share relative to Japan, the US and Europe has been dramatic.

Figure 1: Australia's exports (%)



Source: Australian Bureau of Statistics.

Figure 2: Australia's imports (%)



Source: Australian Bureau of Statistics.

In 1990, China took just 5% of Australia's exports, about the same as New Zealand. By 2020, China was taking an astonishing 42% of Australia's merchandise exports: a higher share than any other nation since the 'mother country' of the UK in the late 1930s. Australia is also important in China's trade profile, ranking fourth as a supplier, just behind Korea, Japan and the US.¹²

Japan drove the growth of Australia's iron ore and coal industries and was, in 1990, by far those sectors' greatest market, taking 26% of all exports. By 2020, its share of Australia's exports had collapsed to just 12%. Europe and the US have also dropped away, as their share of merchandise exports has fallen from 30% to 10%.

Australia's imports have also undergone a radical transformation in trade patterns. In 1990, more than half of our imports came from the US and Europe. By 2020, that share was down to a third. Japan's share dropped from 20% to just 6%. Again, it was the growth of China as the manufacturer to the world that forced those changes. Its share of Australia's imports rose from 4% in 1990 to 29% over three decades. ASEAN nations also became much more important, as their share has risen from 6% to 15%.

Australia's maritime trade routes

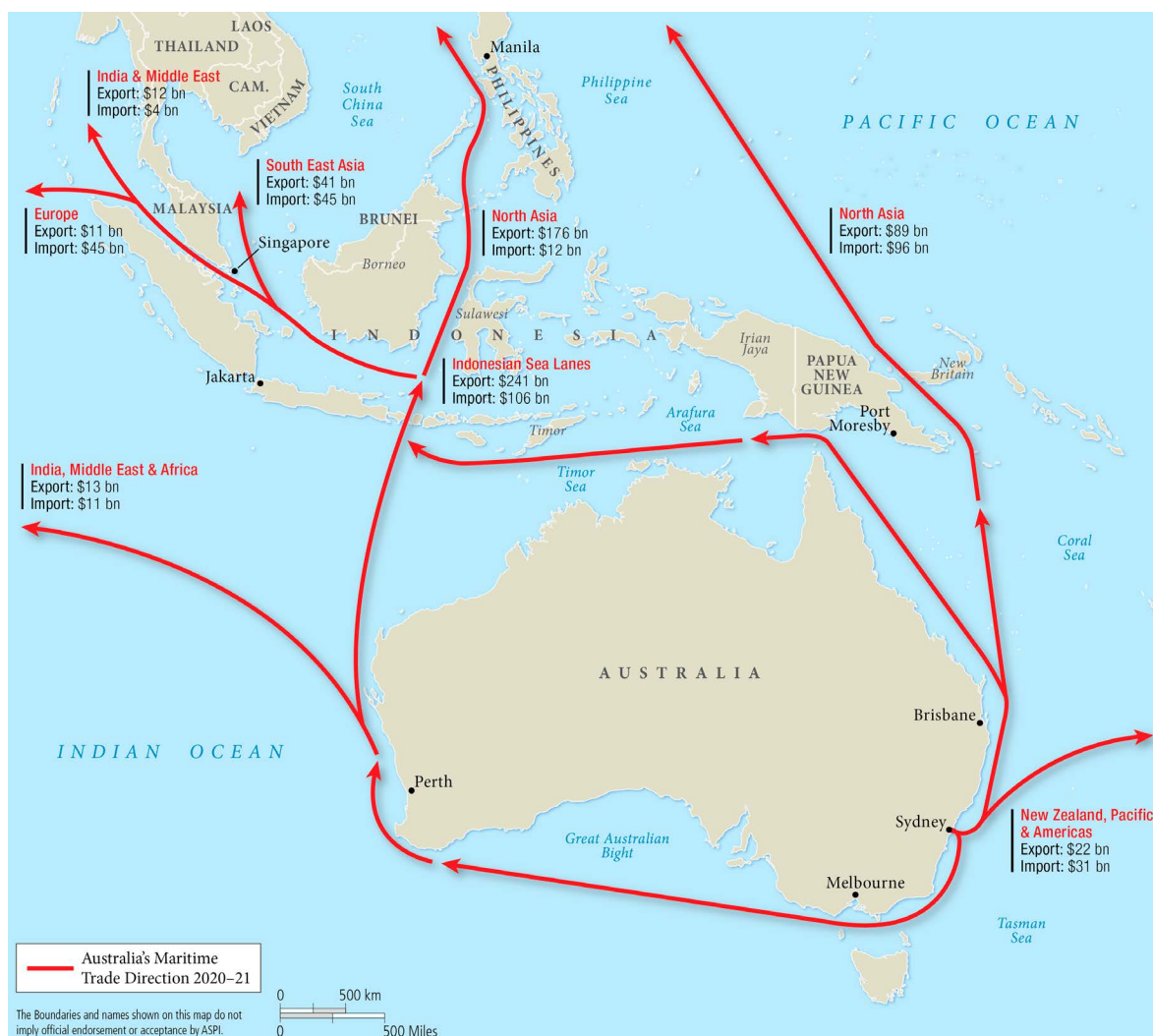
The changes in the direction of Australia's trade have greatly increased the importance of the shipping routes to Asia. Virtually the entirety of Australia's iron ore exports along with most of the west coast liquefied natural gas (LNG) passes through the narrow passage between Indonesia's Lombok and Bali islands, just 1,300 kilometres northwest of Karratha. The Sunda Strait, between Java and Sumatra, is heavily used by container and vehicle carrier ships to Australia and is less than 2,000 kilometres from the northwest coast. Ships carrying Australia's trade between the east coast and North Asia all pass the eastern tip of Papua New Guinea (PNG), just 930 kilometres from Cape York.

Any discussion of the defence of Australia's trade routes must acknowledge the fact that 48% of our maritime exports and 30% of our maritime imports by value are

with China.¹³ Any conflict in which Australia and China found themselves on opposite sides would cause enormous damage to the trade of both countries, regardless of threats to shipping.¹⁴ A further 35% of maritime exports and 32% of imports are with other nations in North and Southeast Asia.¹⁵

A complete description of the main sea routes used in Australian trade was provided by the Bureau of Infrastructure, Transport and Research Economics (BITRE) in 2007; however, it hasn't updated its analysis, and the composition of trade has shifted significantly since the 2004–05 scope of that work (Figure 3).¹⁶ That study identified the number of inward and outward ship movements across Australia's 10 main trade routes, further breaking down the kinds of shipping and the value and tonnage of their cargo on each route.

Figure 3: Australia's maritime trade directions, 2020–21



Source: BITRE and ASPI estimates (see Appendix 3).

As an approximation, both maritime exports and imports from the Australian east coast to China, Korea, Japan and Taiwan mostly travel past the east coast of PNG and through the South Pacific. Some imports from North Asia are transhipped in Southeast Asia, where containers are unloaded from large container ships in Singapore or Malaysia and then loaded on to smaller ships servicing Australia and New Zealand rather than being shipped directly from North Asia.

In 2020–21, about a quarter of Australia’s maritime exports by value and 40% of our imports took that route, east of PNG. That includes the export of coal and LNG from Queensland and NSW as well as the large flow of container shipping bringing imports to the eastern seaboard. The assumptions supporting this analysis are detailed in Appendix 3.

East coast trade with Southeast Asia, India, Europe and the Middle East travels through the Torres Strait and then through the Indonesian archipelago. The exception is ships with drafts too deep to transit the shallow Torres Strait: they can either go south around the Great Australian Bight or follow an ‘S’ bend course, north of PNG and then west past Borneo before heading south again to go through the Malacca Strait into the Indian Ocean. This is the route taken by many ships carrying coal from the east coast to India.

There are also some container ships from North Asia that do a loop from hub ports such as Taiwan’s Kaohsiung, coming south around the east of PNG, calling at Brisbane, Sydney and Melbourne, before heading west to Fremantle and north again through Indonesian waters.

About 90% of Western Australia’s trade goes through Indonesian waters, whether to North Asia or Southeast Asia. The iron ore and LNG exports pass through the Lombok Strait, while smaller bulk carriers and container ships go through the Sunda Strait, which has depth limitations. LNG from the Northern Territory also goes through Indonesian waters, passing close to Irian Jaya.

This results in about two-thirds of Australia’s exports by value and a little over 40% of its imports by value travelling through the Indonesian archipelago. About 6% of exports go east across the Pacific Ocean to

New Zealand, the Pacific islands and North or South America, while about 13% of imports come from the east. Only about 4% of Australia’s maritime trade travels west across the Indian Ocean without going through Indonesian waters, bound for India, the Middle East or the Suez Canal.

Of the Australian exports that enter Indonesian waters, about 73% are headed for North Asia (principally iron ore and LNG), while 17% have destinations in Southeast Asia, and 10% are en route for India, the Middle East or Europe.

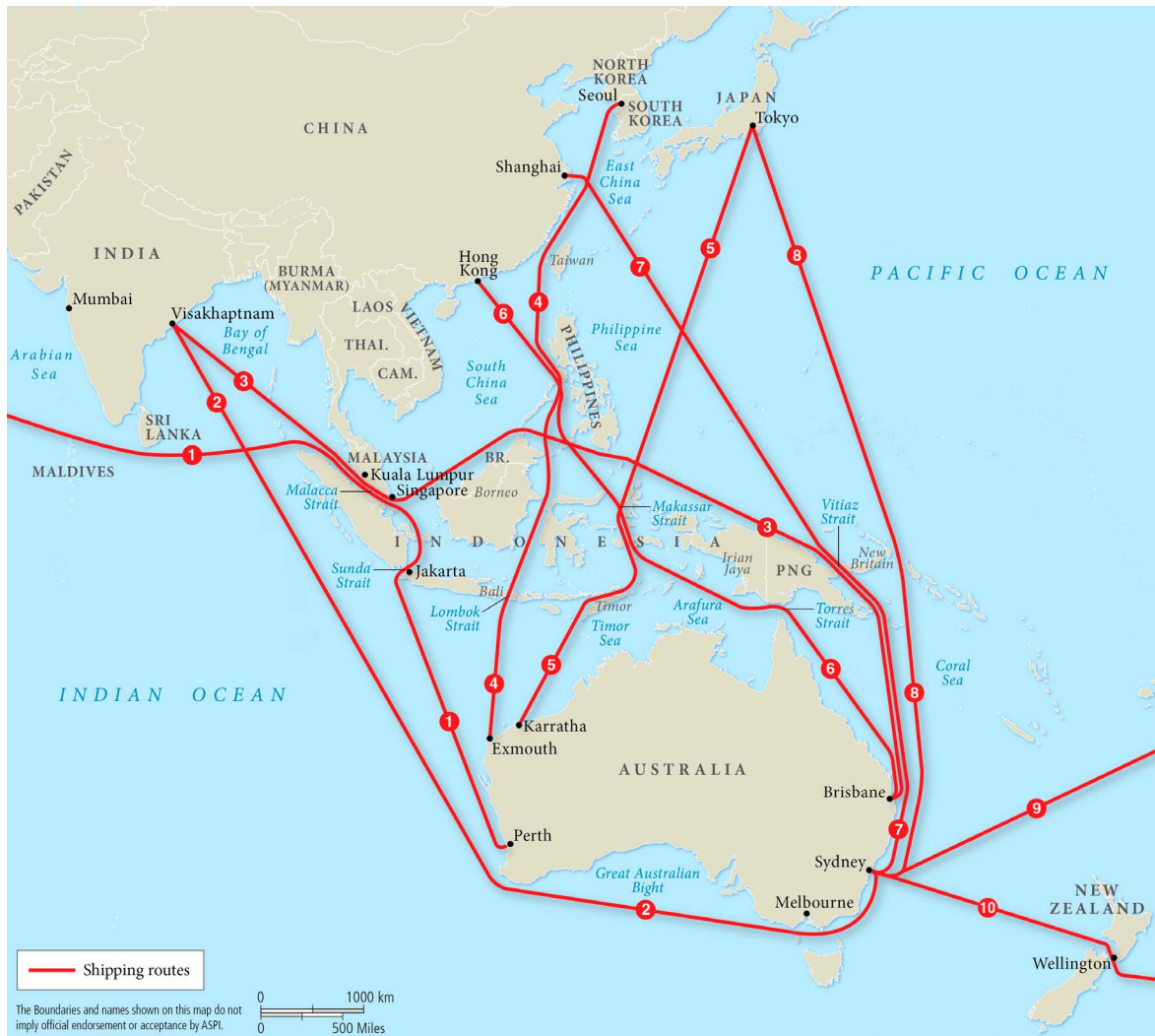
Among the imports coming through the Indonesian straits, about 11% come from North Asia, and a little over 40% from each of Southeast Asia and Europe.

Australia’s key sea lanes

Australia’s sea lanes start at its ports. Australia developed from 1820 as six economic catchments around deepwater ports. The port of Botany Bay handles almost the entirety of container imports into NSW. The port of Melbourne similarly supplies both Victoria and much of Tasmania. The port of Newcastle ships NSW’s coal, Hay Point and Gladstone ship Queensland’s coal and LNG, and Port Hedland and Port Dampier in the Pilbara ship most of the iron ore. Ports Australia lists 41 trading ports; however, the top 10 ports handle 78% of seaborne exports and 95% of imports.

The route for every ship voyage is determined by the operator and the ship’s captain, based primarily on the cheapest and quickest safe route between the origin and destination of the cargo. This presentation of Australia’s key sea routes is drawn from an analysis of routes taken by individual ships travelling in Australian waters in September and October 2023, as tracked by the maritime data firm, VesselFinder.com (Figure 4). The VesselFinder data is drawn from the real-time monitoring signals from ships’ Automatic Identification System (AIS) positioning. A series of individual example routes for container, bulk carrier, LNG, vehicle carrier, oil tanker and ‘break-bulk’ (general cargo) ships is included in Appendix 1.

Figure 4: Australia's shipping routes



1. To Europe via the Suez Canal, passing Malacca Strait
2. To India across the Great Australian Bight and Indian Ocean
3. Coal ships for India that are too large for the Torres Strait
4. LNG / iron ore to China, Taiwan and Korea through Makassar Strait and the South China Sea
5. Similar route to Japan, keeping east of Sulawesi and Philippines
6. To Southeast Asia and Hong Kong through the Torres Strait and past Irian Jaya
7. Main route between China and eastern Australia through Vitiaz Strait between PNG and New Britain
8. Route from eastern Australia to Japan, east of New Britain
9. To the US west coast
10. To New Zealand and the Panama Canal

Route origins and destinations are illustrative. Ships on routes 2 and 3 are likely to be coal carriers from Newcastle and Gladstone, respectively, and may have Indian port destinations other than Visakhapatnam. Similarly, North Asian routes 4, 5 and 7 may have multiple pick-up and drop-off ports in China, Taiwan, Korea and Japan as well as Australian ports, including Melbourne and Adelaide.

East of PNG and through the South Pacific

The route to the east of PNG (Route 7 in Figure 4) is taken by ships travelling between north Asian ports and the eastern Australian coast. Ships travelling to or from Taiwan and the southern Chinese ports mostly use the deepwater passages along the eastern coast of PNG, passing through the 250-metre-deep Jomard passage,

then the 50-kilometre-wide (and 2-kilometre-deep) Vitiaz Strait between mainland PNG and New Britain and then into the Bismarck Sea.

Ships travelling further north to Japan and the northern Chinese ports pass to the east of New Britain (Route 8) between it and the west of Bougainville Island, and into the South Pacific. In both cases, ships have a clear

3,000-nautical-mile (5,500-kilometre) run northwest through the Pacific once they pass PNG before they enter the heavily trafficked waters of North Asia. Ships trading with Australia and New Zealand are the only traffic on that northwest route. Geopolitically, it's an uncomplicated route, with many alternatives.

Indonesian archipelagic sea lanes

The geography of the north–south routes through the Indonesian archipelago and then to the Java Sea or further to the South China Sea is complex. The two most important options are the Sunda Strait, between Sumatra and Java, and the Lombok Strait, east of Java, which runs between the islands of Lombok and Bali. Further east again, there are several routes to both the east and west of Timor.

The route through the Lombok Strait, with a minimum depth of 250 metres, is taken by the iron ore carriers and LNG tankers from the Australian west coast heading to North Asia (Route 4 in Figure 4). Ships then enter the very deep eastern Java Sea and can take a deepwater passage through the Makassar Strait, Celebes Sea and Sulu Sea and then via the Mindoro Strait into the deep northern part of the South China Sea.

The Sunda Strait is the favoured route for tankers and container shipping from Southeast Asia or from the Middle East or Europe (Route 1). It's also used for bulk shipping to Southeast Asia; however, it's limited by its minimum depth of 20 metres, which means that deep-draft ships can't use it. At its narrowest, it's 24 kilometres wide. Sandbanks and strong tidal flows make navigation difficult.¹⁷ Ships head across the shallow west Java Sea to the equally shallow Karimata Strait, which separates the Indonesian islands of Belitung to the west and Borneo to the east. They then head north to the shallow southern half of the South China Sea.

There are then a series of deepwater passages closer to Timor, which ships will often use if travelling through the Torres Strait to the east coast of Australia (Route 6). The Ombai and Wetar straits are deep waters between the north coast of Timor and its Alor and Wetar islands. LNG ships heading from Karratha to Japan (Route 5) use those waters, passing northwest of Timor and through the Makassar Strait into the Philippine Sea. As well as providing a clear east–west channel for ships travelling past the Torres Strait, they also serve as an alternative (although considerably longer distance) route to the Lombok, Sunda and Malacca straits for ships travelling between the Indian and Pacific oceans.

Figure 5: Indonesian archipelagic sea lanes



Source: BITRE.

Many container ships from Southeast Asia and as far north as Hong Kong travel to Australia through the South China Sea, passing close to the western tip of Irian Jaya (Route 6) before heading through the Torres Strait.

The north–south routes through Indonesia have been designated as archipelagic sea lanes (ASL) under the United Nations Convention on the Law of the Sea (UNCLOS; Figure 5). Sunda Strait is ASL I, Lombok is ASL II, and the north–south routes near Timor are ASL III. This designation provides for unhindered passage for both civil and military ships (and aircraft following the same routes). Submarines may travel through these sea lanes submerged, and the right to do so can't be suspended.

Australia sought to have the east–west routes also designated as archipelagic sea lanes, but that was opposed by Indonesia and was unsuccessful. In these waters, there's a right of 'innocent passage,' which means that both merchant and naval ships may freely transit; however, the right can be suspended should national security demand it. Submarines can travel only on the surface, showing their flags.

Both the Lombok and Sunda straits are used extensively by non-Australian traffic. Brazilian iron ore heading for China uses the Lombok Strait, having travelled around southern Africa, while large oil tankers greater than 230,000 deadweight tonnage (DWT), which are too big for the Malacca Strait, also use Lombok as their entry point to Asian ports.

The Malacca Strait

The Malacca Strait, between Indonesia and Malaysia, is the main conduit between Asia, the Middle East and on to Europe, making it one of the world's busiest sea lanes. It carries more than 80,000 ships a year and stretches for about 800 kilometres. It's 250 kilometres wide at the northwest entrance, narrowing to about 16 kilometres at Singapore.

The strait's used for Australian trade from the east and west coasts with Europe and the Middle East (Route 1 in Figure 4). In addition to direct trade, container trade operates from a hub at Singapore. A portion of container trade to Australia is transhipped at ports in Malaysia or Singapore into smaller ships heading for Australia. Australian imports of refined petroleum products from

Singapore and Chinese refineries are also processed from crude oil from the Middle East, most of which transits the Malacca Strait.

Ships carrying coal from Queensland to India travel a long 'S' bend route that takes them east of PNG, then west along its north coast before heading south past the west coast of Borneo, through the Malacca Strait and on into the Indian Ocean (Route 3).

The strait is relatively shallow, with a minimum depth of 23 metres. Ships have been designed to maximise the load that can be carried through the strait; for example, the 'Malaccamax' tanker design has a maximum draft of 20.5 metres (and about 300,000 DWT). Larger and deeper ships from the Middle East use the Lombok Strait to get to Asian ports, rather than the Malacca Strait.

With overlapping jurisdictions from Indonesia, Malaysia, and Singapore, the Malacca Strait is designated a 'transit' sea lane, which means that there's a right, which can't be suspended, to transit. Submarines may travel submerged (a physical impossibility in some parts of the strait), and overflight is permitted.

The Makassar Strait

Running between Indonesia's Kalimantan (Borneo) and Sulawesi islands, the Makassar Strait is the entry point to the South China Sea used by ships carrying Australia's bulk exports to North Asia (Route 4). It has a minimum width of 130 kilometres and is a deepwater passage.

The Torres Strait

The Torres Strait, between the north of Australia and PNG, is used for trade with the Australian east coast that's travelling to or from Southeast Asia, Europe or the Middle East (Route 6). It would also be a potential detour should the Indonesian archipelagic sea lanes be blocked for any reason. However, the Torres Strait is shallow and has many reefs. The maximum draft is 12.5 metres at high tide. In practice, that limits the size of ships using this route to around 100,000 DWT. Larger ships trading between the east coast of Australia and Southeast Asia must either travel around the south of Australia or north of PNG and Borneo and then back down. Australia requires that ships transiting the strait are guided by a pilot. About 3,200 ships, including both international and coastal traders, are guided through the strait each year.

Other routes

Shipping between Europe and Australia has the choice of going through the Suez Canal or going around the Cape of Good Hope at the southern tip of the African continent. Ships using the Suez Canal would typically travel through the Malacca Strait (Route 1 in Figure 4), while those going to the south of Africa simply cross the Indian Ocean. The latter route is longer (although only by about 1,500 kilometres) and is mainly used by large bulk carriers, typically carrying coal, or by ships, such as vehicle carriers, making port calls in South Africa. This route is much shorter for ships travelling across southern latitudes to Australia than for ships rounding the Cape of Good Hope and then heading north, back across the equator to Asia.

The Suez Canal's tolls are high, and it has size limitations, allowing a maximum draft of between 18 and 20 metres, depending upon the beam (width) of the vessel. Until the assaults by Iran-affiliated militia groups in late 2023, approximately 3.5% of Australia's exports and 18% of our imports travelling by sea traversed the Red Sea, and most went through the Suez Canal.

The Middle East region accounts for 2.1% of Australia's maritime exports and 1.9% of its imports. Australia's trade with the Middle East goes through either the Red Sea or the Persian Gulf. The United Arab Emirates, on the Persian Gulf, is by far Australia's largest trading partner in the region. However, the low percentage of direct trade understates the importance of the Middle East, which is the principal supplier of crude oil to the Asian refineries, from which Australia imports refined oil products.

To the east and across the Pacific, ships head to New Zealand (Route 10 in Figure 4), and some travel further to Pacific islands and the US. If bound for the US east coast, the preferred transit is through the Panama Canal; however, tolls, congestion and extended waiting times add costs and lead some ships to take a long route through the Drake Passage south of Cape Horn.

If bound for the US west coast, ships will travel further north past New Caledonia (Route 9). Some bulk ships trading between the east coast of the US and the west coast of Australia cross both the Indian and the Atlantic oceans, going around the Cape of Good Hope and stopping in Cape Town along the way. North America

accounts for 2.9% of Australia's maritime exports by value and 9.4% of our imports. Based on detailed port-to-port statistics for July 2023, at least 45% of maritime exports to the US and 55% of imports are traded with US east coast ports and use the Panama Canal.¹⁸ About 20% of Australia's trade with the US is transhipped in third countries, making it impossible to tell which US port is involved.

North Asian shipping zones

Once shipping from Australia passes into Indonesian waters and beyond into the South China Sea or, for those ships travelling east of PNG, the seas of North Asia, they enter some of the world's busiest shipping zones. Data from the United Nations Conference on Trade and Development (UNCTAD) reveals that, in aggregate, Asian ports account for 35% of all goods loaded onto ships worldwide and 50% of all goods discharged.¹⁹ About half of all container ships' port calls are in Asia, along with 41% of oil tanker calls and 45% of dry-bulk shipping calls.

An analysis by the Center for Strategic and International Studies found that about 21% of the world's trade passes through the South China Sea, including 64% of China's trade and 42% of Japan's maritime trade.²⁰

Australia's bulk exports—iron ore, coal and LNG—are significant amid the dense shipping traffic, as Australia accounts for more than half the iron ore supplied to China, Japan, Taiwan and Korea. It's the largest supplier of coal to all of those countries except China and the largest supplier of LNG.

However, Australia's imports from both North and Southeast Asia form only a very small portion of the maritime traffic in these busy waters, as many containers destined for Australia are carried on ships with other destinations as well. The intensity of the North Asian shipping lanes received focus during the tensions between China and Taiwan when former US House of Representatives Speaker Nancy Pelosi visited the island in August 2022. *Bloomberg* estimated that 48% of the world's container ships had transited the Taiwan Strait in the previous seven months, while 88% of the largest container ships (the largest 10% of the world container shipping fleet) had done so. Ships carrying 1 million barrels of oil travel the strait every day (Figure 6).²¹

Figure 6: Container vessel positions on 2 August 2022



Note: The largest 10% of the fleet by DWT is in blue.
Sources: IHS Markit, Genscape. Bloomberg.

China asserts that the South China Sea is its sovereign territory within what it refers to as the ‘nine-dash line’, which tracks islands and rocks around the sea’s perimeter (Figure 7). The claim was rejected in 2016 by an arbitral tribunal established under UNCLOS, but China hasn’t recognised that judgement. In practice, the South China Sea is crowded with navigational hazards.

This, and the need to seek the shortest route, mean that ships trading with Australia and passing through the South China Sea generally hug the west coast of the

Philippines and Borneo (routes 4 and 6 in Figure 4). It’s the shortest route and also tends to keep them out of the waters claimed by China.

Ships travelling to North Asia have the option of travelling through the Makassar Strait, between Borneo and Sulawesi, and then heading east of the Philippines, avoiding the South China Sea altogether (Route 5). It’s a route used by bulk carriers taking bauxite from the Northern Territory to North Asia and by many LNG tankers, and is the obvious option should the South China Sea ever become a conflict zone.

Figure 7: China’s ‘nine-dash line’



The resilience of trade and alternative routes

Trade is resilient. History shows that maritime commerce can be maintained in the face of great disruption. Shipowners are constantly seeking to move goods along routes that minimise cost, time, distance and risk. If frustrated along one path, they'll seek the next most efficient. If covered by insurance, shipowners will take significant risks, such as sailing through conflict zones.

After Russia reneged on a UN-brokered deal to allow Ukrainian grain shipments through the Black Sea in July 2023, the Ukrainian Government encouraged ships to follow a new route that hugs Ukraine's coast and then the coasts of Romania, Bulgaria and Turkey until they reach the Bosphorus.

Russia warned that any merchant ship travelling to or from Ukraine would be considered a target, and several ships have been hit by Russian missiles and mines.

However, supported by Ukraine's defences and the provision of war-risk insurance subsidised by the UK Government, Ukraine shipped 4.8 million tonnes of grain through the new corridor in December, exceeding the maximum shipments managed through the former UN corridor. A further 2.2 million tonnes of metallurgical products was also exported.²²

Assaults by Houthi militias on shipping passing through the 30-kilometre-wide Bab al-Mandab Strait at the mouth of the Red Sea since October 2023 have led to a significant rerouting of trade between Europe / the US and Asia. The volume of shipping traversing the Suez Canal has dropped from about 5 million tonnes a week to 2.5 million tonnes, while the volume going around the Cape of Good Hope has risen from 4.5 million tonnes to 7 million tonnes. Shipping companies have made their assessments of risk and the relative costs of insurance and a detour of 8,000 kilometres and an additional 6–15 days in travel time. Several hundred ships a week are continuing to traverse the Suez Canal, with the support of a taskforce led by the US Navy.

The most severe attack on merchant shipping since World War II was the so-called 'tanker war' between Iraq and Iran from 1984 to 1988. Although 239 tankers were

attacked and 55 sunk, less than 2% of oil supplies from the Persian Gulf were disrupted, according to analysis by the Strauss Institute at the University of Texas.²³ Tankers continued to traverse the Hormuz Strait between Iran and the Arabian Peninsula, which is only 55 kilometres wide at its narrowest. The waters were mined, and ships were attacked by rockets and helicopters. There was no alternative route to the Persian Gulf ports, apart from a cross-country pipeline built by Saudi Arabia taking oil to the Red Sea coast.

A submission from the industry lobby group Shipping Australia to the Productivity Commission's 2021 inquiry into supply-chain vulnerabilities made the following observation:

The world's sea spaces are vast. The routes around the sea are legion. No one power, or group of powers, has any hope of blocking all, or any discernible fraction of, Australia's sea routes. And even if an incident or an enemy actor did so block a route, ship operators and crews have repeatedly proven they are willing to take the risk (for a fee) and have successfully carried out large numbers of shipping operations despite being attacked.²⁴

And so it comes down to a question of cost. Shipping routes aren't railway lines on the ocean; they're the lowest cost route between the origin and destination. The moment that hostilities commence, insurance costs soar, and alternative routes are used. Maritime trade is a complex system with no central control, but thousands of individual shipping operators making their own decisions about how best to make money carrying goods across the oceans.

The survival of the oil trade in the Persian Gulf during the tanker war highlights the difficulty in stopping ships, even in narrow straits; however, it can be assumed that a determined major naval power could do so.

Conflict scenarios

Rather than blockading trade routes, an adversary that wanted to single out Australia could more readily and cheaply block our major ports by low-cost, low-risk, high-return asymmetric means. China's People's Liberation Army Navy is known to have studied the effectiveness of World War I and World War II disguised merchant raider-minelayers, and Australia has a very low level of mine countermeasure capability against even a World War II-level attack.

In 2017, an iron ore carrier grounded in the mouth of the channel to Weipa. Before it was successfully refloated, there was concern that it would break apart and sink in the channel, potentially blocking iron ore exports for months.²⁵ Access to ports such as Melbourne, Botany Bay and Newcastle could be readily blocked.

Most hypothetical conflict scenarios in the waters to Australia's north involve the US and China and result from either the escalation of an accidental clash in the South China Sea or a Chinese invasion of Taiwan. The moments of greatest maritime tension since World War II have involved Indonesia, during both the Indonesia–Malaysia confrontation in 1964 and the East Timor crisis of 1999.

In 1964, during a conflict known as 'the Confrontation', Indonesia militarily opposed British plans to form an independent Malaysian Republic. The British sent an aircraft carrier supported by several destroyers to Australia, sailing through Indonesia's Sunda Strait. Indonesia then refused permission for a return voyage through the strait, which the British saw as international waters. After a brief stand-off, both sides compromised, and the British warships were allowed to travel through the Lombok Strait.

During the East Timor crisis, the UN's International Force East Timor (INTERFET), which Australia led, required passage through Indonesian waters to insert and resupply troops in East Timor. The concept of 'archipelagic sea lanes' had been formalised under UNCLOS only in the previous year. It gave right of passage to naval vessels; however, the extent of that right was still the subject of debate, and there was

some concern about what would happen should INTERFET forces seek to board Indonesian vessels amid ultimately unfounded rumours that civilians were being forcibly evacuated.²⁶

Neither of those episodes disturbed the passage of merchant shipping, but both highlighted Indonesia's sensitivity to military activity involving passage through its territorial waters.

The economic consequences of blockades

The most comprehensive modelling of the potential economic consequences of a conflict between the US and China was conducted by RAND Corporation analysts in 2016.²⁷ They assumed that the Western Pacific became a war zone, bringing a sharp reduction in merchant shipping, even without a US-imposed blockade. China's trade within the region would, they assessed, fall by 80%, and its global trade would fall by 50%. Chinese trade with the US would halt, while much of the Western Pacific, from the Yellow Sea to the South China Sea, would become hazardous to commercial sea and air transport.

A 2020 study by two academics, Kerem Cosar and Benjamin Thomas, and published by the US National Bureau of Economic Research attempted to measure the economic impact of a conflict that closed both the South China Sea and the east–west archipelagic sea lanes of Indonesia to merchant shipping altogether.²⁸ It postulated that all shipping that currently passes through the Malacca Strait would be rerouted around the south of Australia, adding about 10,000 kilometres to a trip to North Asia. Shipping between the US west coast and India, which currently travels through the Malacca Strait, would similarly be redirected south of Australia.

The study said that the Torres Strait wasn't a viable alternative for a high volume of shipping. It looked only at the effect of lower trade resulting from higher shipping costs or, in the case of the nine countries within the conflict zone, the absolute cessation of maritime trade. The impact of additional shipping costs would

be small compared with the fallout from the loss of essential supplies to a modern economy. The study estimated that Taiwan would suffer a 33% fall in its economy, Singapore 22% and Indonesia 5.6%. For Australia, the fall in GDP would be 1.9%, while for China it would be only 0.7%.

Other research has put the full cost of a conflict between the US and China over Taiwan far higher. For example, modelling by Bloomberg Economics estimated a 10% fall in global GDP in the first year, with China suffering a 20% fall.²⁹ The point of the Cosar–Thomas study for this paper is that it measured the impact on shipping costs for bilateral trade among 51 nations, finding that it would be relatively contained. Even in the event of a catastrophic closure of world’s busiest sea lanes, there are alternative routes.

The idea of a significant share of the world’s shipping, including the bulk ships carrying Australian iron ore, being diverted around the south of Australia to reach Asia by travelling east of PNG may sound extreme. However, that route is broadly similar in length to the detour that ships confront when avoiding the Red Sea by travelling around the Cape of Good Hope to Asia or when they can’t get timely passage through the Panama Canal and are forced to travel around Cape Horn at the southern tip of Chile. Guaranteed passage through the Panama Canal requires booking a five-day window, sometimes several months in advance, which is impractical for some cargoes. The wait time for unreserved spots can blow out to many weeks, as has been the case over the past year when severe drought halved the daily passages of ships through the canal.

Ships travelling to North Asia using routes to the east of PNG to North Asia would be exposed to some level of attack in a widespread war, but it would be much lower than along the closer routes through Indonesia. Once past PNG, ships are in the open sea. While ships could avoid transit through the Indonesian archipelago and the South China Sea by travelling to the east of PNG, the survival of trade with other North Asian partners—Japan, Korea and Taiwan—would depend on the intensity of the conflict in the East China Sea and the Pacific.

As discussed above, although the majority of Australia’s trade travels through the Indonesian archipelago, most is headed for North Asia, which is much more important both as a market for exports and as a source of imports than the Southeast Asian nations. For the North Asian nations, the east PNG route, whether accessed by the Torres Strait or by going around the south of Australia, provides an alternative to the Indonesian sea lanes.

However, the cost would be more than just the additional distance. Australia’s bulk exports to North Asia, including LNG, essentially operate as a conveyor belt to feed steel mills and power stations. If the length of the trip is extended without additional ships, the flow of raw materials is reduced. It has been a source of strategic concern in Japan that it wouldn’t have sufficient LNG ships to maintain the required flow to its power stations in the event of disruption to the Indonesian trade routes. LNG can’t be stored long-term.

While the Australian Defence organisation’s concern is understandably the potential consequences of the disruption of sea commerce for Australia, the consequences for our trading partners should be better understood. Japanese officials have expressed frustration that Australia doesn’t seem to appreciate the criticality of its LNG supplies for the Japanese economy when framing domestic climate policy or managing industrial relations. The government should commission a study of the strategic importance of Australian exports to our principal trade partners.

There’s research showing that trade sometimes continues among belligerents in a war, for example between India and Pakistan in the first Kashmir war (1947–49), between Yugoslavia and Croatia in the war of Bosnian independence (1992) and, most notably, between the UK and Germany in the opening years of World War I.³⁰

However, the expected pattern is for trade to cease between warring nations. As demonstrated in Appendix 2, during World War II, Australia’s trade with Japan and the nations it occupied ceased, as was the case for Australia’s trade with continental Europe under German occupation. However, trade with the UK and the US and with allied nations such as Canada, India and New Zealand continued, despite the risks to shipping.

At the peak of the conflict in 1942–43, exports were only slightly below pre-war levels, while imports had more than doubled.

In the event of a conflict between China and the US, it can be assumed that Australia's maritime trade with China would cease as a result of government orders on both sides. In 2021–22 (when China had extensive trade bans on Australian exports), that represented 48% of Australia's maritime exports and 30% of our imports.

³¹ It's also likely that Chinese shipping would cease servicing Australian trade (or that of the US and other allied nations). China is a major force in world shipping. According to UNCTAD, Chinese and Hong Kong entities own 18.6% of the world's shipping carrying capacity, ahead of Greece and Japan.³² Chinese companies are responsible for just under half the new shipping capacity being built.

A significant share of Australia's maritime trade is carried in Chinese-operated ships. For example, globally, the Chinese shipping line Cosco has 10% of the container shipping market.³³ But its share of Australian trade would be higher, reflecting China's greater share of Australian imports than its global average. Chinese shipping lines operate commercially: Cosco ships will pick up loads in both Chinese and Taiwan ports when *en route* to Australia.

The risk that Chinese ships would be withdrawn from Australian routes in any conflict involving China and the US suggests that an update of the BITRE study of Australia's trading routes should include an analysis of the nationality of the shipping lines servicing Australia. At present, there's no public information on that.

An emerging topic of naval debate is the potential crossover between merchant and military fleets. A widely discussed US Naval Institute paper suggested converting container ships and tankers into missile carriers with vertical launch systems housed in shipping containers. It noted that the US Navy had installed hospital facilities on converted tankers and said that those ships could also be used for missile systems.³⁴

That's already occurring in the Middle East. Iran's military has posted a video of a missile being launched from a former 'Panamax' container ship converted to military use in 2023.³⁵ The *Financial Times* has reported

suspicions that what appears to be a standard bulk carrier is in fact an Iranian intelligence vessel providing information to Houthi militias on which ships to target.³⁶

China and a distant blockade

The country most affected by any major disruption of maritime trade to and from North Asia would be China, which depends on imports for 80% of its iron ore, 70% of its oil and, most critically, 35% of its protein.³⁷ The idea of the US responding to an attempt by China to seize Taiwan by mounting a 'distant blockade' of China—interdicting ships out of military range—has been discussed by US strategic analysts.

In a distant blockade, cargoes bound for China would be denied insurance. Any ships bound for China would be stopped in distant regions ranging from close to Australia (such as the Malacca Strait) to the Panama Canal or Suez Canal. Just the Malacca Strait carries about 80% of China's oil imports. In such a scenario, Australia would be part of an international blockade of China along the same lines as the World War I or World War II blockades of the Central and Axis powers.

Several contributions to the debate have questioned the practicality of a distant blockade in the absence of implausible support from Russia, which has the capacity to at least partially meet many of China's needs. It would also require the support of Indonesia and Malaysia, whose sea lanes would be needed for the blockade. A blockade would require some mechanism for allowing the continued passage of shipping to other North and Southeast Asian nations.³⁸

The sanctions imposed on Russia in the wake of its invasion of the Ukraine highlight the difficulty of limiting trade with a major nation in the absence of support from non-Western nations. Container ship arrivals at major Russian ports were approaching pre-invasion levels by late 2023.³⁹

However, any maritime conflict between China and the US would be likely to include some interdiction of China's commercial shipping. A blockade of Australia's trade routes through the Indonesian archipelago is as likely to be implemented by the US against China as by China against Australia.

There are practical difficulties in supplying China overland. But, as the analysis of sea routes in this paper shows, there are alternative, if more costly, routes to the Malacca Strait for China trade. Those include the Lombok Strait, the Ombai and Wetar straits nearer to Timor and, if all the Indonesian archipelagic waters were to be avoided, the long route around the south of Australia and then north to the east of PNG. The recent surge in Russian oil exports to China using the Arctic route demonstrated the active exploration of alternative supply lines.⁴⁰

Managing the risks to trade routes

The security of our trade routes depends not only upon the capability of our military forces to deter any attacks upon them, as discussed by the 2023 Defence Strategic Review, but also upon the willingness of global shipping owners and operators to continue sailing to Australia at a time of international tension or open conflict. The availability of alternative shipping routes may help shipping operators to manage the risk, but does not remove it.

Australia is isolated from the world's major trade routes that tie together Europe, North America and Asia. Australia is a special destination for the world's shipping industry: it isn't *en route* to anywhere else. The fact that there are no Australian-owned shipping lines means that decisions about whether to continue sailing to Australia during a time of conflict would be taken in boardrooms and executive suites in other countries, where Australia's national interests couldn't be expected to be paramount.

While those considerations have influenced the government's plan to establish an Australian 'strategic' fleet, the most important source of assurance for shipping to Australia is the depth and intensity of competition among shipping operators. In times of conflict, a key issue for shipping companies is the availability of war-risk insurance, and there's a role for government in supporting that. The government also needs to revisit its statute governing the requisitioning of shipping in times of conflict and develop contingency plans for the emergency chartering of shipping.

A strategic fleet

Concern about what would happen to Australia's trade in the event of a conflict is at least partly the motivation for the proposal that Australia should acquire a 'strategic fleet' to ensure that there are ships available to carry essential supplies, regardless of geopolitical developments.

Before the 2022 election, then opposition leader Anthony Albanese launched a plan to develop a fleet of Australian-flagged ships, saying:

In times of conflict and crisis, our economic sovereignty and national security are dependent on Australian seafarers working on Australian ships. Right now, less than one per cent of Australian seaborne trade is carried by Australian ships, forcing our nation to rely on foreign governments and companies for our essential imports.⁴¹

The fleet of Australian-flagged ships has contracted sharply over the past 40 years from more than 80 vessels in the early 1980s to just 15 now. The government-owned shipping company, Australian National Line, was privatised in stages from 1991 to 1998 after years of commercial losses. Cabotage arrangements restricting the carriage of coastal freight by foreign vessels were liberalised under Coalition governments aiming to dilute the power of trade unions and to lower costs to business. That made Australian-flagged shipping increasingly uncompetitive in coastal freight. With the reduction in the fleet has come a fall in the number of qualified Australian seafarers.

The government commissioned a taskforce to develop the parameters for the fleet. It reported in November 2023, commenting:

The Australian fleet currently stands at only 15 vessels over 2000 deadweight tonnes (DWT) (11 on the coast and 4 trading internationally), meaning that in a crisis, we would have great difficulty accessing and controlling the maritime assets that we might require.⁴²

The taskforce, chaired by former Telstra chair and former CEO of logistics firms Asciano and TNT Express, John Mullen, endorsed the need for an Australian-flagged and -crewed fleet of 12 vessels. It said that both government subsidies and tax reforms would be needed to attract commercial interest from ship operators and crew. The idea is to make shipping with Australian crews attractive to private operators, rather than re-establishing a national shipping line. There would need to be an investment in training to provide the workforce of 450 seafarers that would be required.

An equivalent scheme in the US, the Maritime Security Fleet, has about 60 ships and employs 2,400 merchant mariners. A subsidy per ship is set at about US\$5 million (about A\$7.5 million).

The strategic fleet taskforce said that the most significant strategic freight needs were the import and coastal movement of fuel, agricultural and industrial chemicals, and containerised goods. However, it ruled out the use of the envisaged Australian-owned and -operated shipping fleet for importing volumes of crude oil, refined petroleum products or cargo in containers. Those 'were of such a scale as to be beyond the expected capacity of a prospective Australian strategic fleet to move'.

'Other measures should be pursued to provide greater certainty that these trades could be sustained during significant disruption,' the report said. The new fleet would be confined to coastal trade. The taskforce reported fuel industry concerns that having just a couple of Australian-flagged fuel tankers on regular routes would be more likely to reduce fuel security rather than enhance it. It said that the same would be true of vehicle carrier ships, which would be a priority capability for Defence.

The security of global shipping supply

While an increase in the number of Australian-flagged ships and qualified Australian seafarers would be of value in any international crisis, the call that shippers can make on the global shipping industry is the primary guarantee of security. A couple of individual Australian-flagged vessels can break down or lose availability for extraneous reasons, but the global industry has a depth of supply.

This is consistent with the argument made by the industry lobby group Shipping Australia, which contends that the ships will always be there. It says that the key to the resilience of trade is the multiple levels of redundancy and diversification within the industry:

The seaborne part of the Australian 'supply chain' is actually a series of multiple supply chains populated by a multitude of different ships (literally thousands upon thousands of them) going to and from a variety

of destinations. Each shipping company—and even each individual ship—also has a further multitude of diversification factors that massively reduce the risk of disruption.⁴³

Those diversification factors include the ownership, flag, operator and crewing of ships, as well as the differing sizes, sectors and cargoes of ships and the differing routes and strategies to address risk. The structure of the shipping industry varies widely across sectors. The level of competition and the depth of supply would influence the extent to which shipping would still be available to Australia in a crisis.

The container shipping responsible for imports has a few large operators and a large number of small ones. Globally, the top five operators account for 65% of capacity, while there are dozens of smaller operators with from five to 50 ships on their books. The industry lobby group Shipping Australia counts 23 lines with services to Australia.

At the other extreme is the dry-bulk carrier industry shipping most of Australia's exports. It's diverse, and the largest firm, China's Cosco, holds only 3% of the market. The top 20 companies operate barely a quarter of the global fleet. The tanker industry is also highly diverse: the top 30 companies globally operate less than half the capacity.

The general cargo carriers (known as 'break-bulk' carriers) in which industry handles goods that can't economically be packed in shipping containers, is fragmented, with relatively few operators running scheduled services but a huge number offering services 'on call'. The number of general cargo carriers with scheduled services to Australia has fallen from five to two over the past decade. There's no longer a scheduled break-bulk service between Australia and Japan, although a ship will visit a port if there's enough cargo to warrant it.

The differences in the competitive structures of the shipping sectors have shaped their responses to the attacks in the Red Sea. Major container shipping lines were able to divert around Africa and add a 'transit disruption charge' to the cost of carrying containers, while the oil tankers' business was too competitive, so operators were compelled to keep using the Red Sea and absorbing the additional insurance cost.

Table 1 shows the numbers of ships visiting Australia in 2020-21 and their port calls.

Table 1: Ships visiting Australia and their port calls, 2020-21

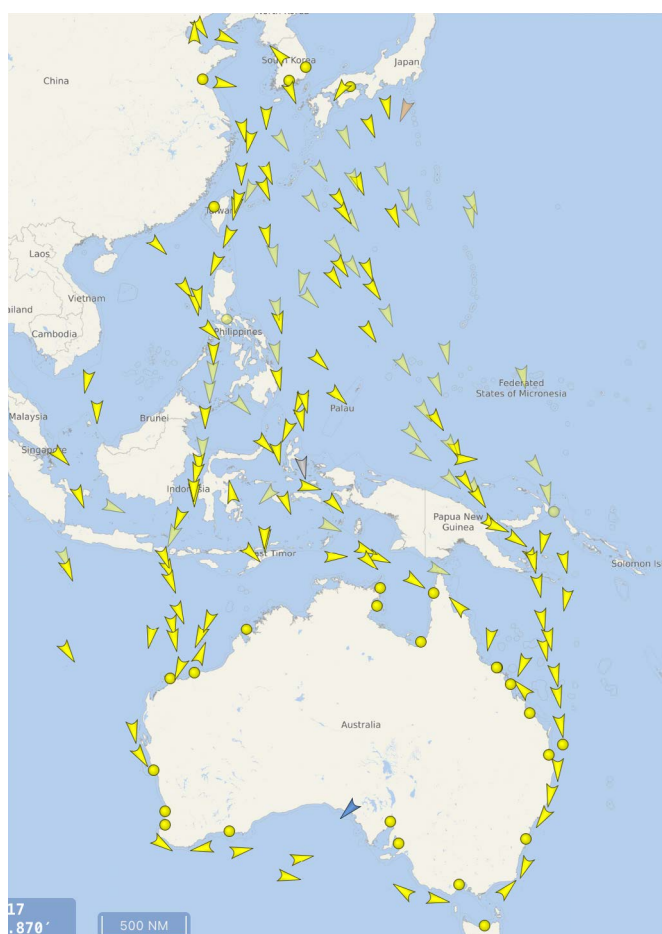
	Ships visiting Australia	Port calls
Bulk carriers	4,578	12,168
Container ships	318	1,483
LNG/LPG tankers	279	1,300
Oil/chemical tankers	603	1,199
General cargo	266	472
Vehicle carriers	185	391

Source: BITRE.

Bulk carriers

Australia is much more important to the dry-bulk carrier industry than it is to the container industry. Australia was the origin for 29% of dry-bulk freight globally in 2021–22, according to estimates compiled for Shipping Australia (Figure 8).⁴⁴ The intense competition among operators and Australia’s global importance to the industry bring security to the supply of bulk shipping to carry our exports.

Figure 8: Approximately 200 bulk ships travelling to Australia from China



Source: VesselFinder.com, 2024, online.

Container shipping

By contrast, the 8 million containers handled by Australian container terminals each year represent just under 1% of the global total. Australia is a high-cost destination for container ships, as up to half the containers brought to Australia leave empty. While a premium is charged to cover that, Australia is also not a node in any of the highly trafficked shipping networks.

UNCTAD measures how ‘connected’ national container shipping is, using an index that’s based on the number of ships’ calls, their carrying capacity, the number of liner companies servicing the country and the number of other countries connected through direct liner shipping services. It can be seen as a measure of how important a country is to the container shipping industry.⁴⁵

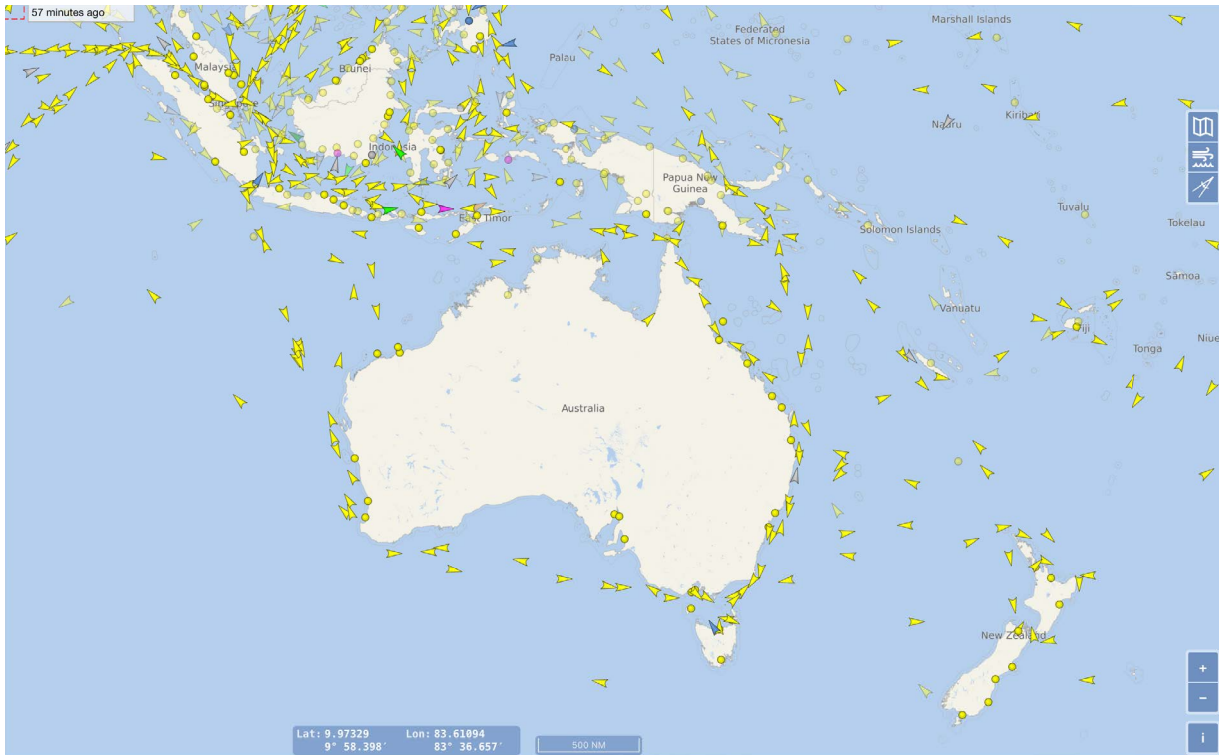
China tops the ranking, followed by Korea, Singapore, Malaysia and the US. Australia’s score has been improving, but it ranks a lowly 57th, just ahead of Argentina and the Congo and below Togo, Chile and Ivory Coast.

While the security of Australia’s liquid-fuel supply has been the subject of many policy interventions and detailed studies, the security of the supply of containerised imports has received less attention. The huge diversity of goods imported by container defies focus, but the fact that Australia imports half its manufactured goods, most of which come by container, underlines their centrality to the economy.

Australia’s small market size, its lack of containerised exports and its isolation from the global container shipping networks all suggest that the security of container shipping supply in a crisis warrants further investigation.

The concern is that, in the event of an international conflict, the container shipping lines would prioritise larger and more profitable routes, and the supply of containerised imports would be jeopardised. It’s a risk that wasn’t canvassed in the Productivity Commission’s 2021 study of vulnerable supply chains. The more recent strategic fleet taskforce report identified the risk, but said that it was beyond the scope of a strategic fleet to address it.

Figure 9: Container ships in Australian and Southeast Asian waters, showing the density of traffic in the Malacca Strait, connecting Asia with Europe, the Middle East and Africa



Source: VesselFinder.com, 2024, [online](https://www.vesselfinder.com).

A particular feature of container shipping that adds resilience is the vast number of shipping containers that traverse the world, supported by strong electronic record and handling systems (Figure 9). The containers can travel extraordinarily diverse routes to Australia, often being carried by several different ships. Some containers from Asia destined for Australia are carried first to distribution centres in Europe or the US. They still need ships to carry them, but there's great flexibility in the routes that they can take.

Fuel security

Tankers trading with Australia have long been seen as integral to the country's security. Fuel sufficient to meet Australia's needs for 20 days is either in transit to Australia or loaded in tankers bound for Australia in ports of nations that are members of the International Energy Agency.

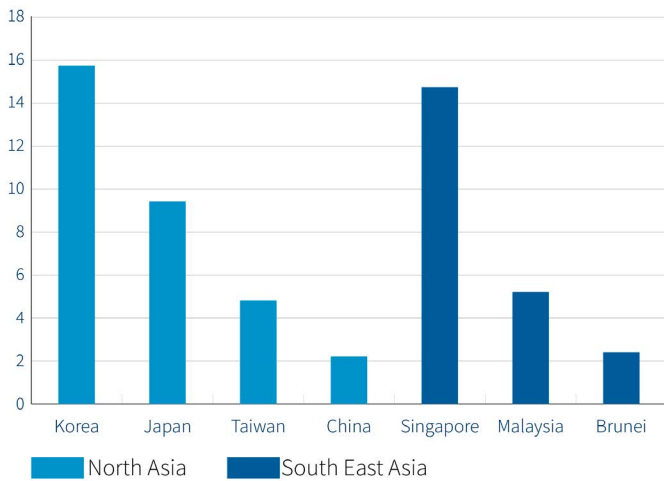
Concern over Australia's vulnerability to an interruption to fuel supplies has led to a series of policy interventions over the past four years, including investment in oil stocks in the US, strengthened stockholding

requirements for Australian oil distributors and subsidies to ensure the continued operation of Australia's last two oil refineries. The Australian Government's commentary on the rationale for the AUKUS program and its investment in nuclear-powered submarines suggests that it has considered the need to protect liquid-fuel supply shipments.

Australia imports crude oil for its two remaining refineries, which aren't configured to handle Australia's domestic crude production, most of which is exported. The two refineries provide about 15% of Australia's refined products; the rest is imported.

While our dependence on imported liquid fuels is a strategic vulnerability, Australia's energy security is enhanced by the diversity of supply. A government review of liquid-fuel security observed that Australia sourced refined products from 66 countries and crude oil from 40 countries (Figure 10).⁴⁶ From the perspective of shipping routes, about 60% of refined-fuel supplies come from North Asia around the east of PNG, while 40% comes from Southeast Asia.

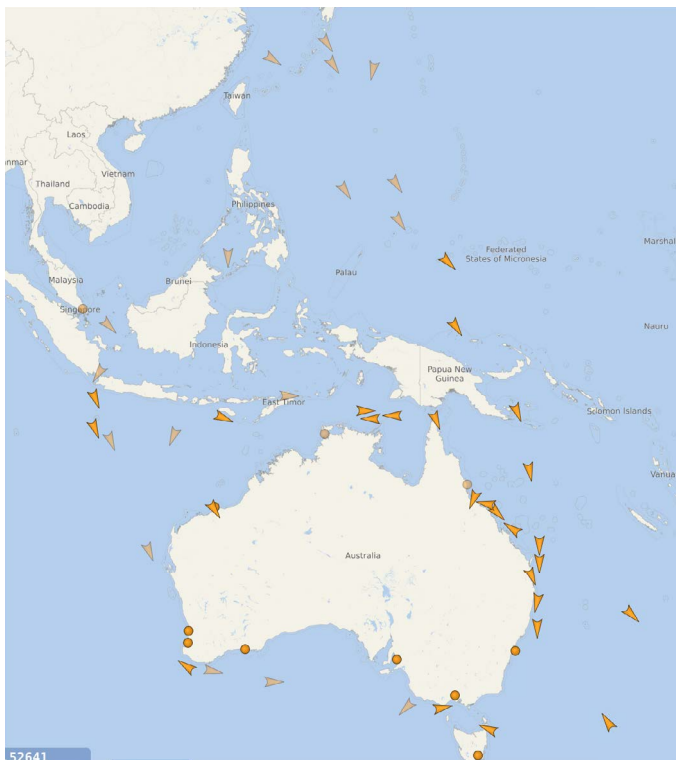
Figure 10: Imports of refined oil, 2022 (\$ billion)



Source: Department of Foreign Affairs and Trade (DFAT) pivot tables.

The government review noted that Asian refineries still obtain much of their supply of crude oil from the Middle East. It estimated that 40% of the liquid petroleum products sold in Australia are derived from Middle East crude, most of which would travel to refineries through the Malacca Strait (Figure 11).

Figure 11: Oil tankers en route for Australia, highlighting both the traffic from Singapore and Malaysia and the line of tankers coming to Australia from North Asian refineries



Source: VesselFinder.com, 2024, online.

The role for government in securing supply

The strategic fleet taskforce’s report includes an extensive discussion of the constraints on requisitioning vessels. The *Defence Act 1903* includes a brief but sweeping statement on requisition powers in times of declared war:

The owner of any vehicle, horse, mule, bullock, aircraft, aircraft material, boat or vessel, or of any goods, required for naval, military or airforce purposes, shall, when required to do so by an officer authorized in that behalf by the regulations, furnish it for those purposes, and shall be recompensed therefor in the manner prescribed.⁴⁷

The taskforce notes that this power does not include the crew:

Should the Defence Act power ever be activated, existing crew members would likely need to be re-contracted, vetted and brought under military discipline, or should the existing crew members not wish to remain on the vessel, the entire crew may need to be replaced.

It adds that there would be practical difficulties, as Defence personnel aren’t trained to operate civilian commercial vessels.

Although the terms of contracts offered to the operators of vessels in a strategic fleet could include provisions for requisitioning in times of national need, the envisaged size of the Australian fleet wouldn’t be sufficient to provide significant incremental capacity.

This suggests that the government needs to be ready to step in, with a preparedness to pay whatever is required to charter the capability that’s needed. The government did this to secure the continued availability of airfreight during the Covid-19 pandemic, when passenger aircraft, which carry the majority of airfreight, stopped flying. It was also the chosen approach, rather than requisitioning, when merchant shipping was needed during the East Timor crisis in 1999. INTERFET forces chartered two merchant vessels to transport equipment.⁴⁸

The government should review the requisition provisions of the Defence Act, which were drafted in 1903 and don't appear to be fit for purpose in the 21st century. The review should consider what form of contracting is appropriate between the government and private sectors when meeting urgent defence needs, including the possibility that the trigger for the operation of the Defence Act—a formal declaration of war—would not have occurred. It should also consider the human resources needed.

War-risk insurance

The most important factor supporting the continued availability of merchant shipping during a conflict is insurance. War-risk insurance has been an essential facilitator of international trade since the mid-17th century. It typically covers damage to or loss of the ship, rather than its cargo, with premiums set at a percentage of the value of the hull. General cargo insurance will usually include coverage of war risk but includes provisions for insurers to vary the premium at short notice.

A note by the global insurer Allianz explains why shippers are prepared to run the risk of transiting the Strait of Hormuz in the Persian Gulf, where attacks increased again in 2019 and have continued.⁴⁹ A very large crude carrier might carry up to 2 million barrels of oil, worth US\$130 million when oil is priced at US\$65 a barrel. A five-year-old ship of that size would be worth about US\$70 million. Following several attacks and the seizure of a British tanker, premiums for tankers in the Persian Gulf rose in 2019 above 0.5% of hull value, which, in this example, would be US\$350,000. That translates to less than US\$0.20 a barrel in additional insurance cost—an amount that can be readily passed on to the customer.

The availability of war-risk insurance has been the key to the resumption of Ukraine's maritime trade since Russia withdrew in July from the UN-brokered agreement that had allowed grain ships passage across the Black Sea. Russia declared that merchant ships travelling to Ukrainian ports would be assumed to be carrying weapons and would be attacked. Insurance rates rose to as much as 3% of hull value after an attack on a Liberian-flagged ship in a Ukraine port killed one person

and injured four others. However, the UK and Ukrainian governments agreed to offer support to 14 insurers, enabling them to cut premiums by as much as 2.5%.

During World War II, the Australian Government took on the task of insuring coastal freight shipping. The international marine war-risk insurance market was being driven by heavy shipping losses in the Atlantic, resulting in prohibitive premiums for Australian coastal shipping. The Treasury took a decision not to reinsure those risks in order that any profit from the insurance operations should flow to the government.⁵⁰

The Hormuz Strait, Ukraine and World War II examples show that there's a role for government in ensuring that war-risk insurance is provided to merchant shipping at a reasonable cost at a time of international conflict. The Treasury should review the experience of other countries in supporting the provision of war-risk insurance and develop policy for responding to a crisis affecting the willingness of ship operators to travel to Australia.

Appendix 1: Sample shipping routes

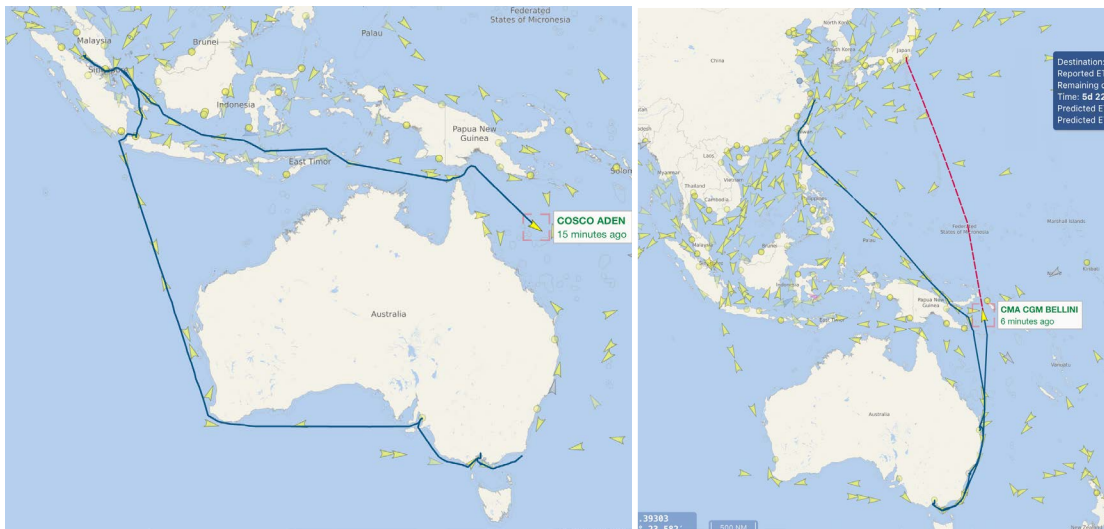
Shipping routes are simply the paths chosen by individual ship operators to minimise cost, distance, time and risk. Apart from a few designated shipping channels, such as the Indonesian archipelagic sea lanes, they have no legal status beyond the rights of shipping in international waters.

The shipping routes detailed in this paper are based on an analysis of the routes taken by individual ships travelling to and from Australia.

The Automatic Identification System (AIS) enables online tracking of all shipping through several services, which provide varying levels of added information. One of those services, VesselFinder, shows the routes that individual ships have taken over the previous 30 days and is the source of these maps.

Container ships

Figure 12: Typical container routes

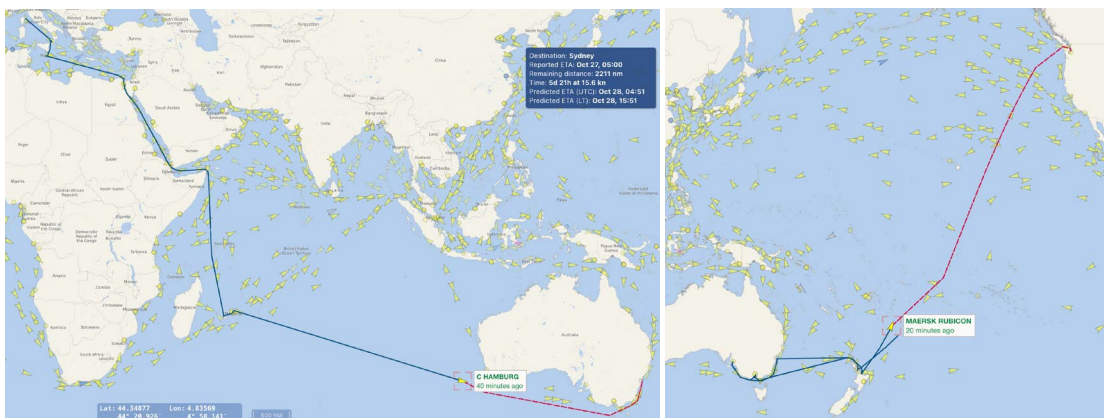


Left: The *Cosco Aden*, 50,000 DWT, headed for Brisbane, having completed a trip from Botany Bay, Melbourne and Adelaide, returning through the Lombok Strait to Singapore and Malaysia's Port Klang.

Right: The major routes to North Asia. The 73,000 DWT *CMA CGM Bellini* loaded in Shanghai and Taiwan's Kaohsiung before taking a route close to north coast of PNG, passing through Vitiaz Strait and calling at Melbourne, Botany Bay and Brisbane, and then returning to Japan, travelling east of New Britain.

Source: VesselFinder.com, 2024, [online](#).

Figure 13: Routes to Europe and North America



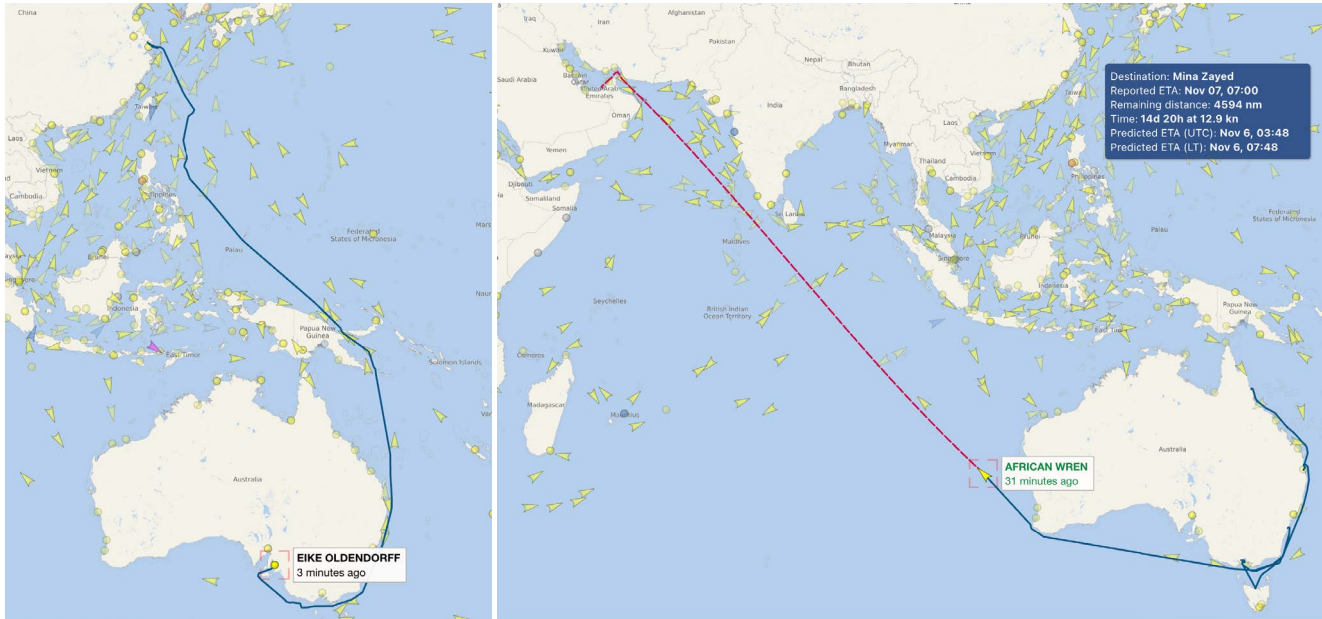
Left: The 104,000 DWT *C Hamburg* was loaded in Italy and Malta, passed through the Suez Canal, and stopped at the transhipping port on the island of La Réunion, before heading east to Sydney.

Right: the 66,000 DWT *Maersk Rubicon* on its regular 60-day loop picking up in Seattle, Oakland and Long Beach in the US, then heading to Auckland, Sydney and Melbourne, returning by Tahiti.

Source: VesselFinder.com, 2024, [online](#).

Break-bulk carriers

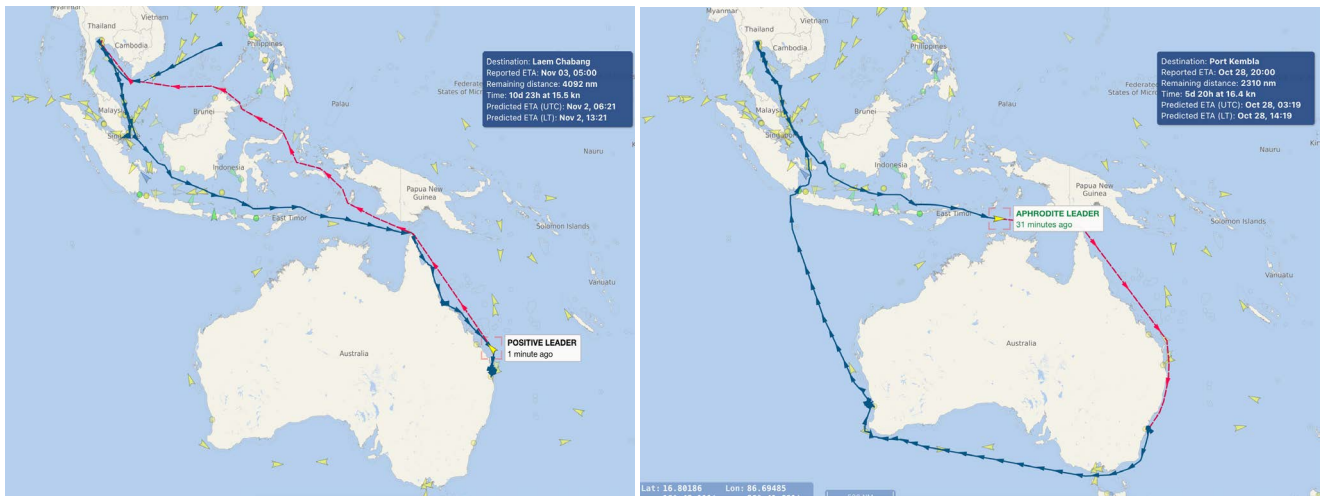
Figure 14: Routes to North Asia and the United Arab Emirates



Left: The 38,000 DWT *Eike Oldendorff* picked up at Osan Korea, before going to Shanghai and then to Adelaide via Vitiav Strait off the north coast of PNG. Right: The 38,000 DWT *African Wren* picked up in Brisbane, Devonport, Geelong and back to Port Kembla before heading to the United Arab Emirates. Source: VesselFinder.com, 2024, [online](#).

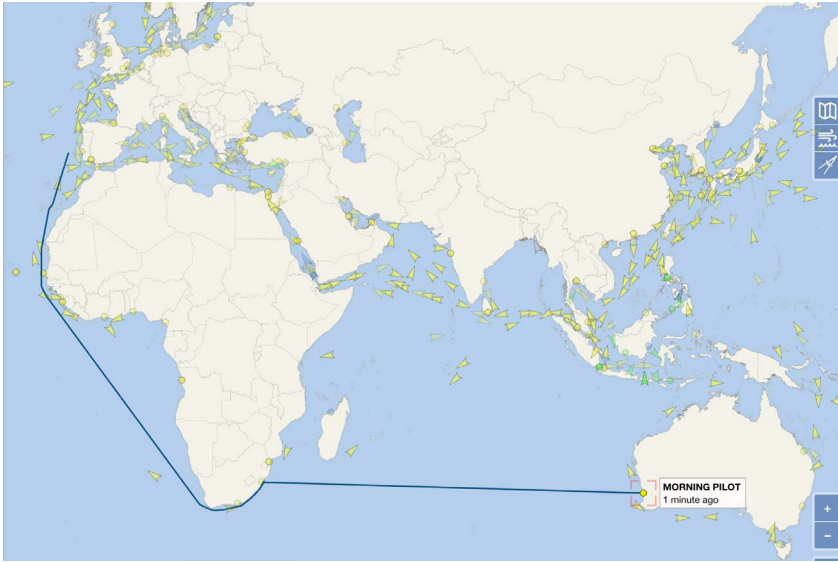
Vehicle carriers

Figure 15: Two vehicle carriers, taking different routes from Thailand to Australia



Left: The 15,000 DWT *Positive Leader* travelled south of Borneo and through the Torres Strait, making stops in Townsville and Brisbane, before returning north of Borneo and Sulawesi. Right: The 24,000 DWT *Aphrodite Leader* travelled north of Timor, through the Torres Strait and then south, with stops at Port Kembla, across the Great Australian Bight to Fremantle and back through Sunda Strait. Source: VesselFinder.com, 2024, [online](#).

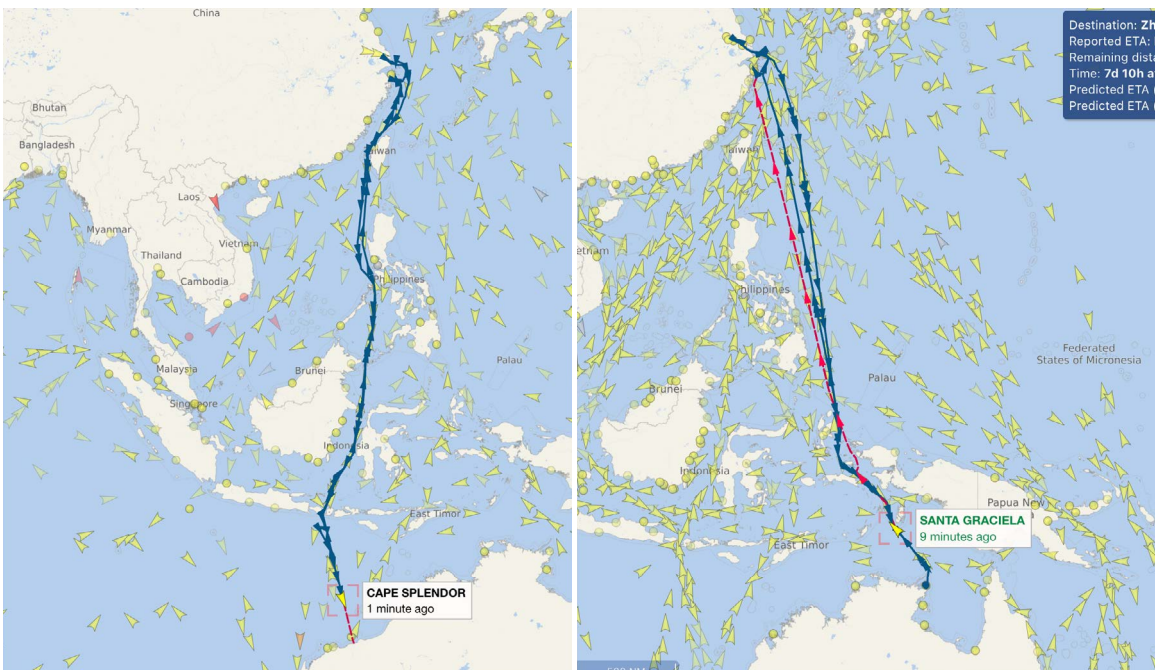
Figure 16: From Southampton to Fremantle



A vehicle carrier, the 23,000 DWT *Morning Pilot*, picked up in Southampton in the UK, Le Havre in France and Zbrugge in Belgium before heading to Durban, South Africa, and then across the Indian Ocean to Fremantle.
 Source: VesselFinder.com, 2024, online.

Bulk carriers

Figure 17: Iron ore and bauxite to North Asia

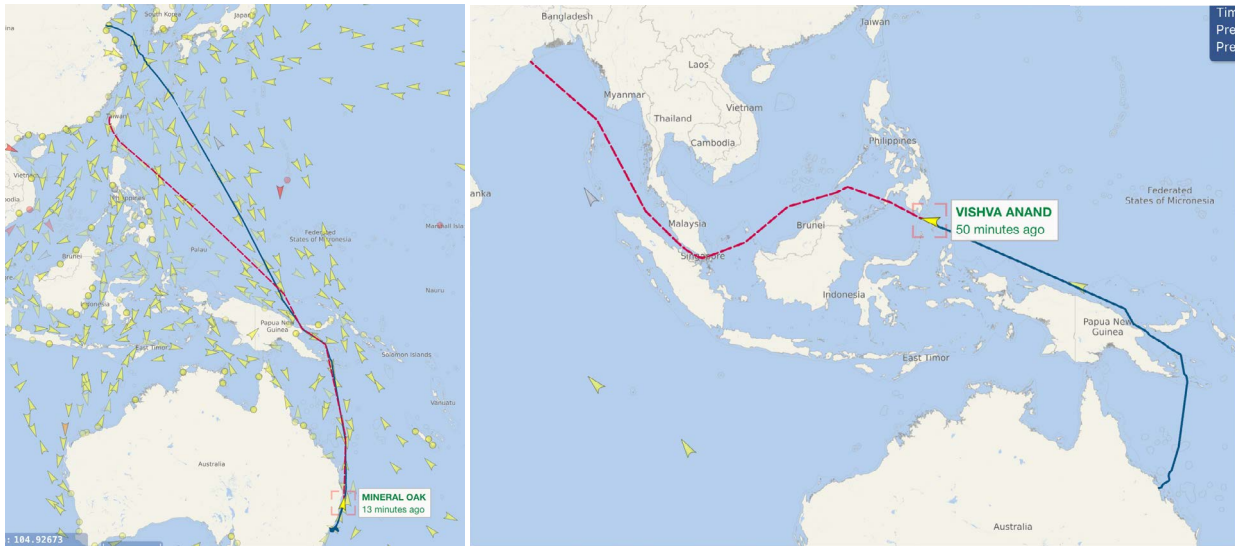


Left: The 206,000 DWT *Cape Splendor* on a typical iron ore bulk carrier route between Ningbo and Shanghai ports in China and Port Hedland. All the yellow pointers on this map represent bulk carriers at sea on 24 October 2023. Ships from Brazil come from the southwest; ships from Africa and the Suez Canal are due west of Malaysia.

Right: A bauxite carrier, the 82,000 DWT *Santa Graciela*, shuttled between Gove in the Northern Territory and China's Zhoushan, its route taking it close to the west coast of Irian Jaya, but to the east of the Philippines, and keeping it out of the South China Sea.

Source: VesselFinder.com, 2024, online.

Figure 18: Coal to North Asia and India



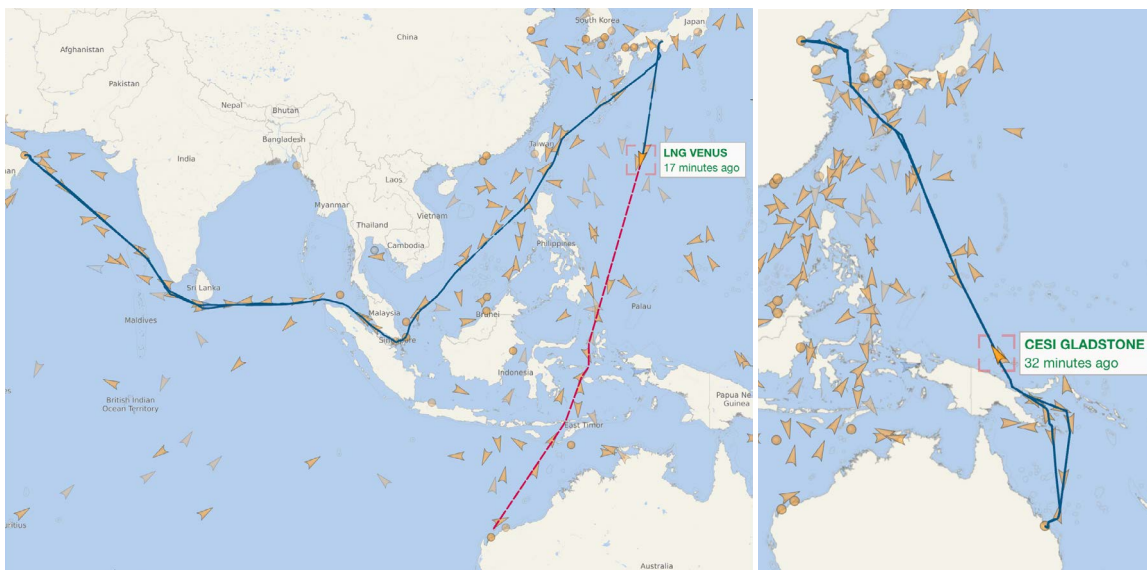
Left: A coal carrier, the 178,000 DWT *Mineral Oak*, travelled slowly, at 8.4 knots, heading for Taiwan, having come from Rizhao Port in China's Shandong Province, following the main route from the east coast to North Asia past PNG.

Right: The *Vishva Anand*, 81,000 DWT, took coal from Hay Point, Queensland, to Paradip Garh in northern India. The vessel's draught of 14.4 metres is too great for the Torres Strait, so it travelled north of PNG, between the Philippines and Borneo and then through the Makassar Strait. Some coal carriers with Indian destinations, particularly from Newcastle, go south and traverse the Great Australian Bight, before heading northwest across the Indian Ocean.

Source: VesselFinder.com, 2024, [online](#).

LNG carriers

Figure 19: LNG to North Asia



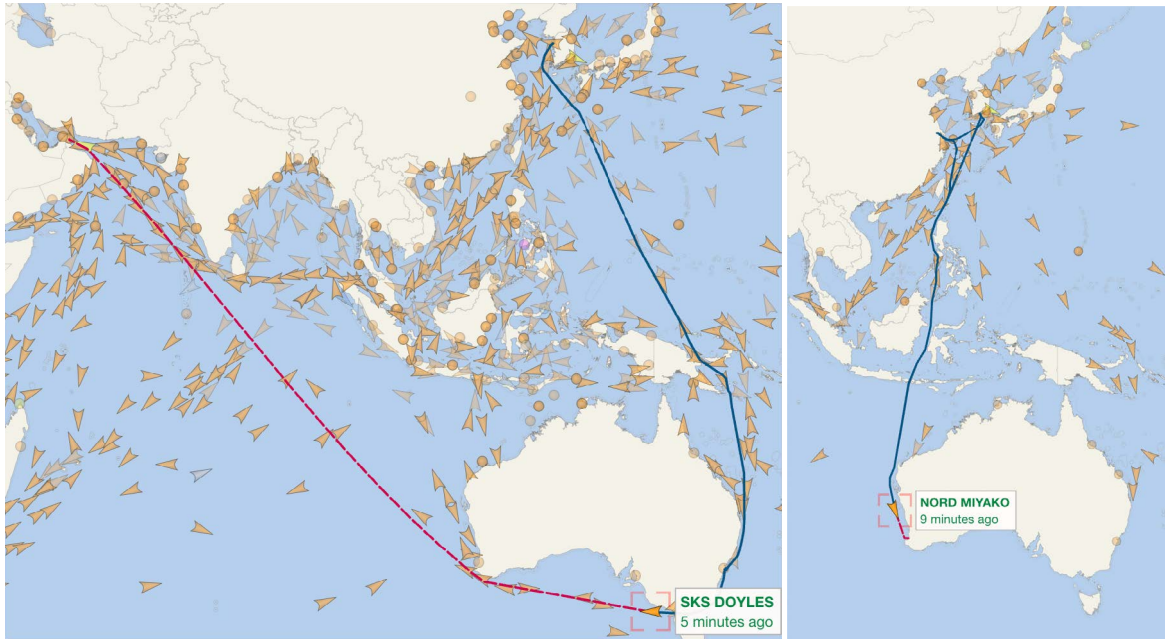
Left: The 86,000 DWT *LNG Venus* headed from Sakai, Japan to Barrow Island, having just delivered from Oman, travelling through Malacca Strait. The Australian journey is 4,200 kilometres, taking 17 days, compared with 6,900 kilometres to Oman, taking 29 days, staying east of Philippines.

Right: The 96,000 DWT *Cesi Gladstone* took gas from Gladstone to China's new Dongjiakou terminal, which is part of Qingdao Port, the world's largest oil and gas port.

Source: VesselFinder.com, 2024, [online](#).

Tankers

Figure 20: Oil to Australia



Left: *SKS DoYLES*, a 119,250 DWT crude oil tanker, came from Korean refineries to Kurnell and headed to the United Arab Emirates.

Right: *Nord Mikayo*, a 52,800 DWT chemical/refined product carrier was en route from Korea to Bunbury, through Makassar Strait and Lombok Strait.

Source: VesselFinder.com, 2024, online.

Appendix 2: The impact of World War II on Australian trade

The volume of global trade has greatly increased since World War II, particularly Australia's trade with Asia; however, records of Australia's imports and exports from that period are instructive, as it was the last time that Australia's trade routes were directly threatened by naval warfare.

At the outset of the war, the Royal Australian Navy expected a total cessation of trade, causing concern in Britain, which was counting on continued supplies of Australian wheat. Securing shipping for essential international and coastal trade was an immediate challenge, particularly as the Navy was expected to requisition much of the available coastal fleet.

The war was at its peak for Australia in 1942 and 1943. Japan had taken Singapore, bombed Darwin and invaded PNG, while the European war still hung in the balance. Australian troops had been withdrawn from North Africa to defend against an expected Japanese attack on home soil. Australia's official war history records that, by 1942, the government had somewhat stabilised the availability of merchant shipping through chartering, but ship losses from mines and torpedoes were rising rapidly.⁵¹

The UK had been by far Australia's biggest trading partner before the war; exports to the UK in 1938–39 were more than three times exports to the next-ranked US. Imports from the UK were almost three times the size, according to historical trade figures compiled by the Department of Foreign Affairs and Trade (DFAT).⁵²

Exports to the UK had fallen by 47% (Table 2 and Figure 21); however, sales to the US, which had entered the war following the Pearl Harbour attack in December 1941, had risen by 71%. Overall, exports were down by only 8%.

Imports kept growing throughout the war and by 1942–43 were more than double their pre-war size. Imports from the UK were up by almost 80%, while imports from the US had soared more than fivefold,

overtaking the UK's. Imports from the US would have included war materiel.

Trade with the UK was still travelling through the Suez Canal, as the UK had taken control of Egypt, although the Mediterranean was still contested waters. Ships from the Australian east coast would probably have sailed south of Australia rather than through the Torres Strait, while ships to the US simply crossed the Pacific.

In high-threat areas only, merchant ships travelled in convoys, protected by naval vessels. They remained subject to attack. Convoying is the trade-protection measure of last resort (the most effective one is evasive routing), as it costs 10%–25% of carrying capacity. During the war, 29 Australian merchant ships were sunk in Australian waters with the loss of 386 merchant seamen.

India was Australia's third largest trading partner, and both exports and imports rose strongly through the war, as was the case with Egypt, Sri Lanka and South Africa. In 1942–43, PNG was Australia's third largest export market; shipments from Australia were dominated by supplies for Australian troops.

However, trade ceased with both North and Southeast Asia as they came under Japanese control, as did trade with Germany and continental Europe.

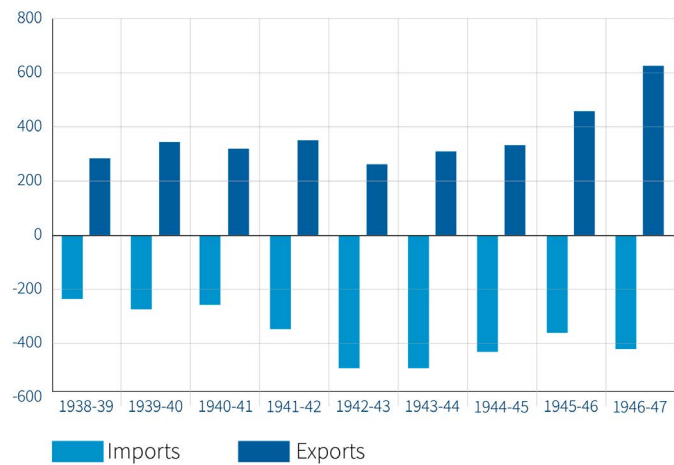
China, Japan, Indonesia (then the Dutch East Indies) and Malaysia (then Malaya) had all been important trading partners before the war. Before the war, France had been Australia's third largest export market, while Japan was fifth and China sixth. The Dutch East Indies had been the fourth biggest source of imports, which were dominated by rubber and oil. Iran and Bahrain became important sources of imports, as supplies from Indonesia disappeared.

Table 2: Australia's trade during World War II (A\$ '000)

	1938–39	1942–43		1938–39	1942–43
Total merchandise exports	285,204	263,147	Total merchandise imports	233,468	491,524
United Kingdom	137,432	73,584	United Kingdom	92,189	164,456
United States	39,135	67,087	United States	33,457	215,563
France	18,772	0	Canada	17,611	22,334
New Zealand	13,364	15,597	Indonesia	16,233	922
Belgium	11,093	0	Germany	9,420	7
Japan	9,731	0	Japan	9,332	9
China	6,172	1	India	6,546	33,889
Germany	5,305	0	Papua New Guinea	5,021	198
Canada	3,987	4,788	New Zealand	4,173	5,110
India	3,932	13,994	France	2,344	36
Malaysia	3,822	1	Belgium	2,244	0
Indonesia	2,759	14	Sweden	2,159	11
Sri Lanka	2,653	7,142	Switzerland	2,144	378
Italy	2,423	0	Malaysia	2,058	89
Papua New Guinea	2,078	28,043	Sri Lanka	1,915	9,181
Netherlands	2,077	0	Iran	1,912	7,876
South Africa	1,627	2,888	Fiji	1,890	451
Sweden	1,274	0	Netherlands	1,598	3
Fiji	1,246	2,393	Italy	1,563	2
Egypt	1,202	3,161	Bahrain	1,488	2,072

Source: DFAT, historical trade statistics.

Figure 21: Australia's trade through World War II (\$m)



Source: DFAT.

Appendix 3: Australia's maritime trade direction

Table 3: Australia's maritime trade direction, 2020–21 (A\$ billion)

	Past east PNG to North Asia	Indonesian sea lanes	East to New Zealand, the Pacific and the Americas	West to India, the Middle East and Africa	Total
Exports	89	241	22	13	355
Imports	96	106	31	11	247

Of the trade that passes through Indonesian waters, the flow of imports and exports is estimated as shown in Table 4.

Table 4: Trade through Indonesian waters, 2020–21 (A\$ billion)

	North Asia	Southeast Asia	Europe	Middle East and India
Exports	176	41	11	12
Imports	12	45	45	4

These estimates are approximations applying the following assumptions to BITRE maritime trade statistics:

- North Asian trade with Australia's east coast travels around PNG, and from the west coast through Indonesian sea lanes. Australian Bureau of Statistics state trade figures are used to estimate the proportions of each.
- Most European trade with Australia passes through the Malacca Strait.
- Most of India's coal imports from Australia travel around the north of New Guinea and then south past Borneo and through either the Malacca or the Lombok straits.
- Trade with the Middle East either travels through the Malacca Strait or directly across the Indian Ocean to Western Australia or the south of Australia.

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Acronyms and abbreviations

AIS	Automatic Identification System
ASEAN	Association of Southeast Asian Nations
BITRE	Bureau of Infrastructure and Transport Research Economics
DFAT	Department of Foreign Affairs and Trade
DWT	deadweight tonnage
GDP	gross domestic product
INTERFET	International Force East Timor
LNG	liquefied natural gas
NSW	New South Wales
PNG	Papua New Guinea
UN	United Nations
UNCLOS	UN Convention on the Law of the Sea
UNCTAD	UN Conference on Trade and Development

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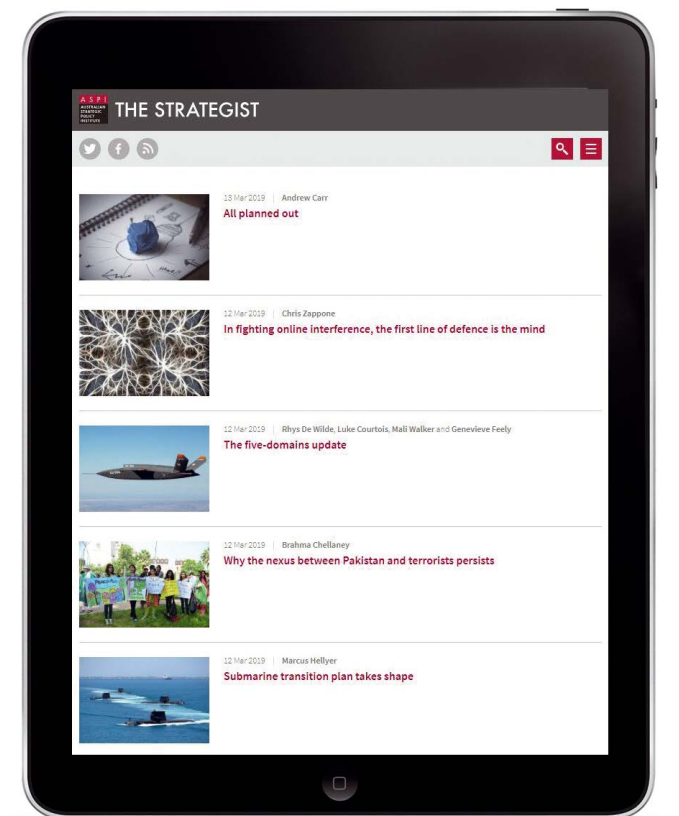


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