Seafood - Supply Chain Benchmarking Report

Report for the Department of Infrastructure, Transport, Regional Development and Communications

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Executive Summary and Scope

EXECUTIVE SUMMARY

Seafood is an important protein consumed in restaurants, takeaway outlets, sushi bars, and homes around the world.

Seafood is imported, farmed or caught within a country's waters and depending on the desired end product, seafood may go through various types of processing. Primary processing includes cutting, filleting, de-boning, gutting and packaging the seafood. Secondary processing can include canning, smoking or brining the seafood. After processing, the seafood is usually taken to a distribution centre for export or domestic consumption. Live, chilled and frozen seafood is usually transported by road or airfreight in refrigerated or frozen conditions. Processed and packaged seafood can be transported in ambient conditions by road and sea.



Figure 1: Typical seafood value chain (country agnostic)

The seafood supply chain can be segmented into three key movements (referred to as 'flows' throughout this report)

- The first flow consists of imported chilled and frozen products (flow 1).
- The second flow consists of the movement of imported processed products (flow 2).
- The third flow consists of the movement of domestically caught or produced seafood to port for export or to domestic consumers (flow 3).

Australia's seafood supply chain transports c.340 kilotons (kt) of seafood annually (including salmon, barramundi, prawns and other fish) in a variety of forms including fresh/chilled, frozen and tinned. Australia's seafood is known internationally for its quality, as most high-value seafood is exported to international markets, with domestic consumption supplemented by imports. Seafood is moved large distances in Australia (c.1,800km on average), due to significant distances between key fishing areas and major urban centres, with road freight rates estimated to be AUD c.\$0.33 per tonne-km (tkm).

The U.K. and Canada have been selected as comparative countries for Australia's seafood supply

chain as they export similar products, with all three countries exporting salmon and competing for international consumers. Both the U.K. and Canada also have some geographical and demographical features that are similar to Australia.

The seafood industry in the U.K. is similar to Australia, relying heavily on imported products while exporting high value seafood to the U.S. and Europe. Most of the U.K.'s wild catch and aquaculture production is concentrated in the north (in Scotland), which is also where a substantial proportion of processing is located. One of the U.K.'s key exports is "Scottish Salmon", which is analogous to Australia's "Tasmanian Salmon" and is sold to international consumers at a premium. Comparatively, imports of seafood are concentrated in the lower half of the U.K. Average distances travelled in the U.K. are much lower than Australia (c.160-240km), due to its smaller land mass and higher population density.

Broadly, seafood production and import/export is concentrated on Canada's east (Atlantic provinces) and west (Pacific provinces) coasts, forming two key corridors with fairly limited volumes moving between them. A key feature of Canada's seafood supply chain is the amount of seafood moved over the border to and from the U.S., with eastern and western states of the U.S. providing seafood to the respective corridors within Canada. Seafood moves a significant distance within Canada and to/from the U.S. (c.800km on average), partly due to the length of this freight corridor. Overall, road freight costs are lower than Australia at AUD c.\$0.1-0.2 per tkm.

Scope

This paper's scope covers the import and export of fish and prawns in a chilled, frozen, fresh, or processed state. It covers movements of seafood from port, catch or farm to distribution centres with limited focus on last-mile distribution. Crustaceans and shellfish are excluded from the paper's scope.

KEY FINDINGS & AREAS FOR FURTHER INVESTIGATION

- Canada's freight costs is c.50% less expensive per tkm for refrigerated and non-refrigerated items than the U.K. and Australia.
- This difference is likely attributable to the use of large trucks, cheaper fuel costs, long haul trips and economies of scale that are captured through trading with the US. However, further investigation could be done into the reasons for this discrepancy, potentially highlighting ways to increase Australia's seafood freight efficiency.

Australian Supply Chain Overview

AUSTRALIAN SUPPLY CHAIN OVERVIEW

Generic seafood supply chain overview (all countries)



Figure 1: Typical seafood value chain (country agnostic)

The seafood supply chain includes wild caught seafood, farmed seafood and seafood imports. While wild caught and farmed seafood begin as fresh products, imported seafood can arrive in various forms, including chilled, frozen and tinned/processed products.

Seafood may be transported live or may be processed in-country. Most seafood undergoes "primary processing", while some seafood products also undergo substantial additional "secondary processing". The seafood supply chain can be segmented in four key movements (referred to as 'flows' in this report).

- The first flow consists of imported chilled and frozen products (flow 1).
- The second flow consists of the movement of imported processed products (flow 2).
- The third flow consists of the movement of domestically caught or produced seafood to port for export or to domestic consumers (flow 3).

The level of processing usually has an impact on the supply chain. Chilled seafood tends to be higher quality (and better tasting) than other segments, but is more perishable and requires refrigerated transport. This segment includes seafood that is sold either fresh or packaged in a supermarket, a fish market to restaurants, or exported. Usually, this seafood has undergone primary processing (e.g., heading, gutting, boning or filleting).

Frozen seafood products are less time-sensitive than chilled products, however, transport costs attract an additional premium due to the increased cost of frozen product logistics. Frozen seafood can also include processed seafood products, such as fish fingers or crumbed fish cutlets sold at supermarkets. Canned or heavily preserved seafood products have undergone secondary processing such as brining or canning and are often stored at ambient temperature, significantly reducing their cost to transport.

Once seafood has been processed, it is moved to distribution centres and sent to seaport, to airport or to retail outlets such as supermarkets and restaurants.

Seafood in Australia

Australia's seafood supply chain is weighted towards seafood imports. However, while exports have a lower share of overall tonnage, Australia's seafood exports tend to be high value products, such as salmon, prawns and barramundi and are still important to the overall economy. Australia's tinned seafood production is low, due to high competition from foreign markets (particularly Thailand). As such, most export products tend to be frozen or fresh with lower levels of processing.



Figure 2: Volume of seafood imports by type (Source: ABARES). *Note: Includes fish and prawns and excludes other crustaceans and molluscs.

Seafood products in Australia are predominantly moved via road, usually using B-doubles, due to the time sensitive and perishable nature of the freight.

Fish varieties differ by region, due to Australia's large land mass and variable climates. Salmon can be wild caught (in the lower half of Australia) or farmed. Most salmon are farmed in Tasmania due to suitable water temperatures. Prawns in Australia are wild caught and farmed. Australian prawn farming is predominantly based in Queensland, where the waters are tropical, with remaining farms in New South Wales, Queensland, the Northern Territory and Western Australia.¹ Tuna are caught and farmed largely in New South Wales and South Australia. Finally, Barramundi tends to be farmed in the north, particularly in Queensland and the Northern Territory.

Australia's population lives on the coast, meaning freight flows are spread around the periphery.



Figure 3: Employment by state (Source: Australian Bureau of Statistics via ABARES)

Key supply chain flows

Key flow #1 - Movement of imported chilled and frozen products

Fresh and frozen imports arrive into Australia either by airfreight (particularly for high value seafood) or ship. Depending on its state, the seafood may move to a processing plant before moving to the consumer, potentially via distribution centre. If the seafood does not require domestic processing, it will travel directly to the consumer, potentially through a distribution centre network.

Key flow #2 – Movement of imported processed products

Processed imports typically arrive by sea due higher processing levels, which allows them to be transported using a cheaper and slower mode.² A large proportion of these products are canned fish, predominantly from Thailand.

Starting at the port, seafood is transported via road to a distribution centre, where it is distributed to

supermarkets, restaurants (including fast food) and other retailers. It may also go directly to a processing plant before arriving at a distribution centre.

Key flow #3 – Movement of domestically caught or produced seafood to port for export or to domestic consumers

Commercial fisheries transport their catch to the fish markets (usually by the ocean). Fish markets, such as the Sydney Fish Market, are a significant component of the Australian seafood industry and where live caught fish are aggregated to be sold for domestic consumption or for export. Fish markets bring together buyers and sellers of fish, including the production, wholesale and retail seafood players. These buyers include exporters, wholesale providers that supply restaurants, other commercial resellers and direct retailers.

Processing and packaging tend to be done in-state, particularly where a state specialises in a specific type of seafood. In some cases, seafood undergoes primary processing either at the farm, or close to landing and then taken to a distribution centre. Domestic distribution can require inter-state road transport (and transport by sea to and from Tasmania).

Most exports are air freighted due to the time sensitivity of fresh and frozen seafood products and must be trucked from the distribution centre to an airport. Seafood consumed domestically is transported from distribution centres to supermarkets and restaurants.

¹ Australian Prawn Farmers Association

² <u>ABARES: Australia's trade in fisheries and aquaculture products</u> 2018

Basis for International Comparison

BASIS FOR INTERNATIONAL COMPARISON

The U.K. and Canada have been chosen as suitable comparative countries for Australia's seafood supply chain as they are considered competitors in the export of high value seafood, particularly salmon. In addition, both countries have some geographical similarities to Australia, such as a low population density in Canada and the U.K.'s water border.

The United Kingdom

The U.K. and Australian seafood supply chains have the following similar features:

- Both countries have significant salmon farming operations, with "Scottish Salmon" and "Tasmanian Salmon" being seen as high-quality brands that compete for similar global consumers (mainly in Asia).
- The U.K. and Australia are both net importers of seafood products, despite being island nations.3 This indicates a similarly complex supply chain that includes significant inflows and outflows through ports and airports.
- Both countries have a heavy reliance on road transport for the seafood supply chain, helping with the comparability of modal analysis.
- Both countries consume mostly salmon (lower quality salmon than that exported), prawns, tuna and white fish and import most of this, suggesting similarities in the import supply chain.

While the U.K. and Australian supply chains are similar, there are notable distinctions between the domestic supply chains that need to be considered when interpreting the data in this report:

- Australia is geographically isolated, meaning much of its fresh or chilled seafood must be air freighted. Comparatively, in the U.K., fresh or chilled seafood can be shipped to the U.S. or Europe, with airfreight only being required for the Middle East and beyond.
- The U.K. was formerly part of the European Union. This has somewhat complicated the domestic seafood supply chain, as chilled/ frozen seafood was sometimes sent to Europe for processing and returned as a processed import (and vice versa). The outcome of Brexit on the U.K. seafood supply chain is still unclear.

 The U.K. has a smaller landmass than Australia, meaning that the average distance travelled is expected to be lower.

Canada

The Canadian and Australian seafood supply chains have the following similar features:

- Both countries have significant salmon farming operations with high-quality brands that compete for similar global consumers (mainly in Asia).
- Both countries have a large landmass, with low population density and significant distance between population centres. This increases the distance travelled within the supply chain and increases the reliance on airfreight for timesensitive fresh seafood.
- Both countries have a heavy reliance on road within the seafood supply chain, facilitating modal comparisons.

While the Canadian and the Australian supply chains are similar, there are notable distinctions between the domestic supply chains that need to be considered when interpreting the data in this report:

- Canada shares a border with the U.S., meaning that seafood imports and exports can be moved between the countries via road, potentially increasing the simplicity and efficiency of road transport. Combined grocery freight between the two countries may also provide economies of scale. Comparatively, Australia is an isolated landmass therefore all trading partners are overseas operators. All imports must enter through seaports or airports, with additional loading and unloading required.
- Canada's population is concentrated on the east and west coasts, creating distinct freight "corridors" that create the potential to channel volume for more optimised freight movement and backhaul. Comparatively, Australia's population live on the coast around an island, meaning overall freight flows are generally more peripheral in character.

³ ABARES - Australia's Seafood Trade (2015)



U.K. Comparison

U.K. SUPPLY CHAIN

Seafood in the U.K.

As a significant fishing nation, the U.K. is a large consumer and exporter of seafood. In 2019, the U.K. imported c.720kt of seafood, with large imports of tuna, cod, salmon and prawns.⁴ The U.K. exported c.450kt of sea fish, predominantly salmon, mackerel and herring. Cod, haddock, salmon, tuna and prawns make up c.60-80% of consumption in the U.K., with a significant volume sold through fish and chip shops.⁵



Figure 5: U.K. imports and exports by seafood type (Source: U.K. Marine Management Organisation)

Type of seafood	Key origin of import into the UK
Salmon	Norway, Sweden
Tuna	Mauritius, Ghana, & Ecuador
Prawns	India, Denmark, & Iceland
Cod	Iceland, China, & Norway

Table 1: Origin of key imports into the U.K. by seafood type (source: U.K. Marine Management Organisation)

Within the U.K., seafood production is concentrated in the north with a high proportion of wild-caught fish landed at Scottish ports. Aquaculture is also concentrated in the north, with Scottish Salmon making up c.150kt of c.190kt of fish farmed in the U.K. in 2018.

While seafood is largely produced in the north, seafood imports and exports tend to flow through ports in the south, linking up to the E.U. and Asia. An estimated c.60-80% of the U.K.'s domestic catch is exported.⁶



Figure 6: U.K. wild-caught seafood landings at top ports (Source: U.K. Marine Management Organisation)

Processing plants are concentrated in Scotland (47% of FTEs) and Humber (Grimsby) & Northern England (36% of FTEs), predominantly servicing the northern and central areas of the U.K.⁷



Figure 7: Heat map of food processing plants and location of key ports (Source: Industry participants, Sea fish Authority)

Key supply chain flows

All food (including seafood) is carried via road in the U.K. Seafood travels along one of three key flows. Broadly, trip distances are relatively small at c.160km - c.650km, taking up to a maximum of c.6 hours.

⁴ <u>Marine Management Organisation: U.K. Sea Fisheries Statistics</u> 2019

⁵ <u>Uberoi, Hutton, Ward and Ares: U.K. Fisheries Statistics (House of Commons Library Briefing Paper), 2020</u>

⁶ Uberoi, Hutton, Ward and Ares: U.K. Fisheries Statistics (House

of Commons Library Briefing Paper), 2020

⁷ Uberoi, Hutton, Ward and Ares: U.K. Fisheries Statistics (House of Commons Library Briefing Paper), 2020

Key flow #1 – Movement of imported chilled & frozen products

The most commonly imported fresh/chilled and frozen seafoods are salmon and prawns which typically arrive whole at a variety of ports. Imports from Europe and the Nordic countries tend to arrive at eastern ports such as Felixstowe and Grimsby, while imports from other areas such as Mauritius and Ghana tend to arrive at southern and western ports like Plymouth, Bristol and Liverpool. Fresh seafood can also arrive from abroad at Heathrow Airport.



Figure 7: Key flows of imported fresh/chilled and frozen seafood (Source: Industry participants, Sea fish Authority)

When entering via sea, seafood is unloaded from the port and packed onto lorries (alternatively, pre-loaded lorries are rolled-off the ship). The lorries tend to be small (22 pallet) capacity. The seafood travels to a processing plant an average of c.160-240km away, with the journey taking c.2-3 hours (maximum journey time of c.5-6 hours).

Once processed, a portion of the seafood is sent to a supermarket distribution centre, c.160-240km away. After reaching the distribution centre, products are picked and then transported up to c.50km to stores. The remainder of seafood is sent to a wholesale distribution centre and then distributed to restaurants nearby.

Key flow #2 – Movement of imported processed products

Canned seafood is generally shipped into the west coast of the U.K. From there, the seafood is transported via road to a wholesaler/supplier distribution centre and then to a supermarket distribution centre. The average trip distance is approximately c.480km.

Key flow #3 – Movement of domestically caught or produced seafood to port for export or to domestic consumers

Scottish Salmon is a core export for the U.K. It is largely farmed in the north of Scotland. Most primary

processing is done in Scotland to preserve the "made in Scotland" claim. It is transported c.250km to the centre of Scotland (Glasgow / Edinburgh) for processing.

From central Scotland, the seafood will travel c.300-600km to one of the key seaports, airports or distribution centres, depending on its destination. For the U.S., seafood is exported through Liverpool, while Asian exports typically go through south coast ports. Exports to the Middle East must be transported to Heathrow Airport due to the low volume of flights between the Middle East and U.K.'s regional airports.



Figure 8: Key flows of domestically produced fresh/chilled and frozen seafood (Source: Industry participants, Sea fish Authority)

Domestically caught fish follows a similar path, either being processed in Scotland or at Grimsby before being distributed domestically (particularly to London) or sent to seaport/airport for export.

Seafood freight data in the U.K.

Industry participants have suggested that seafood freight costs in the U.K. are c.20% higher per tkm than in Canada, as smaller trucks are used in Canada and Australia. Furthermore, loading and unloading costs remain the same, but are spread over a shorter distance due to lower average distance travelled.

Typically, in the U.K., a c.240-320km journey on a lorry costs AUD c.\$730-920 without temperature control and AUD c.\$920-1,280, when temperature controlled, with estimates ranging from AUD c.<\$1.10-\$3.30 per km (depending on negotiating power) for a standard lorry and a c.20-35% premium for frozen or refrigerated freight.

Estimated costs per tkm (AUD)	Standard	Refrigerated / frozen
Average	\$0.29	\$0.37

Table 2: U.K. estimated costs per tkm (Source: Industry participants)

Canada Comparison

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CANADIAN SUPPLY CHAIN

Seafood in Canada

Canada's large geography and sparse population has led to a decentralised seafood supply chain. A key feature of this supply chain is the amount of seafood moved across the U.S. / Canada border.

Broadly, seafood production/processing and import/exports are concentrated on Canada's east (Atlantic regions, majority of Canada's wild seafood) and west coasts (Pacific regions, majority of Canada's aquaculture). Similarly, volumes consumed are largest in the east and west provinces, forming two distinct road freight corridors that flow to and from the U.S. with limited volumes in between.



Figure 9: Canada, seafood landings and aquaculture (Source: Fisheries and Oceans Canada & Statistics Canada)

In 2019, Canada exported 608kt of seafood, with top destinations including the U.S. (c.300kt) and China (c.134kt). The top exporting provinces were British Columbia (BC), Nova Scotia (NS), Newfoundland (NL) and New Brunswick (NB), on the east and west sides of Canada.



Figure 10: Domestic exports of selected seafood commodities by province 2019 (Source: Fisheries and Oceans Canada)

In 2019, Canada imported c.538kt of seafood. This was predominantly imported to BC, Ontario (ON), NB and NS. A substantial proportion (c.171kt) of Canada's imports came from the U.S., with c.76kt from China, and c.81kt from Thailand and Vietnam. Together, these four countries make up c.61% of Canada's imports, with the remainder from the rest of the world.



Figure 11: Domestic imports of selected seafood commodities by province 2019 (Source: Fisheries and Oceans Canada)



Figure 12: Canada imports and exports of seafood by type 2019 (Source: Fisheries and Oceans Canada) *Note: excluded contains shellfish, which is outside of the scope of this paper. Other contains fish oil, fish meat and miscellaneous fish products.

Key supply chain flows

Despite the long distances, seafood travels mostly by road, with a small amount of airfreight. Volumes broadly fall into two main "flows" to and from the U.S.

Key flow #1 – Movement of imported chilled and frozen products

The largest proportion of Canada's seafood imports come from the U.S. The key border crossings are:

- Calais, Maine (east)
- Blaine, Washington (west)
- Buffalo-Niagara Falls, New York (east)
- Champlain-Rouses Point, New York (east)



Figure 13: Canada's seafood imports from the U.S. by point of entry (circle represents relative size in AUD \$m) (Source: United States Bureau of Transportation 2019)

Long haul journeys and from the U.S. increase the average trip distance, with standard journeys between the two countries being up to c.2400km, depending on exact origin and destination. Journeys to Ontario tend to be the lowest at c.1000-1200km, while journeys to Alberta are typically over 2400km.

Upon entering Canada, the trucks (generally large, with c.50-100 tonne capacity) travel to processing plants before travelling to major regional distribution centres owned by either a distributor or a large supermarket chain. The seafood is then transported to a local retailer / store or restaurant.

Key flow #2 – Movement of imported processed products

The import of processed seafood products is similar to the import of fresh and frozen products, with many products coming from the U.S. via land border. Products can also arrive at Canada's seaports (e.g., from China, Thailand and Vietnam), before travelling to major distribution centres and then to local retailers or restaurants.

Key flow #3 – Movement of domestically caught or produced seafood to port for export or to domestic consumers

Domestically caught seafood is offloaded at the dock. From there, seafood is transported to a processing plant. Seafood can also be processed near the farm. A significant proportion of processing is done on Canada's west coast, which mainly processes farmed salmon.

Once processed, plants sell finished products into the distribution chain and the product is transported to a distributor or wholesaler warehouse.⁸ Distributors and

wholesalers can transport seafood to secondary processors, repackaging plants and retailers.

Seafood production is partly consumed within Canada but is also sent offshore. In 2019, 50% of Canada's exports (c.300kt) were sent to the U.S. This volume largely went through three key border crossings, all via road before travelling to different states:

- Calais Maine (c.86kt, NB)
- Blaine Washington (c.74kt, BC)
- Houlton Maine (c.58kt, NB)



Figure 14: Canada's seafood exports to the U.S. by point of entry (circle represents relative size in T) (Source: United States Bureau of Transportation 2019)

Other exports are sent to port from the distribution to Asia and the E.U.

Seafood freight data in Canada

Seafood generally travels with other groceries, with frozen and chilled seafood products being transported at lower temperatures with other chilled produce at an additional cost. Industry experts suggest that the premium for refrigeration is c.20-30% for chilled and 25-35% for frozen.

Canada's freight costs tend to be low per tkm due to the use of large trucks, cheaper fuel costs in North America, and long hauls. The average distance for food transport journeys is c.800km, including processing and distribution journeys.

Journey (AUD per tkm)	Ambient cost (est.)	Refrigerated cost (est.)	Frozen cost (est.)
To U.S.	\$0.09	\$0.12	\$0.12
From U.S.	\$0.12	\$0.15	\$0.16
All food road freight	\$0.14	\$0.18	\$0.19

Table 3: Canada estimated costs per tkm by transport type to and from the U.S (source: Statistics Canada Canadian Freight Analysis Framework, industry participants, L.E.K. Analysis)

⁸ British Columbia Ministry of Agriculture: British Columbia Wild Seafood Industry Profile (2020)



Data comparison

DATA COMPARISON

A high-level summary of the key freight metrics for each country is shown in the table below.

Estimates	Australia (CSIRO)	U.K.	Canada
Annual tonnes moved (c.000)	c.340	c.1,217 ⁹	c.1,345 ¹⁰
Annual net tkm (c. millions)	c.400	c.389 ¹¹	c.900-1,100 ¹²
Annual trailers / shipments (c.000)	c.32	c.145 ¹³	c.87 ¹⁴
Cost of movement (AUD \$ per tkm)	c.\$0.33	c.\$0.29 (unrefrigerated) ¹⁵ c.\$0.37 (refrigerated) ¹⁶	Unrefrigerated averages: ¹⁷ \$0.09 for trips to the U.S., \$0.12 for trips from the U.S., \$0.14 for all food road freight Refrigerated / Frozen averages: \$0.12 for trips to the U.S., \$0.15-0.16 for trips from the U.S., \$0.18-0.19 for all food road freight
Total transport costs (AUD c.\$m)	c.132	c.120 ¹⁸	c.130-200 ¹⁹
Average trip distance (km)	Salmon: c.1,800 Barramundi: c. 4,100 Prawns: c.740 Fish: c.650 Average: 1,800	c.160-240 ²⁰ per leg	c.800 (including trips from U.S.) ²¹
Average trip duration (c. hours)	Salmon: c.36 Barramundi: c.44 Prawns: c.8 Fish: c.7 Average: c.24	c.2-3 ²²	c.10 ²³

tonnes / total food tonnes). Also calculated by total tonnes * average trip distance

- ²¹ Canadian government average of all food transport
- ²² Aggregate of industry participant views
 ²³ Aggregate of industry participant views

⁹ Aggregate of production and imports

¹⁰ Aggregate of production and imports

¹¹ Total tonnes multiplied by average trip distance of 320km (assuming two legs) ¹² <u>Statistics Canada</u>; total of all food transport * (est. seafood

¹³ U.K. tonnage divided by Australian tonnes per trailer, assuming 20% smaller truck size

¹⁴ Statistics Canada; total of all food transport * (est. seafood tonnes / total food tonnes)

¹⁵ Aggregate of industry participant views, calculation relative to

Canada's figures ¹⁶ Aggregate of industry participant views, calculation relative to Canada's figures ¹⁷ <u>Statistics Canada</u>; average of all food transport + expert

interview

¹⁸ Multiplying tkm by \$/tkm

¹⁹ Multiplying tkm by non-refrigerated and refrigerated \$/tkm

²⁰ Aggregate of industry participant views

FREIGHT DATA COMPARISON SUMMARY

As a perishable animal protein, seafood requires refrigerated conditions and as little transit time as possible within the supply chain to maintain freshness and product quality. As such, the efficiency of the seafood supply chain is an extremely important part of seafood trade. Australia's seafood supply chain volumes (c.340kt) are around a quarter of those in the U.K. (c.1,217kt) and Canada (c.1,345kt). The average trip duration in Australia (c.24 hours) is high, driven by salmon volumes coming from Tasmania and barramundi volumes coming from the Northern Territory. Comparatively, the both the U.K. (c.2-3 hours) and Canada (c.10 hours) have lower average journeys than in Australia. This difference in average journey time due to higher distance travelled leads to a comparable task in Australia (c.400tkm) relative to the U.K (c.389tkm) and Canada (c.900-1,100tkm) despite Australia's lower volumes.

Seafood freight costs vary between countries. The cost of seafood freight per tkm in Australia (AUD c.\$0.33) and the U.K. (AUD c.\$0.29 for ambient, AUD c.\$0.37 for refrigerated) are relatively similar, while the cost in Canada is notably lower. Industry participants have suggested that this lower cost can, at least in part, be attributable to cheaper fuel costs and high efficiency of backhaul volumes between the U.S. and Canada.

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