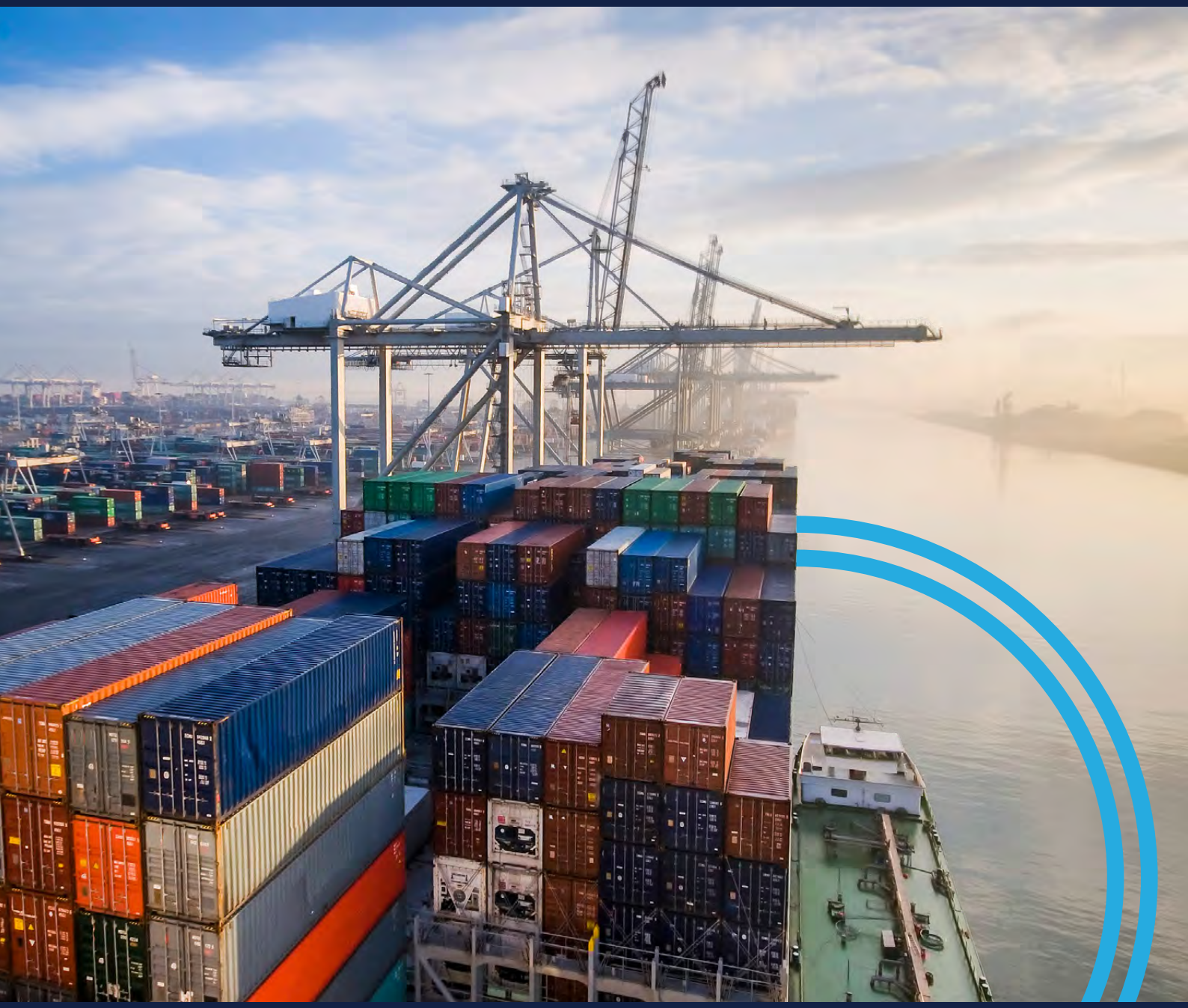
Industry Skills Australia



Strategic Fleet
Workforce Supply and Demand Forecast Study

September 2025

JSC Jobs and Skills Council
Transport and Logistics
An Australian Government Initiative

About ISA

Industry Skills Australia (ISA) has been established as the Jobs and Skills Council (JSC) for the Transport Supply Chain industries, which includes Aviation, Maritime, Rail, Transport and Logistics, and the emerging sectors of Omnichannel Logistics and Distribution, and Air and Space Transport and Logistics.

Owned and led by industry, our JSC is committed to building a world-class supply chain workforce to increase productivity, create better jobs and build opportunities for individuals.

We will do this through:

- leveraging almost 30 years of history with Transport Supply Chain industries
- undertaking research and data analysis to inform workforce planning
- advocating for a workforce development approach in tackling industry skills issues, and
- developing priority training package products.

Publication Date

To be confirmed.

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Industry Skills Australia Limited acknowledges and thanks representatives of the industry that provided their assistance in developing the Strategic Fleet Workforce Supply and Demand Forecast Study. ISA would also like to specifically acknowledge Australian Maritime Safety Authority (AMSA), Jobs and Skills Australia, the National Centre for Vocational Education Research (NCVER), the Bureau of Infrastructure and Transport Research Economics (BITRE), Centre of Decommissioning Australia (CODA) and 4C Offshore for the provision of data and advice for this project. This report was developed with funding from the Department of Employment and Workplace Relations under the Jobs and Skills Council Program. ISA also acknowledges the Traditional Custodians of Country throughout Australia.

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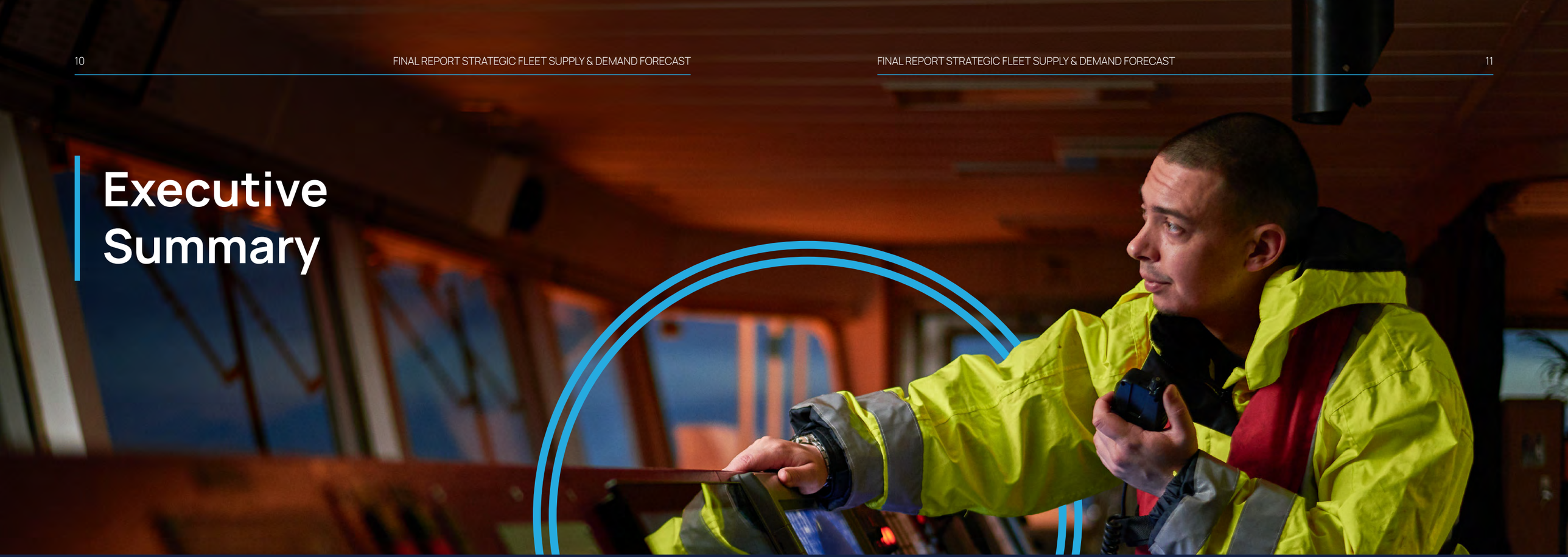


As an island nation, Australia's economic sovereignty, prosperity and national security are inextricably linked to a resilient maritime fleet crewed by skilled seafarers. In recognition, the Australian Government has committed to establishing an independent Strategic Fleet of up to 12 Australian-flagged and crewed vessels, commencing with a pilot of three vessels. Given this ambition, having an up-to-date understanding of seafarer supply and demand is more critical than ever.

This report presents findings from the Strategic Fleet Workforce Supply and Demand Forecast Study (the Study) conducted by Industry Skills Australia (ISA) in line with Recommendation 9 of the final report of the Strategic Fleet Taskforce[1]. By bringing datasets from multiple sources together for the first time, the Study provides an unprecedented level of insight into the size, composition and future dynamics of Australia's maritime freight workforce.

In addition to refining data on the current maritime workforce, the Study gathered information on training and career pathways to better understand how individuals enter, progress through, and exit from the maritime freight industry. A key feature of the Study was the application of systems dynamic modelling to simulate workforce levels, including inflows and outflows across a range of scenarios. This modelling incorporated key variables such as age profiles, promotions, retirement and industry growth, providing a detailed picture of workforce dynamics over time.

The Study primarily focused on seafarers who hold certificates issued in accordance with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)[2]. Expanding the pool of these STCW-qualified seafarers is a key priority in achieving the Strategic Fleet Taskforce's objectives.

1 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. (2023). Strategic Fleet Taskforce: Final report. Commonwealth of Australia. https://www.infrastructure.gov.au/sites/default/files/documents/strategic-fleet-taskforce-final-report.pdf

2 International Maritime Organization. (1978). International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 (as amended). https://www.imo.org/en/ourwork/humanelement/pages/stcw-convention.aspx

Key findings

Australia's trading fleet

The Study is the first to collate and harmonise disparate data on Australia's trading fleet. Analysis reveals a significant shift in fleet composition over the past decade. By 2022-23, the number of Australian-flagged vessels in the trading fleet (including both major and minor components) had fallen by 27% from a peak of 73 vessels in 2015-16. Over the same period, the total number of vessels employing Australian crew, regardless of flag, declined by 32%.

In 2022-23, there were an estimated 1,441 Australian crew positions, a 35% decrease compared to 2013-14. This decline reflects a broad structural change within the fleet, with a marked trend towards larger, foreign-flagged vessels which has contributed to the shrinking number of Australian seafarers.

STCW seafarer demographics

The Study highlights several striking demographic trends among STCW-certified seafarers in Australia. Notably, with a median age of 49, this workforce is a full decade older than the national median (39[3]) and more than one-third are expected to retire within the next decade. Nearly half of all Masters and Class 1 Engineers are nearing retirement age, with too few junior officers available to replace them.

Gender imbalance remains a challenge in the industry, with women making up only 3.5% of the STCW workforce, predominantly in non-technical roles. Fewer than 1% of engineering-qualified seafarers are women. However, the median age of female seafarers is 7 years lower than their male counterparts, indicating potential for gradual change over time.

Geographically, Tasmania stands out with the highest per capita concentration of seafarers, despite larger states having greater absolute numbers.

The training pipeline

Analysis of the training pipeline for seafarers provides further insight into workforce demographics. With a median age of 33, graduates are 16 years younger than the current STCW certified workforce. Despite this younger profile, there is a persistent gender imbalance in the training pipeline. Although female representation in Engine and Ratings training has doubled from a very low base, there has been no evident improvement in the proportion of female Deck Officer graduates. First Nations people are also under-represented in officer training pathways (Deck and Engine) despite being over-represented in Ratings qualifications.

Tasmania is the dominant geographic location for STCW training, with more than half of all graduates completing their studies in the state.

3 Jobs and Skills Australia. (2025). Occupation profiles data – May 2025 (Table 9, 4-digit occupations) [Data set]. Jobs and Skills Australia. https://www.jobsandskills.gov.au/sites/default/files/2025-07/occupation_profiles_data_-_may_2025.xlsx

Graduate employment outcomes

The Study examined graduate employment outcomes to assess how well the training system is meeting the needs of the maritime freight sector, comparing outcomes for STCW graduates with those who completed Near Coastal qualifications.

Near Coastal qualifications lead to diverse career pathways, ranging from traditional maritime positions to less expected roles including Police Officer and Park Ranger. In contrast, STCW qualifications provide a more specialised pathway with graduates overwhelmingly entering core maritime roles like Ship's Engineer and Deck Hand.

The tourism industry is the largest single employer of maritime graduates, significantly outpacing the freight industry. While only a small proportion of graduates are directly employed in the Water Freight Industry, many enter the industry indirectly through labour-hire arrangements, as a substantial share of maritime graduates are employed by labour supply and recruitment agencies.

Seafarer career pathways

The Study examined existing career pathways by mapping formal progression routes across seafaring roles and analysing career movements using training and certification data. Despite the availability of numerous formal routes to senior maritime roles, most seafarers follow a primary, dominant pathway for each peak qualification. On average, it takes approximately 7.5 years to progress from an entry-level certificate to a Masters Unlimited, and 6.4 years to reach Engineer Class 1. However, career progression analysis is constrained by the available data because 83% of seafarers in the dataset hold only a single certificate.

Notably, while only 1% of Near Coastal graduates transition to an STCW qualification, this group represents a significant inflow into the much smaller STCW-qualified workforce, accounting for nearly 7% of all new STCW completions.

Future scenarios

To understand how these pressures will evolve, the Study developed a system dynamics model to forecast workforce supply and demand. The model focuses on the Australian crewed Major fleet, as this is the fleet most relevant to the Strategic fleet. The model shows that while the Strategic Fleet provides a vital floor for the fleet's survival, it does not fix the underlying cost issues causing the wider fleet's decline. This is compounded by an ageing workforce and powerful new competition for crew from the offshore energy sector through the next decade. The model identifies the number of available training berths as the ultimate bottleneck, a critical constraint that limits the entire system's ability to train the next generation of seafarers needed to meet future demand.

Strategic implications

The Study establishes robust benchmarks, grounded by accepted industry definitions and reliable datasets, providing a strong foundation for shaping the future of Australia's maritime freight workforce. This comprehensive evidence base will enable industry leaders, policymakers and training providers to make informed decisions, target strategic interventions and anticipate challenges and growth opportunities over the coming decade.

The report is intended to spark collaborative dialogue, guide future policy development and support the ongoing evolution of Australia's maritime freight industry. As the industry navigates rapidly changing economic and security environments, findings from the Study will serve as a critical resource for aligning workforce strategy with the nation's Strategic Fleet ambitions.

Key terms and concepts

Acronyms used in this report

ABS	Australian Bureau of Statistics
AMSA	Australian Maritime Safety Authority
AVETMISS	Australian Vocational Education and Training Management Information Statistical Standard
BITRE	Bureau of Infrastructure and Transport Research Economics
CoC	Certificate of Competence
CoP	Certificate of Proficiency
COST	Certificate of Safety Training
DCV	Domestic Commercial Vessel
IMO	International Maritime Organization
ISA	Industry Skills Australia
JSA	Jobs and Skills Australia
MAR	Maritime Training Package
NC	Near Coastal
NCVER	National Centre for Vocational Education Research
RAV	Regulated Australian Vessel
RTO	Registered Training Organisation
STCW	Standards of Training, Certification and Watchkeeping
STP	Single Touch Payroll
URF	Unit Record File
USI	Unique Student Identifier
VET	Vocational Education and Training

Key terms and concepts used in this report

Australian trading fleet	As identified by BITRE, freight ships owned or operated by Australian companies at the end of each financial year, including only active vessels that called at an Australian port during the year.
Entry point roles	Foundational qualifications or roles, such as Watchkeeper Deck or Navigational Watch Rating, that do not require prior seafaring experience.
Major trading fleet	Vessels with a deadweight tonnage of 2,000 or more.
Minor trading fleet	Vessels with a deadweight tonnage of less than 2,000 tonnes.
Seacare Scheme	A national scheme providing safety, rehabilitation, and compensation for seafarers on prescribed vessels.
Seafarer	Individuals who hold a valid certificate issued by the Australian Maritime Safety Authority (AMSA) that legally permits them to work on commercial vessels in Australian waters.
Sea time	The documented time a person has spent working on a vessel at sea, which is a requirement for obtaining or upgrading maritime certificates.
Strategic Fleet	An Australian Government initiative to establish a fleet of up to 12 Australian-flagged and crewed vessels that operate commercially but are available for government use in times of crisis.
Temporary Licence	Licences granted for foreign vessels to temporarily operate on specific coastal routes when no Australian-flagged ship is available.
Ticket	An informal term for any current AMSA seafarer certificate, including Certificates of Competency (CoC), Certificates of Proficiency (CoP), and Certificates of Safety Training (COST).
Training berth	A designated position on a vessel for a trainee or cadet to gain the required sea time and practical experience needed for certification.
Transitional General Licence	Trading licences that were intended to help transition foreign-flagged vessels to Australian registration.

01

Introduction

Over the past three decades, Australia's maritime freight sector has experienced a marked shift from predominantly Australian-flagged vessels towards foreign-flagged ships, raising significant concerns about economic sovereignty, supply chain resilience and national security. In response, the Australian Government has committed to establishing a Strategic Fleet to safeguard essential trade and reduce vulnerability to global disruptions.

The Strategic Fleet will require a skilled maritime workforce, yet skill shortages are already being felt in key maritime occupations. The challenges of an ageing workforce and emerging skills shortages, which are detailed in this study, have been echoed by major industry employers, who have highlighted the erosion of this essential capability and a widening gap between the demand and supply of maritime professionals[4]. In addition to a year-on-year increase in freight task, demand for maritime workers is being driven by the requirements of offshore wind farm construction and maintenance, and oil and gas decommissioning.

To support informed investment and policy decisions about Australia's Strategic Fleet, government and industry need reliable data on current and future maritime workforce supply and demand. This report addresses these challenges by providing a detailed profile of the maritime freight workforce, an analysis of career pathways and robust forecasts of seafarer supply and demand, to guide targeted policy and workforce development.

4 Australian Resources and Energy Employer Association. (2024, July 23). INPEX maritime workforce position paper. AREEA. https://www.areea.com.au/wp-content/uploads/2024/07/2024-07-23_INPEX_Maritime_Workforce_Position_Paper.pdf

Background

The composition of the Australian trading fleet has undergone a profound structural shift. Australian-flagged vessels, once dominant, have steadily been replaced by foreign-flagged ships. In the early 1990s, there were 73 Australian-registered major[5] trading vessels and only three foreign-flagged[6]. By 2022-23, this had reversed: around 20 Australian-flagged major vessels remained, compared to 81 foreign-flagged (Figure 1).

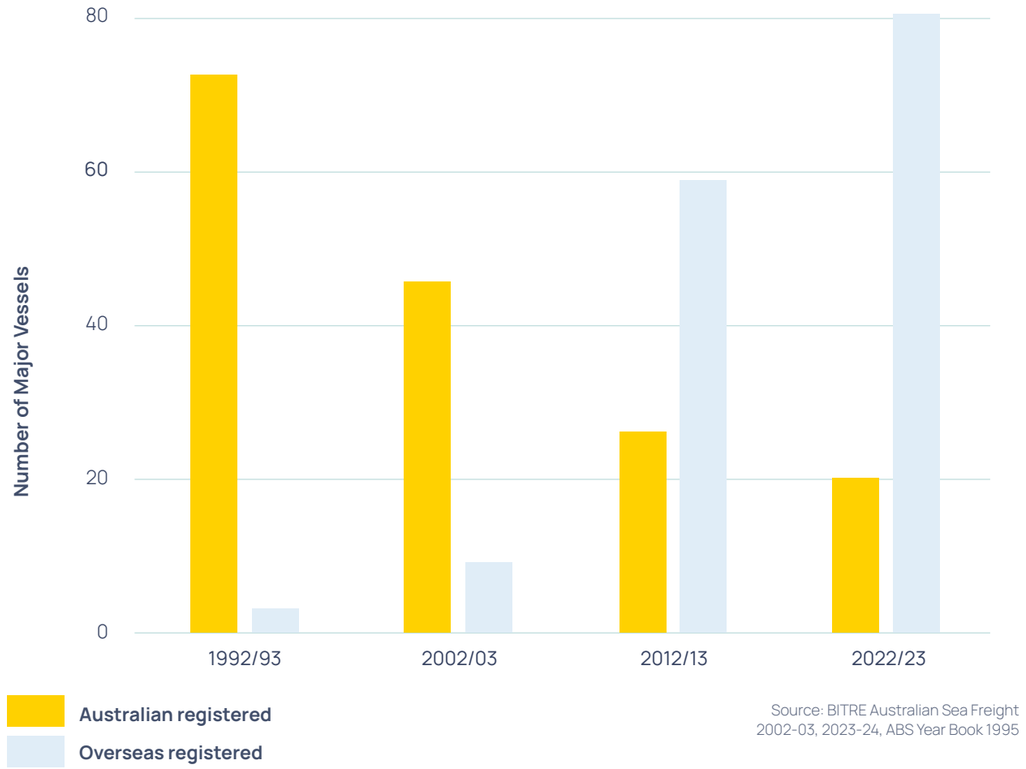


Figure 1: Trends in Australian and Overseas-Registered Major Vessels

5 2,000 dead weight tonnage and over
6 Australian Bureau of Statistics. (1995). Year Book Australia, 1995 (No. 1301.0). Retrieved from https://www.ausstats.abs.gov.au/ausstats/free.nsf/0/C77AC42B651AFF25CA2573DA007B95D4/$File/13010_1995_chapter21.pdf#page=16

This growing reliance on foreign-flagged shipping has raised significant policy concerns regarding Australia's economic sovereignty, supply chain resilience and national security. In response, the Australian Government established the Strategic Fleet Taskforce, which recommended[7] the creation of a Strategic Fleet of up to 12 Australian-flagged and crewed vessels. These would operate commercially but be available for government use in times of crisis. The government has committed to a five-year pilot program to establish three initial vessels, with a longer-term goal of expanding to 12. The Taskforce estimates that 432 STCW-qualified seafarers will be required to support the full fleet.

A clear understanding of the current and future maritime freight workforce is essential to support effective policy and investment planning for the Strategic Fleet. The long-term decline in domestic shipping has been a key driver of workforce contraction. However, existing data sources are fragmented. The available statistics are often obscured by overlap with other maritime-related occupations that use the same qualifications, certifications or training pathways.

7 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. (2023). Strategic Fleet Taskforce: Final report. Commonwealth of Australia. https://www.infrastructure.gov.au/sites/default/files/documents/strategic-fleet-taskforce-final-report.pdf

Purpose

The purpose of ISA's Strategic Fleet Workforce Supply and Demand Forecast Study (the Study) is to produce a comprehensive forecast of the supply and demand for maritime freight seafarers in Australia. Findings and forecasts from the Study will provide a critical evidence base to inform strategic planning for the national skills system, training providers, industry stakeholders and government bodies.

The Study directly responds to Recommendation 9 of the final report of the Strategic Fleet Taskforce[8], which calls upon Industry Skills Australia to "undertake maritime workforce planning, involving development of seafarer supply and demand forecasts" as part of the Maritime Industry 2025 Workforce Development Plan.

By documenting outcomes from the Study, this report aims to support the development of targeted strategies to address key challenges impacting the supply, development and retention of Australia's maritime workforce.

This report delivers three core components:

1. Workforce Profile: A detailed and authoritative analysis of the current size, demography and scope of Australia's existing maritime freight workforce.
2. Career and Training Pathways: A mapping and analysis of entry and progression routes within the maritime workforce, including transitions between Near Coastal and STCW qualifications.
3. Supply and Demand Forecast: A comprehensive projection of the number of seafarers required over the next five to ten years across various scenarios that consider the demands of the Strategic Fleet, offshore wind farm construction and maintenance, and oil and gas decommissioning.

8 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. (2023). Strategic Fleet Taskforce: Final report. Commonwealth of Australia. https://www.infrastructure.gov.au/sites/default/files/documents/strategic-fleet-taskforce-final-report.pdf

02

Understanding Australia's Maritime freight workforce

The Study draws on multiple data sources to build a profile of Australia's maritime freight workforce, establishing an evidence base to understand its current composition and the pipeline for future seafarers[9].

To build the maritime freight workforce profile, the Study:

- **Estimated the number of Australian seafarers** through an analysis of the Australian trading fleet (see Section 03 - *Australia's trading fleet*)
- **Examined demographic data** of qualified seafarers (see Section 04 - *STCW seafarer demographics*)
- **Analysed training data** to understand the characteristics of individuals undertaking maritime qualifications (see Section 05 - *The training pipeline*).

9 In the context of this Study, seafarers are defined as individuals who hold a valid certificate issued by the Australian Maritime Safety Authority (AMSA) that legally permits them to work on commercial vessels in Australian waters.

Seafaring certificates

Qualifications are central to the development of a workforce profile. In Australia's maritime industry, Australian Maritime Safety Authority (AMSA) seafarer certificates are the primary legal and professional credentials required for work. These certificates are commonly referred to as 'tickets'.

These tickets determine not only who can work on commercial vessels but also the specific roles they can perform from entry-level ratings to Masters of large ships.

The AMSA certification framework is the cornerstone for analysing the size, skill composition and career pathways of the maritime workforce.

Certification framework

Australia's maritime certification framework is divided into two main categories:

- **STCW certificates:** Issued in accordance with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers[10].
- **Near Coastal certificates:** Issued under Marine Order 505 that allow service on Australian domestic commercial vessels (DCVs) operating in Australian near-coastal waters[11].

The certification framework includes three certificate types: Certificates of Competence (CoC), Certificates of Proficiency (CoP) and Certificates of Safety Training (COST) (Table 1).

Each certificate qualifies the holder to serve in a specific capacity or role onboard a vessel. These roles are grouped into capacity categories, such as Deck, Engine, and Ratings, which are typically hierarchical and carry defined responsibilities and levels of authority within the vessel's command structure.

10 International Maritime Organization. (1978). International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 (as amended). https://www.imo.org/en/ourwork/humanelement/pages/stcw-convention.aspx

11 Australian Maritime Safety Authority. (n.d.). Marine Order 505: Certificates of competency under the national law. https://www.amsa.gov.au/about/regulations-and-standards/marine-order-505-certificates-competency-national-law

Table 1: Maritime Certificates of Competency and Proficiency by Domain, Group, and Capacity

Domain	Certificate Type	Group	Capacity
STCW	Certificates of Competency (CoC)	Deck	Master; Chief Mate; Mate; Watchkeeper Deck
		Engine	Engineer; Engineer class 1; Engineer class 2; Engineer Watchkeeper; Electro-technical Officer
		Yachts	Master (yachts); Chief Mate (yachts); Watchkeeper Deck (yachts)
	Certificates of Proficiency (CoP)	Ratings	Chief Integrated Rating; Integrated Rating; Able Seafarer Engine Rating; Able Seafarer Deck Rating; Engine Room Watch Rating; Navigational Watch Rating
		Other	Marine Cook
	Certificate of Safety Training (COST)	-	All STCW seafarers
Near Coastal	Certificates of Competency (CoC)	Master	Master Near Coastal; Master Inland Waters
		Engineer	Engineer Near Coastal; Marine Engine Driver
		Dual	Coxswain; General Purpose Hand
		Sailing Master	Sailing Master Coastal; Sailing Master Offshore

Linking vessel operations to certification requirements

The type of qualifications required for a vessel's crew is primarily determined by the vessel's area of operation. Minimum safe crewing (or 'manning') requirements for Australian regulated vessels are mandated by Navigation Act 2012[12].

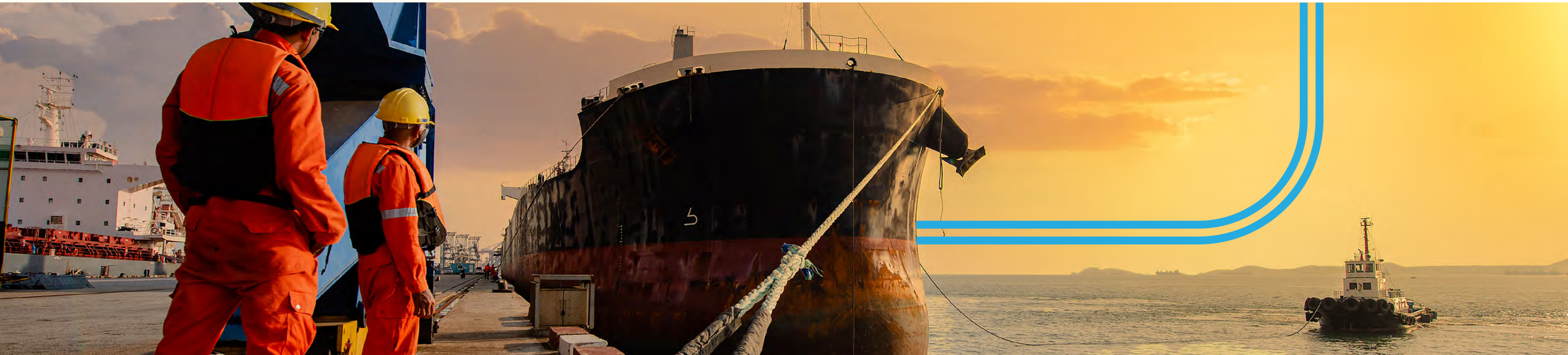
- A vessel undertaking **international voyages** must comply with the STCW Convention. The entire crew, from the Master to the Ratings, must hold the relevant **STCW** certificates.
- A vessel operating exclusively as a Domestic Commercial Vessel (DCV) in **Australian near-coastal waters** is governed by domestic regulations, principally Marine Order 505. The crew must hold the appropriate **Near Coastal** certificates.

For Domestic Commercial Vessels (DCVs), AMSA requires[13] owners to determine and document safe crewing levels based on vessel size, operations, and risk factors, with larger vessels generally expected to meet STCW standards.

The direct link between a vessel's operational profile (international or domestic) and its legally mandated crewing is central to understanding the supply and demand for qualified seafarers. Using this connection, the Study analysed the composition of the Australian trading fleet to estimate the overall supply of seafarers in the STCW and Near Coastal domains.

12 Australian Government. (2012). *Navigation Act 2012* (Act No. 128 of 2012). Federal Register of Legislation. https://www.legislation.gov.au/Details/C2012A00128

13 Australian Maritime Safety Authority. (2024, March 21). *Crewing guidance for domestic commercial vessels*. https://www.amsa.gov.au/vessels-operators/domestic-commercial-vessels/crewing-guidance-domestic-commercial-vessels



03

Australia's trading fleet

Over the past decade, Australia's trading fleet has undergone a fundamental transformation, marked by a steep decline in the number of Australian-crewed vessels and a corresponding 35% drop in local seafarer positions.

To fully grasp the drivers and scale of this change, this section analyses the composition and trends of the fleet. The Australian trading fleet, as defined by the Bureau of Infrastructure and Transport Research Economics (BITRE)[14], comprises freight ships owned or operated by Australian companies as at the end of each financial year. It includes only active vessels that called at an Australian port during the year and excludes passenger-only ships and vessels under 150 gross tonnes.

The fleet is categorised into major and minor trading fleets based on deadweight tonnage and further classified by trading patterns (coastal or international) and registration status (Australian or overseas). The BITRE dataset used for the Study covers the period from 2013-14 to 2022-23.

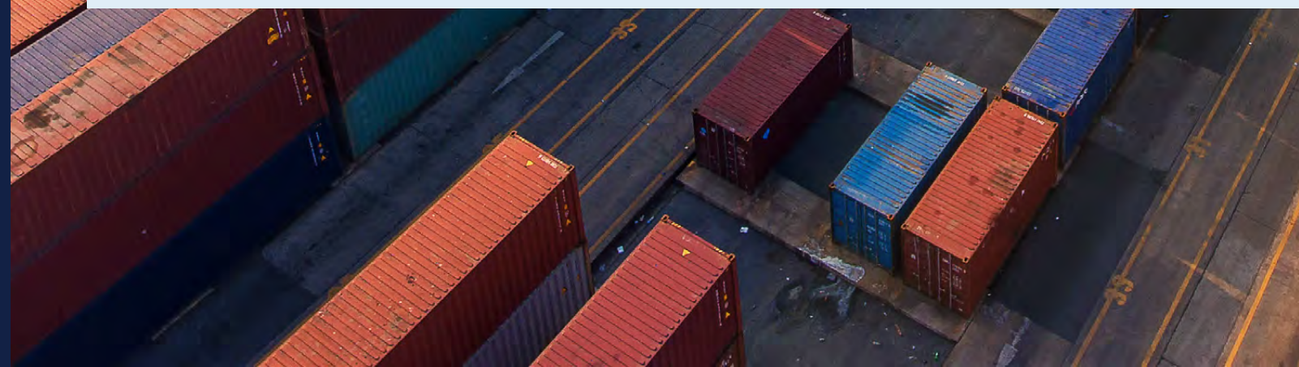
14 Bureau of Infrastructure and Transport Research Economics. (2023). *Australian sea freight 2020-21* (Statistical report, p. 77). Canberra, ACT: BITRE. https://www.bitre.gov.au/sites/default/files/documents/Australian%20Sea%20Freight%202020-21.pdf

Table 2: Trading Fleet Classifications

Vessel size	
Major trading fleet	**Minor trading fleet**
Deadweight tonnage of 2,000 or more	Deadweight tonnage of less than 2,000 tonnes
Trading pattern	
Coastal trading fleet	**International trading fleet**
80% or more of voyages involve Australian ports	More than 20% of voyages involve overseas ports
Registration status	
Australian registered/flagged	**Overseas** registered/foreign flagged

Headline insights

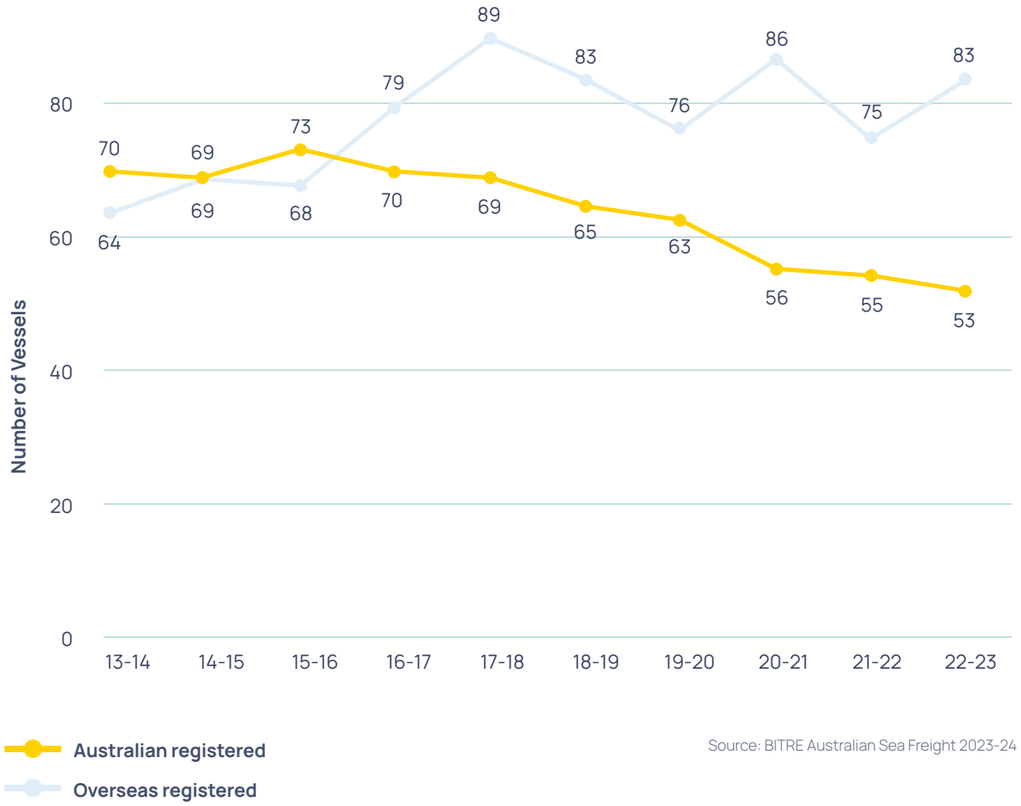
- **Decline in Australian-flagged vessels:** By 2022-23, the number of Australian-flagged vessels in the trading fleet (including both major and minor components) had fallen by 27% from a peak of 73 in 2015-16.
- **Reduction in vessels employing Australian crew:** Over the decade to 2022-23, the number of vessels employing Australian crew, regardless of flag, declined by 32%.
- **Decrease in Australian crew positions:** In 2022-23, there were an estimated 1,441 Australian crew positions, representing a 35% drop since 2013-14.
- **Structural shift in fleet composition:** The move toward larger, foreign-flagged vessels has significantly contributed to the decline in Australian seafarer numbers.



Declining numbers of Australian-flagged vessels

The flag a ship flies, known as its flag state, determines the national laws and regulations that apply to the vessel, including those that govern crewing. For Australian-flagged ships, this generally means they must comply with Australian labour laws, safety regulations, requiring the employment of crew under Australian conditions.

The number of Australian-flagged vessels in the trading fleet (including both major and minor components) has declined in recent years, falling 27% from a peak of 73 vessels in 2015-16. A significant contributor to this decline was the reflagging of 12 Australian-flagged vessels to foreign registers, with these events peaking in the 2017-18 and 2020-21 financial years.



Source: BITRE Australian Sea Freight 2023-24

Figure 2: Trends in Australian and Overseas-Registered Vessels

Sharp decline in Australian-crewed vessels

Foreign-flagged vessels may, under certain circumstances, employ Australian crew[15]. The national workplace relations system is established by the Fair Work Act. The Fair Work Act applies[16] to ships engaged in coastal trading (including foreign-flagged ships) in the Australian territorial sea and other Australian waters if they are:

- a general licensed ship
- an emergency ship, or
- a temporary licensed ship.

The Fair Work Act does not apply to ships that are registered on the Australian International Shipping Register when the ship is engaged in international trading.

The Seafarers Act establishes a rehabilitation and workers' compensation scheme for seafarers . However, it does not apply to all seafarers[17]. The following factors help determine if there is coverage by the Seafarers Act:

- whether the employee is a seafarer or a trainee
- whether the employee is on a prescribed ship
- the prescribed ship is engaged in international, inter-state or territory trade or commerce, and
- there is no exemption by the Seacare Authority from coverage under the Seafarers Act[18].

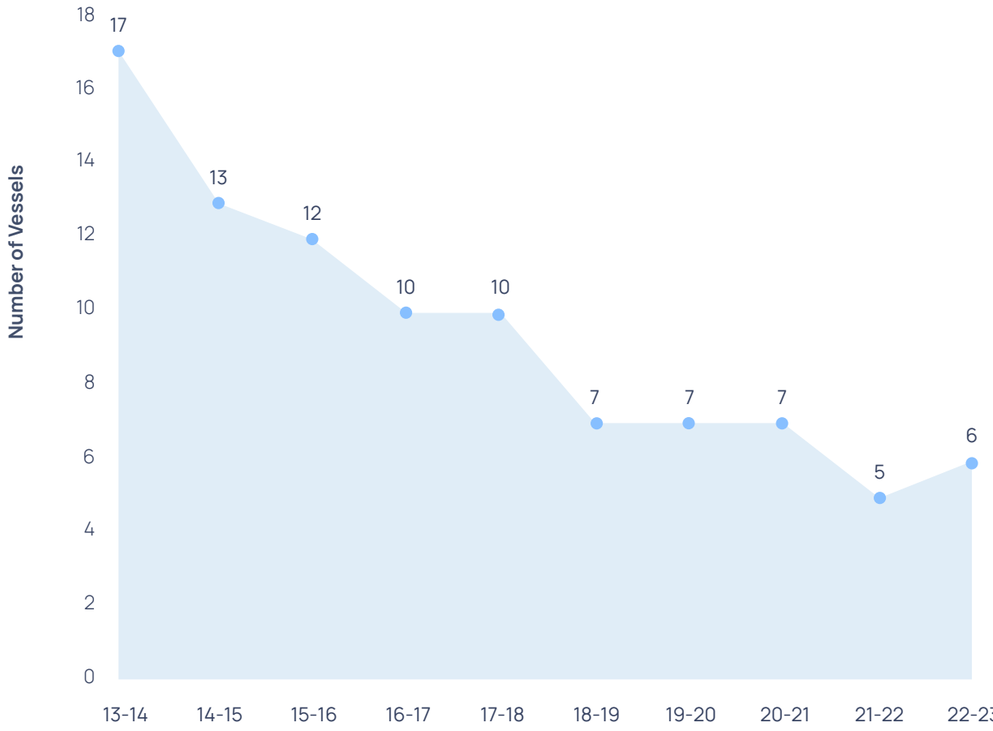
Historically, Transitional General Licences (available until 2017-18) also encouraged the use of Australian crew on foreign-flagged vessels by requiring applicants to declare that crew were Australian citizens or held appropriate Australian visas. However, despite these provisions, over the last decade, the number of foreign-flagged vessels employing Australian crews has plummeted by more than half, from 17 in 2013-14 down to just six (Figure 3.)

15 Maritime Union of Australia. (2023, December 14). Seventy Australian seafarers to join new Woodside LNG ship. https://webarchive.nla.gov.au/awa/20240324042050/http://www.mua.org.au/news/seventy-australian-seafarers-join-new-woodside-lng-ship

16 Fair Work Ombudsman. (n.d.). Maritime industry - workplace rights and entitlements. https://www.fairwork.gov.au/tools-and-resources/fact-sheets/rights-and-obligations/maritime-industry-workplace-rights-and-entitlements

17 Seafarers Safety, Rehabilitation and Compensation Authority. (2022, April 27). Who is covered [Web page]. Seacare. https://www.seacare.gov.au/coverage-legislation/who-is-covered

18 Since 2021-22, Seacare annual reports have stopped listing scheme participants and now only report exemptions, citing the unavailability of Seafarers Act insurance. The 2023 Blue Water Report attributes this to major insurers withdrawing from the Seacare market. This shift has likely forced operators to seek exemptions due to lack of access to mandatory insurance. Despite this, seven foreign-flagged trading vessels still employed Australian crew in 2022-23.



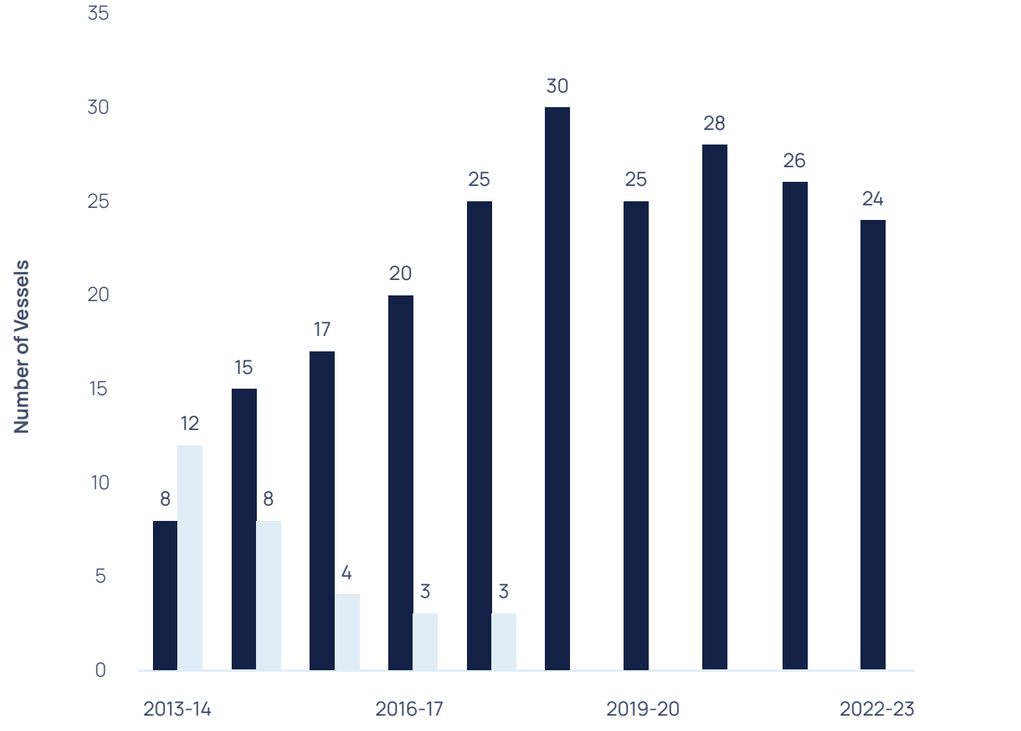
Source: BITRE Australian Sea Freight 2023-24. Seacare Authority. Annual Reports and Exemptions

Figure 3: Foreign-Flagged Vessels Employing Australian Crew

A key factor in this trend is the changing landscape of vessel licensing. As shown in Figure 4, the industry has shifted away from licence types that once encouraged the employment of local seafarers. Transitional General Licences, which were intended to transition foreign flagged vessels to Australian registration[19], were phased out by 2018-19. In their place, the use of Temporary Licences has surged. These licences are granted for foreign vessels to temporarily operate on specific coastal routes when no Australian-flagged ship is available[20], effectively creating a pathway for foreign-crewed ships to dominate coastal trade. Temporary Licences grew from just 8 in 2013-14 to a peak of 30 in 2018-19 and remained high at 24 in 2022-23.

19 Senate Standing Committees on Rural and Regional Affairs and Transport. (2015, October 12). Chapter 2 – The current law and the provisions of the bill. In Shipping Legislation Amendment Bill 2015 [Provisions]: Report. Commonwealth of Australia. https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Rural_and_Regional_Affairs_and_Transport/Shipping_Bill_2015/Report/c02

20 Ibid., Chapter 2.



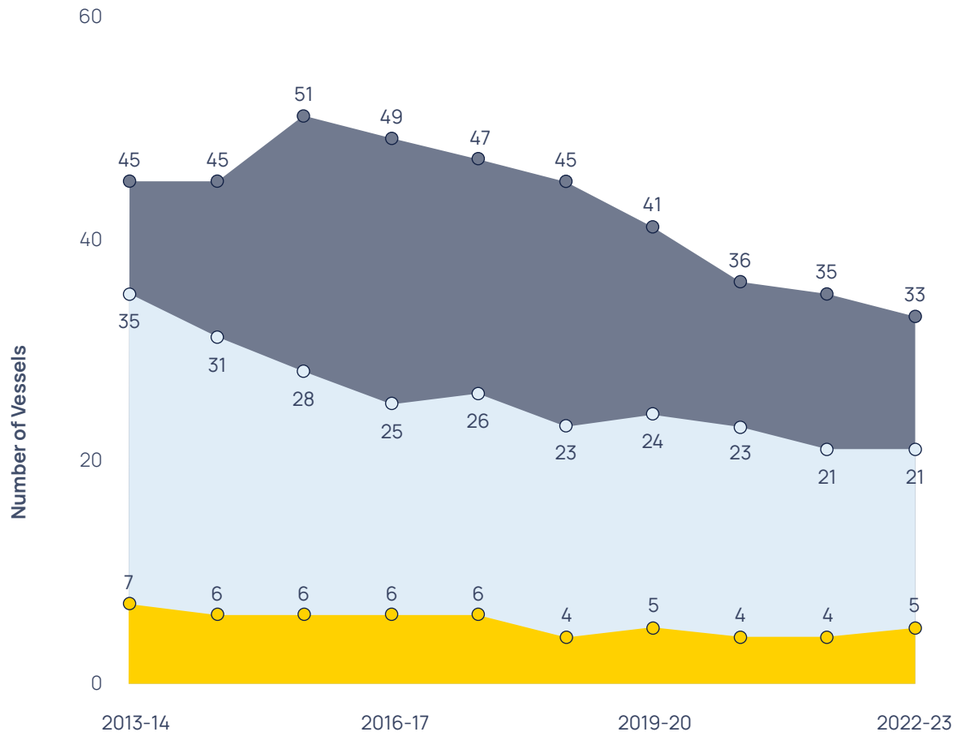
Source: DITRDCSA, General Licence Granted Data and Temporary Licence Voyage Reports

Figure 4: Licence Type by Foreign Flagged Vessel

Combined with the decline in Australian-flagged vessels, this has led to a significant reduction in the total number of trading vessels employing Australian crew, from 87 in 2013-14 to only 59 a decade later, representing a 32% decrease.

The decline in the Australian-crewed fleet has been uneven across the fleet sub-categories. The Minor fleet, which makes up the largest component of Australian-crewed vessels, has seen a 27% decline over the past 10 years. The Australian-crewed Coastal fleet has contracted by 40% over the same period.

While the International fleet had a decade of relative stability to 2022-23, it has since seen the last of its Australian-flagged vessels disappear with the reflagging of four North West Shelf LNG carriers in 2024[21]. This leaves a known total of two internationally trading vessels crewed by Australians: the ICS Reliance[22] and the Woodside Goode[23]. The latter appears in 2023-24 Seacare data, placing it just outside the timeframe of the primary BITRE dataset used for this analysis.



Source: BITRE Australian Sea Freight 2023–24, Seacare Authority, Annual Reports and Exemptions

Figure 5: Australian-Crewed Vessels by Type

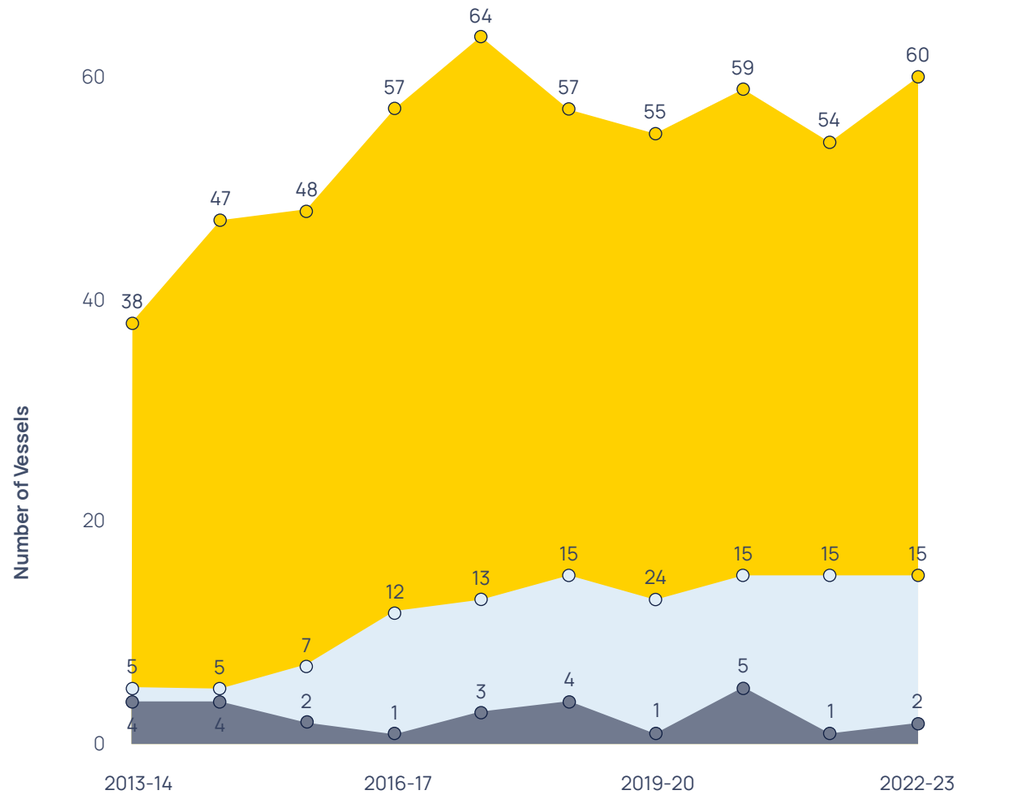
21 Crisp, D. (2024, March 20). Sayonara to NWS carriers. Daily Cargo News.

22 Maritime Union of Australia, Australian Institute of Marine and Power Engineers, & Australian Maritime Officers Union. (2025, July). Joint Maritime Unions submission: Consultation paper 1 – A new Australian second register (Table 4). https://www.aimpe.asn.au/files/202506_Joint_Maritime_Unions_Submission_-_consultation_paper_1_-_a_new_Australian_second_register.pdf

23 Australian Institute of Marine and Power Engineers. (2024, October). On Watch [PDF]. https://www.aimpe.asn.au/files/On_Watch_Oct_2024.pdf

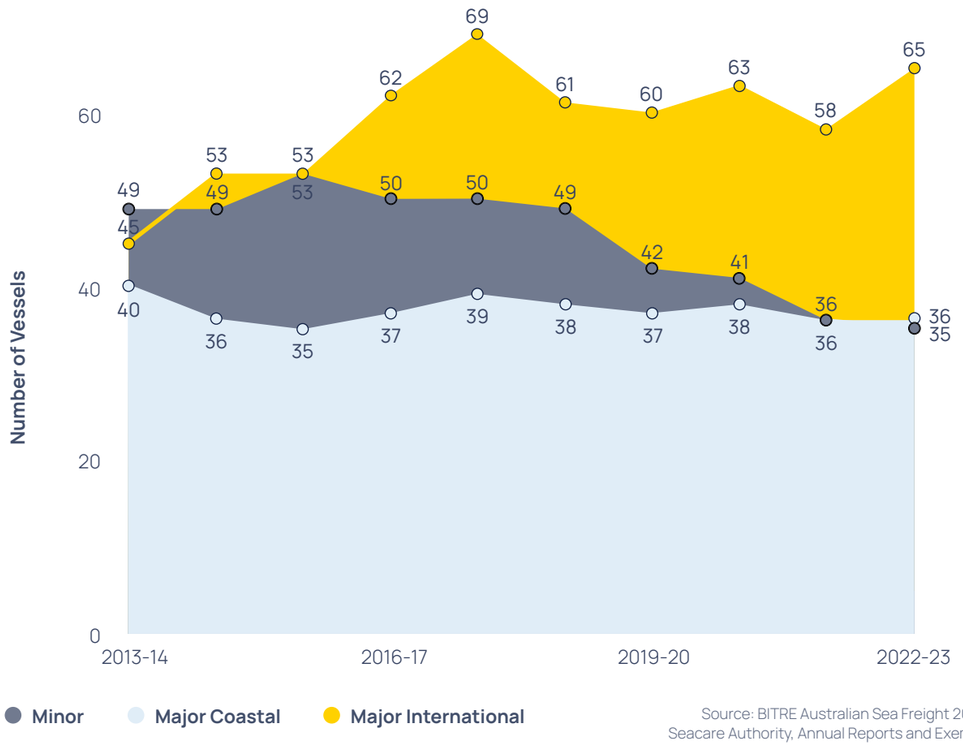
In contrast, the presence of foreign-crewed vessels grew significantly in the decade to 2022-23.

- Foreign-crewed vessels in the International fleet increased by 58%.
- Coastal vessels with foreign crew tripled, increasing from 5 to 15 vessels.
- The presence of foreign crew in the Minor fleet remained low throughout the decade with just 2 foreign-crewed vessels in 2022-23.



Source: BITRE Australian Sea Freight 2023–24, Seacare Authority, Annual Reports and Exemptions

Figure 6: Foreign-Crewed Vessels by Type



Source: BITRE Australian Sea Freight 2023–24, Seacare Authority, Annual Reports and Exemptions

Figure 7: Entire Trading Fleet Vessels by Type

When considering the entire trading fleet (Australian and foreign flagged) trends over the decade to 2022-23 show strong growth in the International fleet, relative stability in the Coastal fleet, and a decline in the Minor fleet.

However, these overall trends mask shifts in the concentration of Australian and foreign-crewed vessels which directly impact the Australian seafarer workforce.

- **International fleet:** Growth has been dominated by foreign-crewed vessels, while the presence of Australian crew in this sector has been reduced to just two foreign-flagged vessels[24].
- **Coastal fleet:** Foreign-crewed vessels are replacing Australian-crewed vessels. Australian-crewed vessels fell by 14 while foreign-crewed vessels increased by 10.
- **Minor fleet:** This fleet, which is almost entirely Australian-crewed, has declined by more than a quarter.

24 The Woodside Goode, a major international vessel, appears in the Seacare Scheme in 2023-24, just outside the scope of the BITRE dataset. Alongside the ICS Reliance, it is one of only two international trading vessels known to be employing Australian crew during this period.

Estimating the decline in Australian seafarer jobs

The Study quantified the workforce impact of trends in the trading fleet by converting vessel counts into an estimated number of seafarer positions using a systematic methodology that prioritised reliance on official data.

- For vessels below certain thresholds, crewing minimums were based on guidance from AMSA[25].
- For larger vessels, the analysis used data where AMSA had already determined appropriate crewing.
- For vessels not covered by the above methods, crewing estimates were derived through online research or, where necessary, projected using a multiple linear regression model based on the characteristics of similar vessels.

To illustrate this methodology in practice: a smaller general cargo ship might require a minimum crew of 4 under AMSA's guidance; a large Regulated Australian Vessel might have a specific manning level of around 19 as determined by AMSA; and a foreign-flagged bulk carrier's crew of 20 would be projected using our model, based on bulk carrier vessels with known crewing.

The analysis of estimated seafarer positions indicates that the impact on jobs has been more severe than vessel numbers alone suggest. While the number of ships employing Australians fell by 32% over the last decade, the corresponding number of crew positions dropped by around 35%, from an estimated 2,228 in 2013-14 to just 1,441 in 2022-23[26].

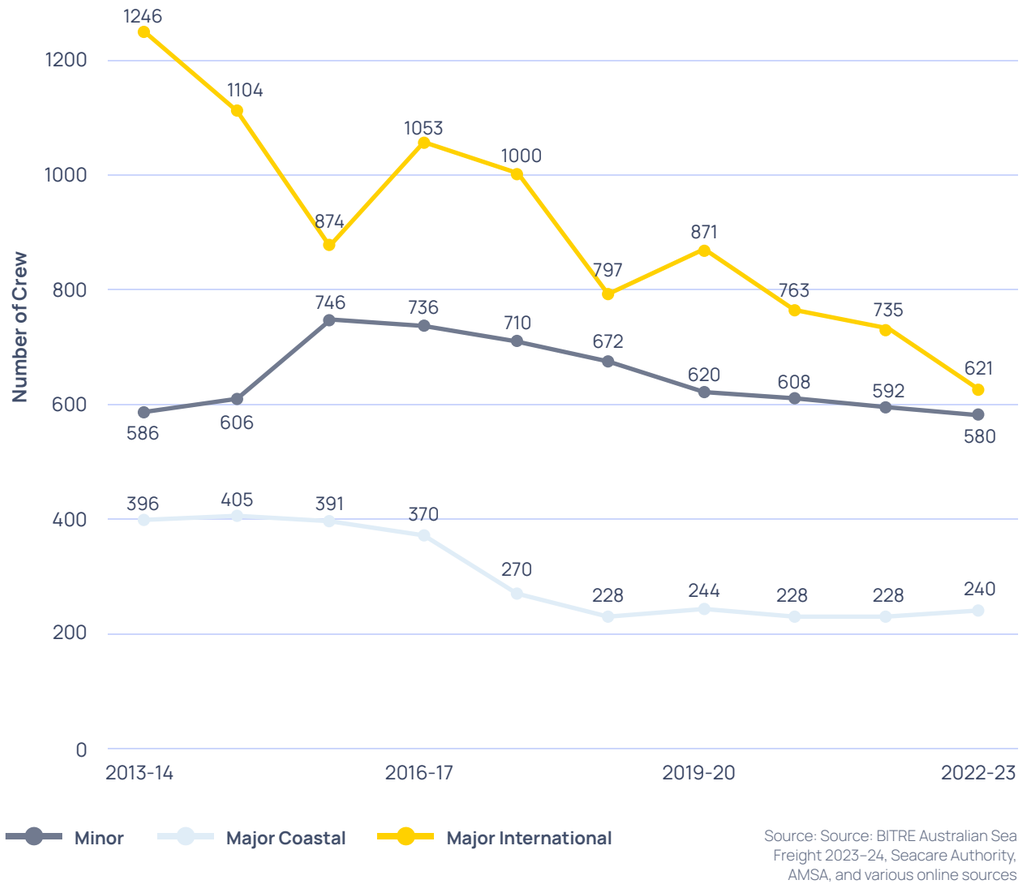
The decline in Australian crewing was widespread but not uniform. As shown in Table 3, Australian crew numbers fell in all fleets over the decade to 2022-23: by half (50%) in the Coastal fleet and by 39% in the International fleet. The Minor fleet, the most insulated of the three sectors, has seen its Australian crew numbers remain largely static over the last decade, however, this stability masks a 22% decline from its peak in 2015-16 (Figure 8).

25 Australian Maritime Safety Authority. (n.d.). Crewing guidance — domestic commercial vessels. Retrieved July 12, 2025, from https://www.amsa.gov.au/vessels-operators/domestic-commercial-vessels/crewing-guidance-domestic-commercial-vessels#Refertominimumcrewingtable

26 This estimate is based on normalised minimum safe crewing levels, which are then scaled to reflect the total crew complement. For LNG tankers, minimum crewing is multiplied by 2.4; for all other vessels, by 2. A small number of vessels had mixed crews at various times, but variations in crew composition and duration are not reflected in the estimate.

Table 3: Estimated Australian Crew Positions by Fleet Type

Fleet Segment	Est. Crew (2013-14)	Est. Crew (2022-23)	Change	% Change
Major Coastal	1,246	621	625	50.2%
Major International	396	240	156	39.4%
Minor	586	580	6	1.0%
Total	2,228	1,441	787	35.3%



Source: Source: BITRE Australian Sea Freight 2023–24, Seacare Authority, AMSA, and various online sources

Figure 8: Australian Crewing by Fleet Type

Next section

The crewing estimates presented in the previous section provide insight into the overall size of Australia's maritime freight workforce and highlight trends in positions filled by Australian seafarers.

The next section of the report provides information on the demographic profile of the workforce through an analysis of AMSA data on certificate holders.

04

STCW seafarer demographics

The previous section highlighted a decline in positions filled by Australian seafarers. To gain insight into the people who work in these roles, the Study analysed AMSA data on holders of Certificates of Competency and Certificates of Proficiency.

This section presents demographic insights into the qualified maritime workforce. The AMSA certificate dataset covers the whole of the qualified maritime workforce, including seafarers working in tourism and yachting, passenger transport, offshore oil and gas, public safety, port operations, aquaculture and fishing, and scientific research, as well as maritime freight.

The Study focuses primarily on holders of STCW certificates, as expanding this pool of STCW-qualified seafarers is a priority for achieving the objectives of the Strategic Fleet Taskforce.

Headline insights

- The median age of STCW seafarers is **49** - ten years above the national average.
- **Over one-third** of the workforce is expected **to retire** within the next decade.
- **Nearly half of Masters and Class 1 Engineers are nearing retirement,** with too few junior officers to replace them.
- **Women represent just 3.4% of the STCW workforce** and are largely in non-technical roles.
- **Fewer than 1%** of engineering-qualified seafarers are women.
- **Female STCW seafarers** are, on average, **7 years younger** than males.
- **Tasmania has the highest number of seafarers per capita,** despite larger states having greater overall numbers.

A looming retirement wave

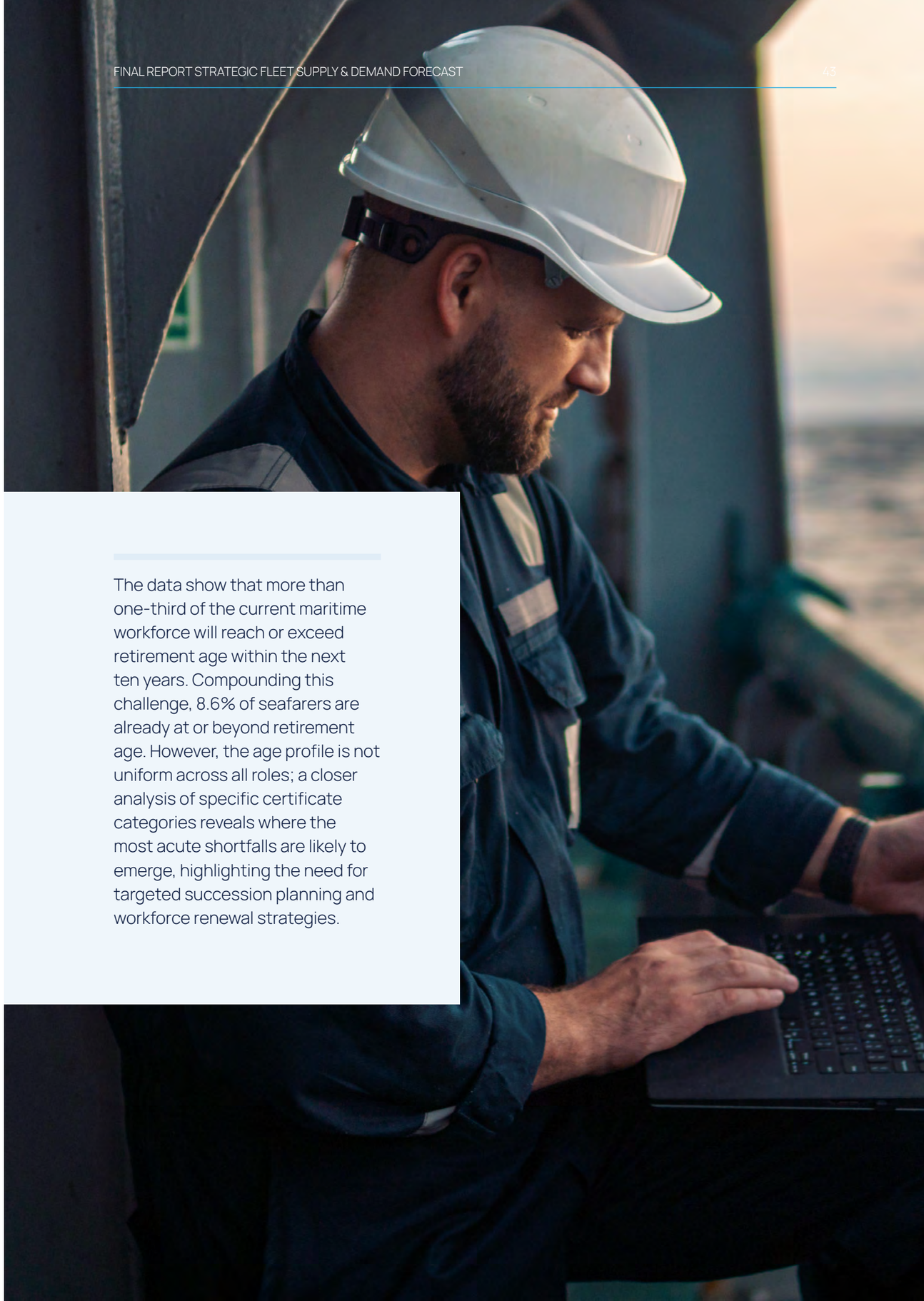
An examination of the age demographics of the STCW-qualified workforce reveals a significant structural challenge: the workforce is considerably older than the national average (Figure 9), signalling a wave of impending retirements that could lead to critical occupational shortages.

The median age of an STCW seafarer is 49, which is 10 years older than the median age of all Australian workers. This age disparity is further highlighted by the fact that approximately 60% of STCW seafarers are over the age of 45, compared to just 40% of the broader Australian workforce, placing them among the top 40 oldest occupations in the nation.[27]

Source: AMSA STCW CoC data (Nov 24), JSA Occupation Profiles data

Figure 9: Age Profile of STCW-Qualified Seafarers by Capacity Group

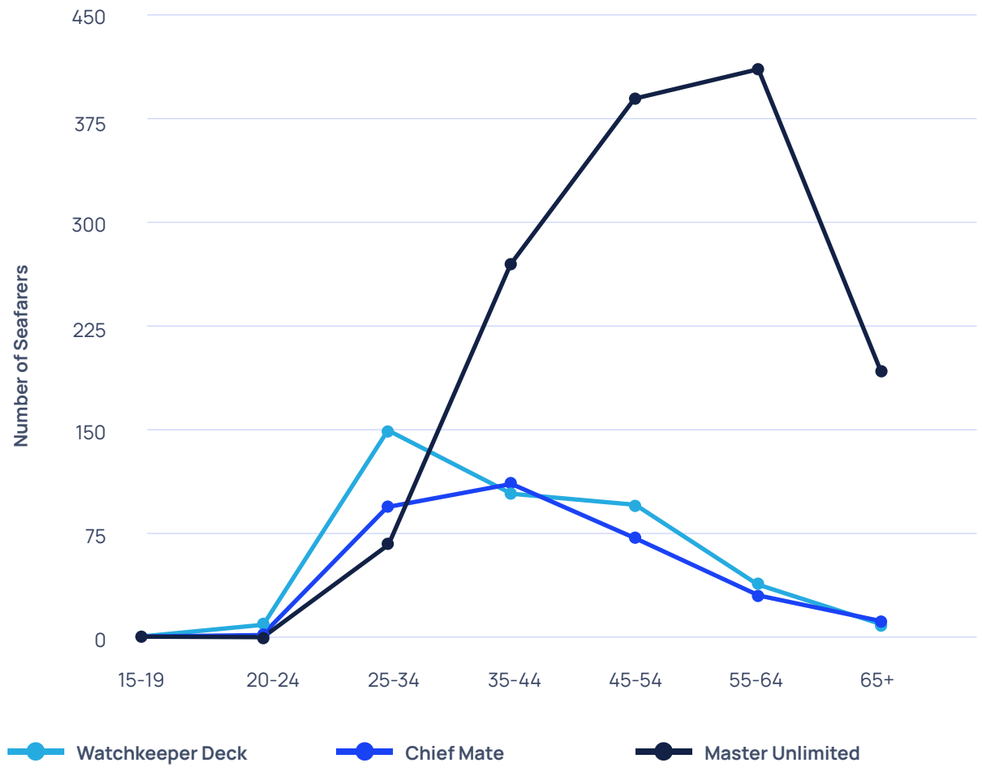
27 Jobs and Skills Australia. (2024, November). Occupation profiles data - November 2024 [Data set]. https://www.jobsandskills.gov.au/data/occupation-and-industry-profiles



The data show that more than one-third of the current maritime workforce will reach or exceed retirement age within the next ten years. Compounding this challenge, 8.6% of seafarers are already at or beyond retirement age. However, the age profile is not uniform across all roles; a closer analysis of specific certificate categories reveals where the most acute shortfalls are likely to emerge, highlighting the need for targeted succession planning and workforce renewal strategies.

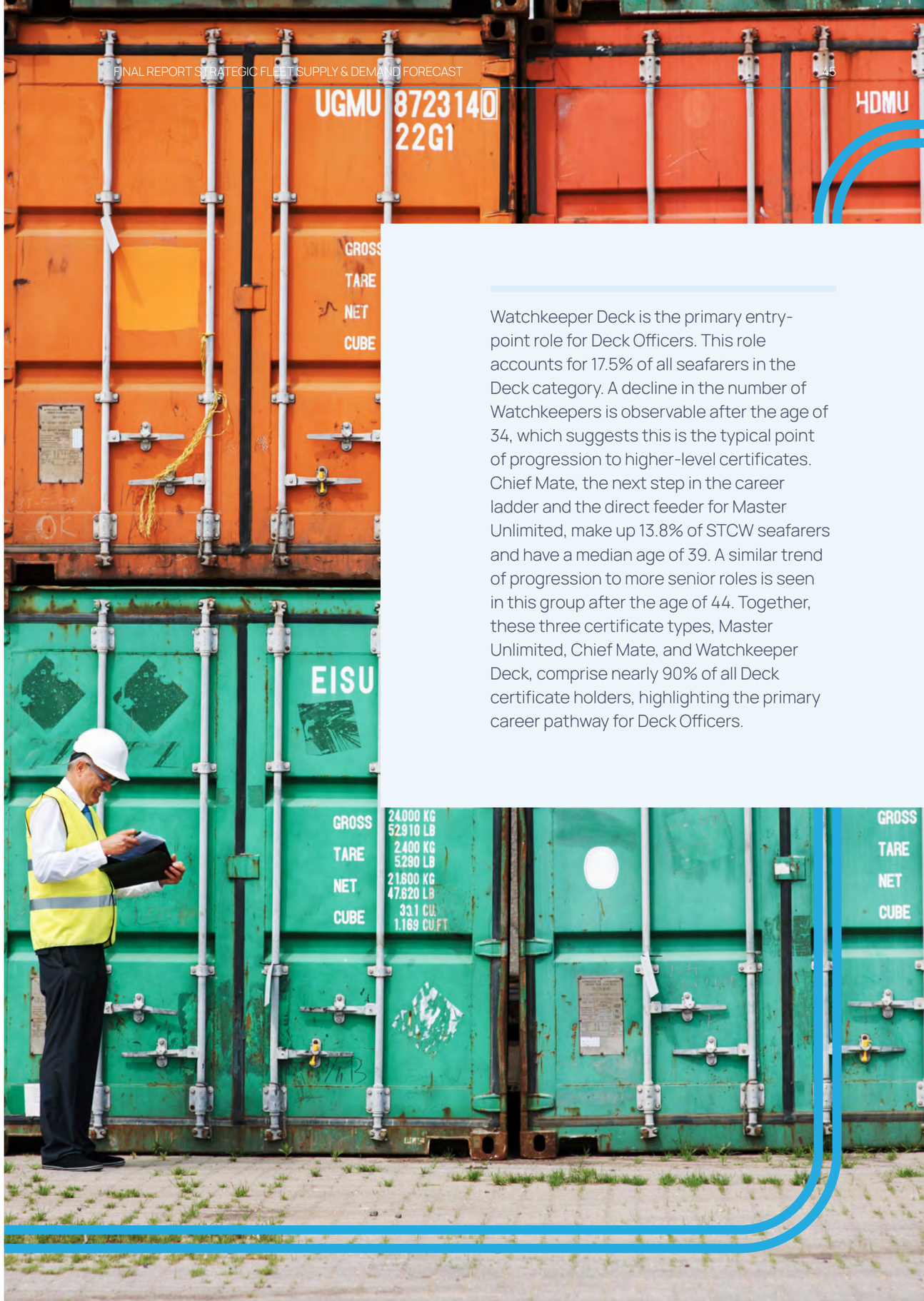
A generation at the helm prepares to retire

Within the Deck Officer cohort, those holding a Master Unlimited certificate constitute the largest group, at 58% of all deck seafarers (Figure 10). This group is also among the oldest, with a median age of 53. The data show that nearly half (45.3%), or around 600 Masters, are expected to reach or surpass the retirement age within the next decade. However, the pipeline of junior officers appears insufficient to fill the impending gap. The number of Masters Unlimited aged 55 and over is almost double the entire pool of feed-in officers (359 Chief Mates, Chief Mates < 3000 GT and Masters < 3000 GT).



Source: AMSA STCW CoC data (Nov 24)

Figure 10: Age Profile of STCW Seafarers by Deck Capacity



Watchkeeper Deck is the primary entry-point role for Deck Officers. This role accounts for 17.5% of all seafarers in the Deck category. A decline in the number of Watchkeepers is observable after the age of 34, which suggests this is the typical point of progression to higher-level certificates. Chief Mate, the next step in the career ladder and the direct feeder for Master Unlimited, make up 13.8% of STCW seafarers and have a median age of 39. A similar trend of progression to more senior roles is seen in this group after the age of 44. Together, these three certificate types, Master Unlimited, Chief Mate, and Watchkeeper Deck, comprise nearly 90% of all Deck certificate holders, highlighting the primary career pathway for Deck Officers.

The engine room's succession crisis

The age profile of Marine Engineers clearly indicates a clear pattern of career progression but also signals a significant future shortfall (Figure 11). The career path typically begins with Engineer Watchkeeper, the youngest group, with many advancing to Engineer Class 2 after the age of 34. Subsequently, progression from Class 2 to Class 1 Engineer is common around the age of 45.

Class 1 Engineers are the most numerous and oldest group, with a median age of 54. Like with Deck Officers, a substantial retirement wave is imminent. Approximately 48% of all Class 1 Engineers will reach or exceed retirement age in the coming decade. The data reveal a concerning gap: there are currently 376 Class 1 Engineers over the age of 55, which is more than the entire cohort of Class 2 Engineers under 55 (337). Since Class 2 is the sole pathway to achieving a Class 1 certificate, this disparity points to a looming shortage of senior engineers.

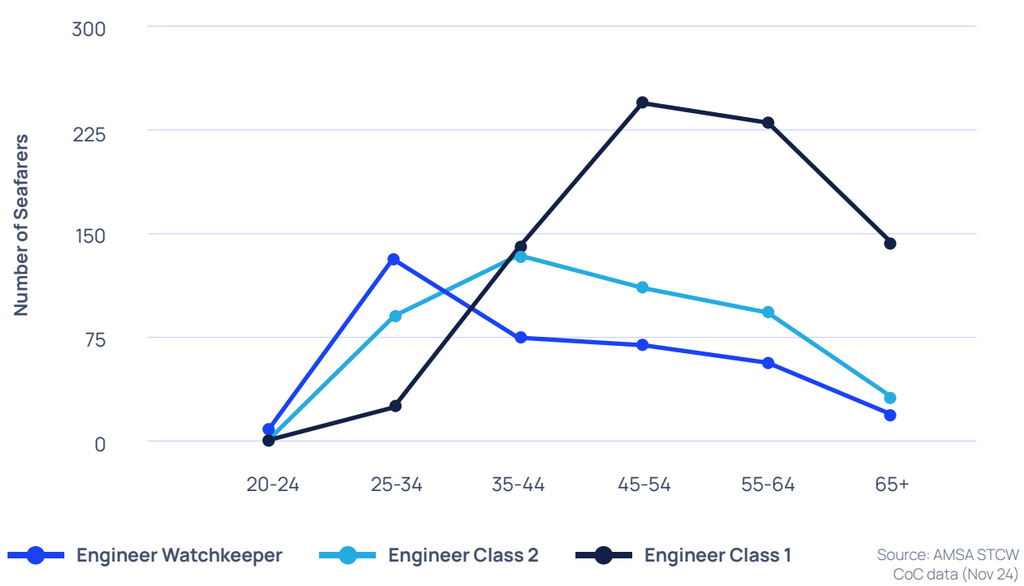


Figure 11: Age Profile of STCW Seafarers by Engine Capacity

An ageing Ratings workforce

Unlike the officer ranks, the most senior certificate for Ratings, Chief Integrated Rating, does not represent the majority. Instead, Integrated Ratings make up the largest portion at 61%. When combined with Navigational Watch Ratings, these two roles account for approximately 90% of all Ratings (Figure 12).

While the overall median age for Ratings is 49, there is significant variation within this group. For Navigational Watch Ratings the median age is 42, whereas for Chief Integrated Ratings it is 56, placing them among Australia's ten oldest occupational groups[28].

Able Seafarers constitute only 1.5% of all Ratings, and their median age of 53 for Able Seafarer Deck suggests this career pathway is in decline. As the Ratings career pathway diagram (Figure 28) illustrates, this is likely due to a more direct route enabling a Watch Rating to become an Integrated Rating, effectively bypassing the Able Seafarer stage.

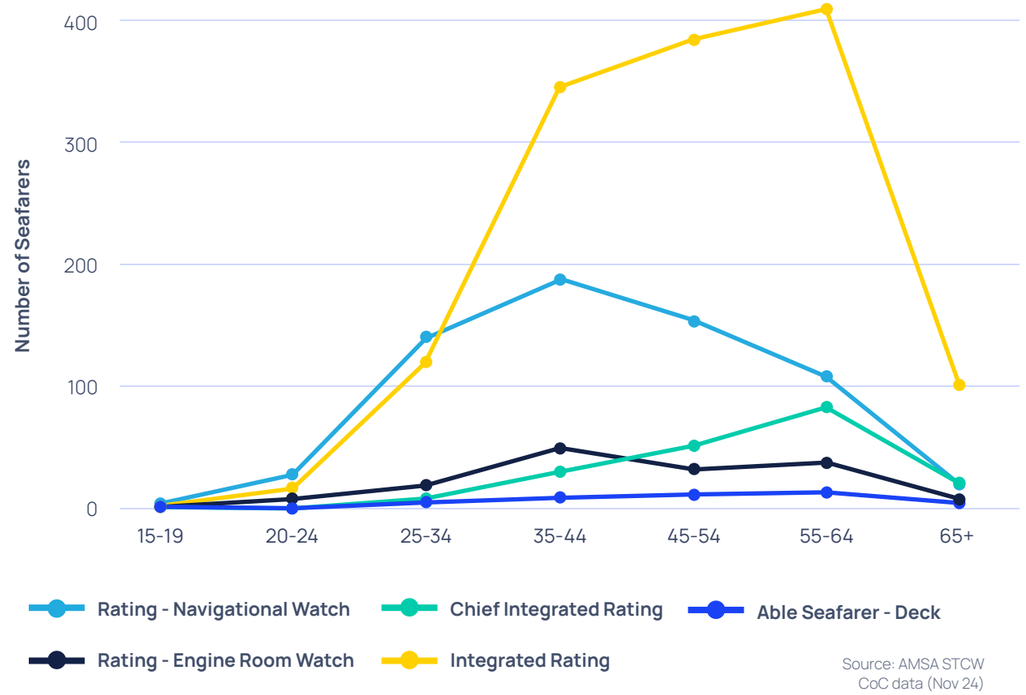


Figure 12: Age Profile of STCW Seafarers by Ratings Capacity

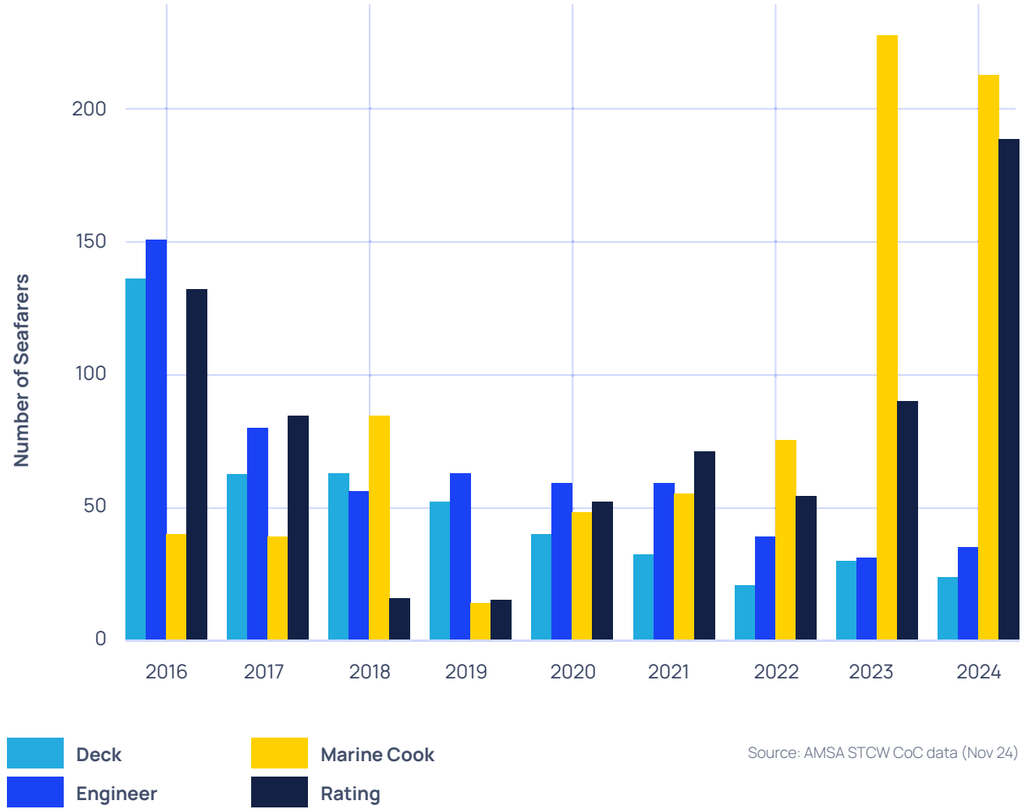
28 Jobs and Skills Australia. (2024, November). Occupation profiles data - November 2024 [Data set]. https://www.jobsandskills.gov.au/data/occupation-and-industry-profiles

Failing to replenish the ranks

The data clearly illustrates a significant challenge facing the maritime industry: a large portion of its most experienced seafarers is approaching retirement. To understand how this impending loss of personnel is being offset, it is crucial to examine the inflow of new seafarers. By examining the presence of new entrants, we can gain insight into the effectiveness of current recruitment and training pathways and assess the industry's capacity for renewal.

Given that the AMSA dataset represents a snapshot of all certificate holders at a specific point in time, identifying new entrants requires a clear definition. For this analysis, we define a "new entrant" as a seafarer who appears in the certificate data for the first time holding an entry-point qualification. These entry-point qualifications, such as Watchkeeper Deck, Navigational Watch Rating, and Marine Cook, are foundational certificates that do not require prior seafaring experience. This approach allows us to distinguish genuine newcomers from existing seafarers who are renewing their certificates.

As illustrated in Figure 13, the recent growth in new entrants, while positive at first glance, masks significant differences between capacity groups. The surge in 2023 and 2024 was overwhelmingly driven by a sharp increase in new Marine Cooks and Ratings. In 2023, Marine Cooks alone accounted for 60% of all new entrants. In 2024, new Marine Cooks and Ratings together comprised over 87% of the total intake.



Source: AMSA STCW CoC data (Nov 24)

Figure 13: New Entrants by Department

However, the nature of this surge among Marine Cooks warrants closer examination. In Figure 14, we can see the contrasting age profiles of new entrants from the last three years. While entrants for Deck, Engineering, and Ratings are relatively young (with median ages of 31, 33, and 37 respectively), the median age for a new Marine Cook is 47. This significantly older profile strongly suggests that the recent spike is not driven by new seafarers entering the industry, but rather by the formal certification, or upskilling, of an existing workforce.

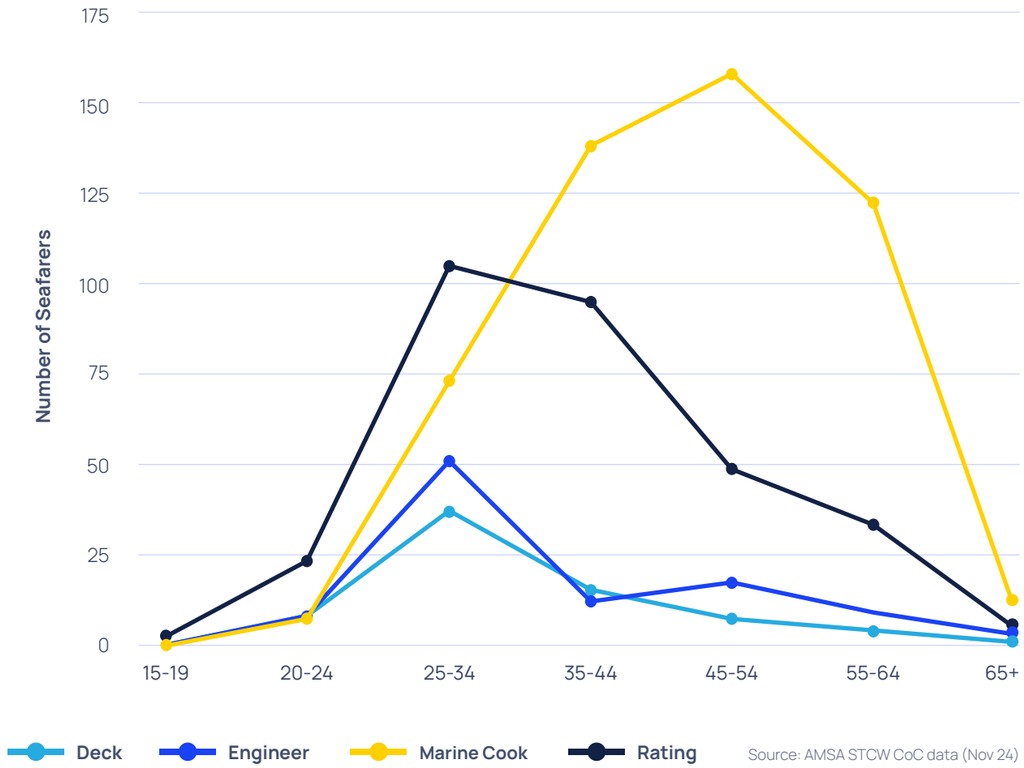


Figure 14: Age Profile of New Entrants (2022-2024)

There is no ambiguity about the intake of Deck and Engineer officers, the direct feed-in for the senior roles identified as facing a succession crisis, which has remained critically low. The number of new Deck entrants in 2024 stood at just 24, a fraction of the 136 who entered in 2016. Similarly, the Engineer intake of 35 in 2024 is dramatically lower than the 151 who joined in 2016. This trend confirms that the pipeline for replacing retiring Masters and Class 1 Engineers is not being adequately filled.

In conclusion, while the overall number of new seafarers has rebounded in the last two years, this recovery masks a deepening structural problem. The growth is almost entirely concentrated in new Ratings and the upskilling of existing Marine Cooks, while the intake for Deck and Engineer officer pathways has dwindled and failed to recover. This combination of an ageing senior workforce and a weak pipeline of junior officers is precisely what would be expected in an industry with a declining number of vessels, where diminished career opportunities and a lack of training berths creates a self-reinforcing cycle of workforce decline.

Female representation in STCW roles is minimal

Women remain significantly underrepresented in STCW-certified seafaring roles, making up just 3.4% of the workforce. Participation varies sharply by role:

- **Engineering:** Fewer than 1% of engineers are female, indicating an almost complete exclusion from this technical career path. Since engineering roles are a key pipeline to senior positions both at sea and ashore, this severely constrains future gender balance in leadership.
- **Marine Cooks:** By contrast, women make up around 14% of Marine Cooks, reflecting a concentration in roles that are often seen as domestic or service based. While this boosts overall numbers, it obscures the persistent gender gap in Deck and Engine roles.

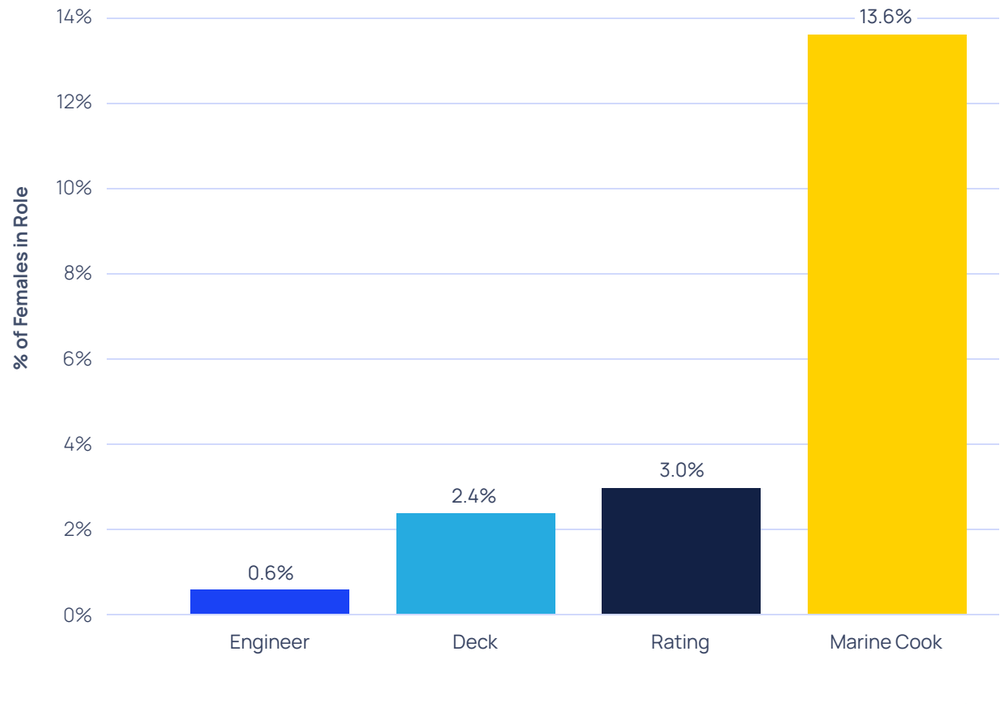
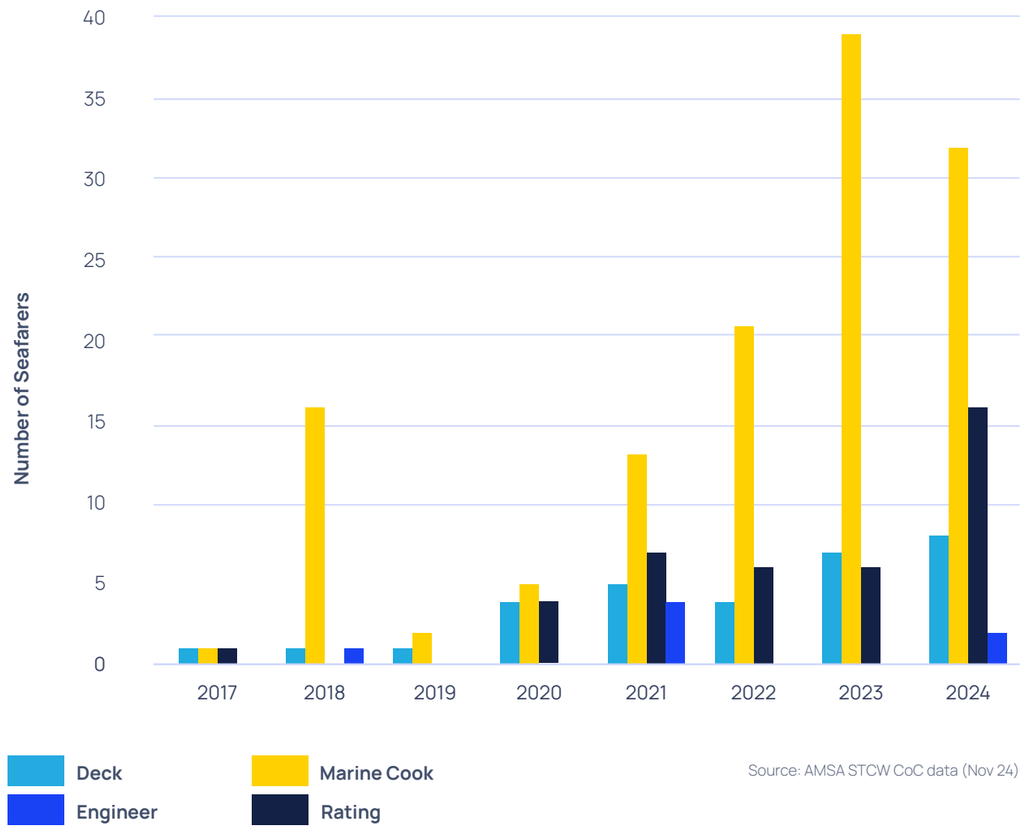


Figure 15: Female Representation by STCW Capacity Type

The median age for females in STCW roles is 43, which is seven years younger than the median age for men in the same roles. This age varies depending on the specific role. For instance, the median age for female Ratings is 38, while for female Marine Cooks it is 47. The relatively young median age for female Ratings suggests that many women in these roles are new to the maritime industry, a trend supported by Figure 16. While a younger female workforce could indicate potential for growth, their high concentration in Ratings positions limits their overall impact on workforce diversity. Furthermore, the small number of women in senior Deck and Engine roles, particularly in older age groups, may point to difficulties in retaining women within the STCW workforce.

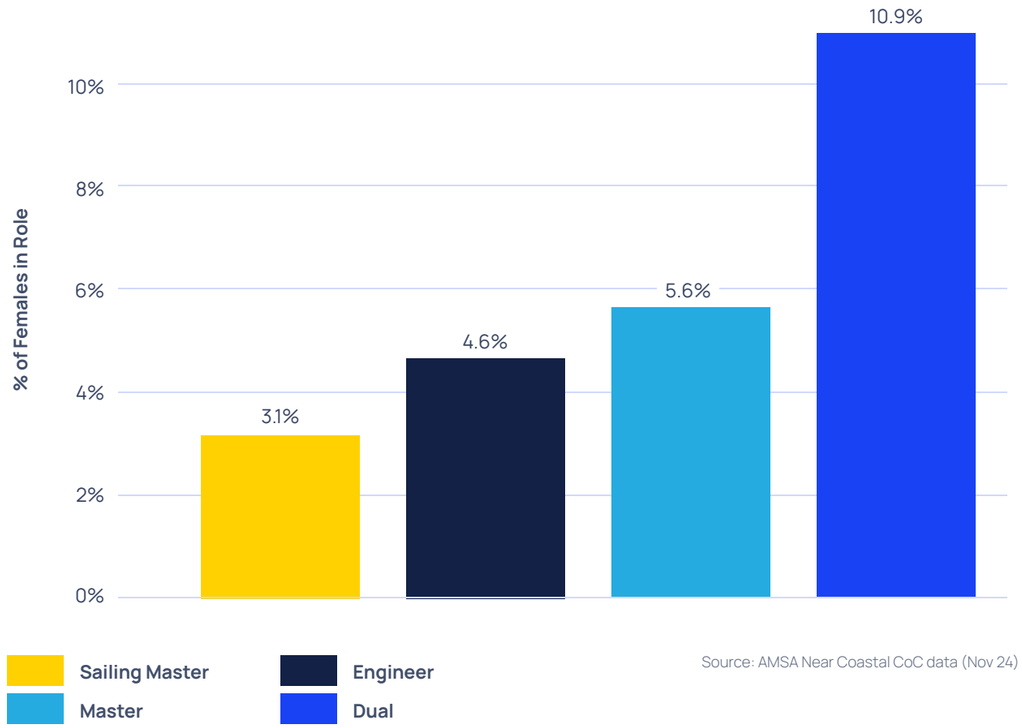


Source: AMSA STCW CoC data (Nov 24)

Figure 16: Female Representation by Capacity Type Over Time

While women make up just 3.4% of STCW-certified seafarers, their representation in Near Coastal roles is significantly higher (8.3%), more than double the STCW rate. The contrast is most evident in engineering roles, where women account for 4.6% of Near Coastal engineers, almost eight times the 0.6% representation seen in STCW engineering roles. Women's representation in Navy engineering roles is higher still, at 9.7%, more than double the Near Coastal engineering share and over sixteen times the STCW engineering rate[29].

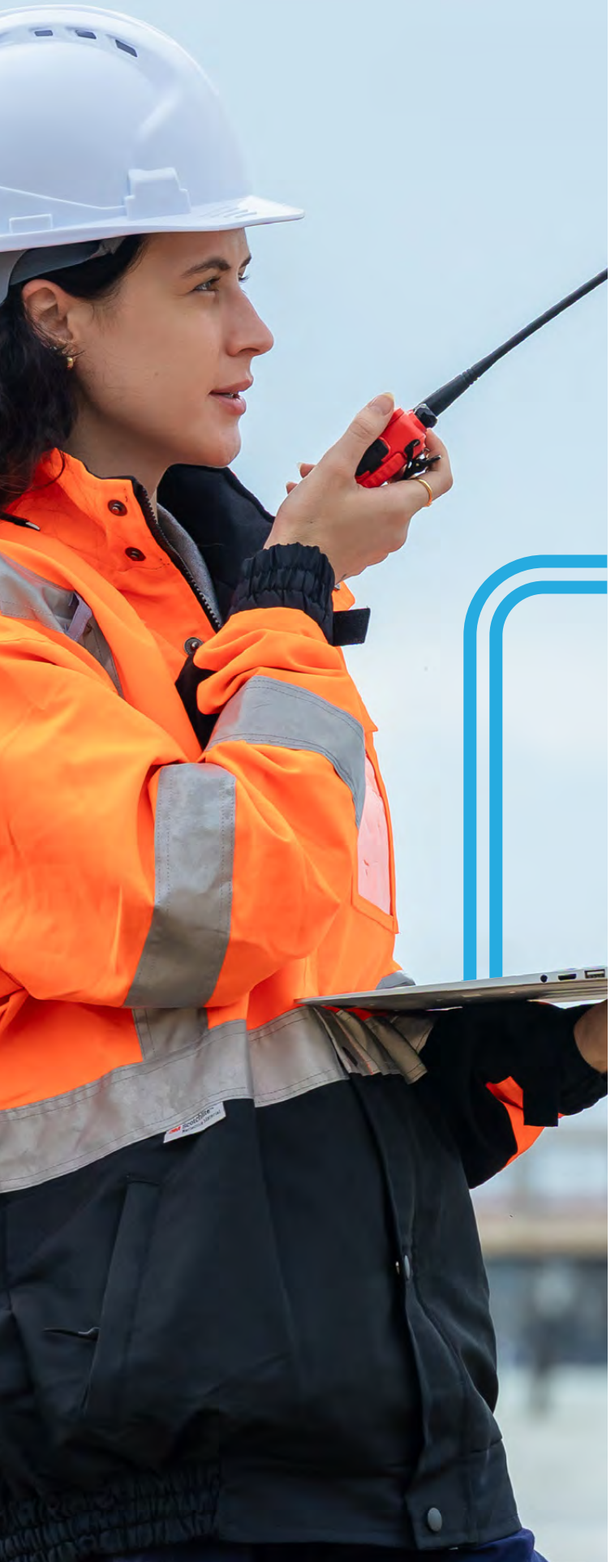
The Navy results indicate that women can and do thrive in maritime roles when opportunities and pathways are accessible, suggesting that the low representation in the broader STCW workforce is influenced more by structural and career pathway barriers than by a lack of interest or capability. This pattern is reinforced by the fact that women in the Maritime industry are more likely to enter or remain in Near Coastal roles. This suggests that features of the Near Coastal sector, such as shorter voyages and more predictable schedules, may be more conducive to attracting and retaining women.



Source: AMSA Near Coastal CoC data (Nov 24)

Figure 17: Female Representation by Near Coastal Capacity Type

29 Department of Defence. (2025). Women in the Australian Defence Force: 2023–2024 report. Commonwealth of Australia. https://www.defence.gov.au/sites/default/files/2025-05/Women-in-the-ADF-2023-2024.pdf

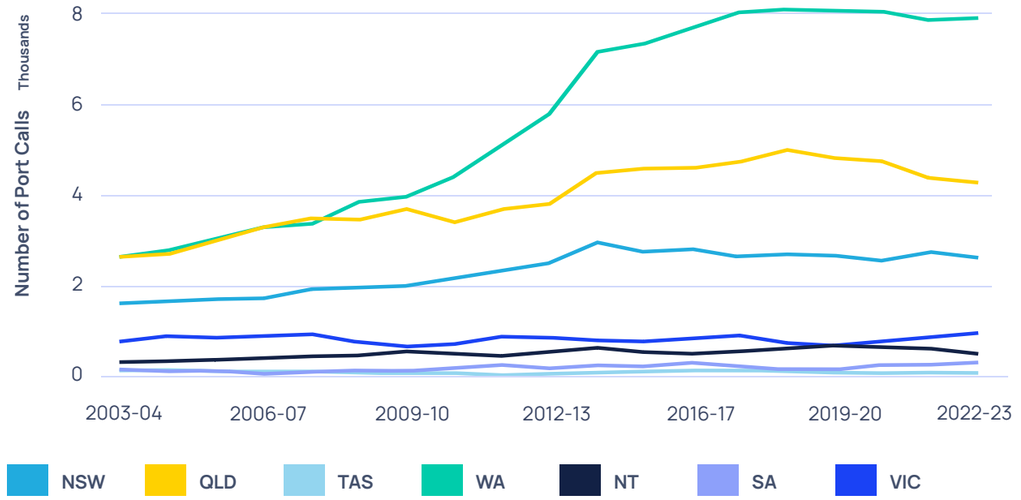


Geographic location of the STCW workforce

Rather than by population size, the geographic distribution of Australia's STCW-certified workforce is primarily dictated by the location of major maritime industries and port activity. An analysis of STCW seafarers' primary addresses reveals a strong concentration in states with dominant international port operations. Specifically, Western Australia, Queensland, and New South Wales are home to the vast majority of the nation's STCW-certified seafarers, a direct reflection of their critical roles as hubs for Australia's international trade.

The dominance of these three states in the maritime workforce is directly linked to the intense international port activity they host. Western Australia and Queensland, which account for 45.9% of Australia's STCW certificate holders, are also responsible for a significant portion of the nation's international port calls (Figure 18). Together with New South Wales, these states contain eight of the top ten busiest ports in the country and accounted for two-thirds of the nation's port activity in 2022-23[30].

30 Bureau of Infrastructure and Transport Research Economics. (2024). Australian sea freight 2023–24. Department of Infrastructure, Transport, Regional Development, Communications and the Arts. https://www.bitre.gov.au/sites/default/files/documents/asf-2023-24.pdf



Source: BITRE Australian Sea Freight 2012-13, 2023-24

Figure 18: Cargo Vessel Port Calls from International Origins

This concentration of the maritime workforce is clearly driven by the specific nature of the industries in these states:

- **Western Australia**: The state's prominence is overwhelmingly fuelled by the massive bulk export ports in the Pilbara region. Ports like Port Hedland, the world's largest bulk export facility[31], are central to Australia's iron ore trade, handling approximately 80% of the national trade and 43% of the global trade in this commodity[32].
- **Queensland**: Similarly, Queensland's high number of STCW seafarers corresponds with its major coal and LNG (liquefied natural gas) export terminals. Ports such as Gladstone, Queensland's largest multi-commodity port[33], and Hay Point, a dedicated coal port, are vital to servicing the mines of the Bowen Basin[34].
- **New South Wales**: The maritime industry in New South Wales is characterised by a mix of major container traffic and significant bulk exports. Port of Newcastle is a leading coal export port and second only to Port Hedland in terms of port calls from overseas[35].

31 Ports Australia. (n.d.). Pilbara Ports. Retrieved September 11, 2025, from https://www.portsaustralia.com.au/members/pilbara-ports
32 Container News. (2024, August 12). New export record for Pilbara Ports. https://container-news.com/new-export-record-for-pilbara-ports/
33 Gladstone Ports Corporation. (n.d.). Port of Gladstone. Retrieved September 11, 2025, from https://gpcl.com.au/ports-and-trade/port-of-gladstone/
34 North Queensland Bulk Ports Corporation. (n.d.). Port of Hay Point. Retrieved September 11, 2025, from https://nqbp.com.au/our-ports/hay-point
35 Bureau of Infrastructure and Transport Research Economics. (2024). Australian sea freight 2023–24. Department of Infrastructure, Transport, Regional Development, Communications and the Arts. https://www.bitre.gov.au/sites/default/files/documents/asf-2023-24.pdf

While states with extensive coastlines like Western Australia and Queensland are natural locations for significant maritime activity, the primary driver for the resident seafarer population is the economic utilisation of that coast through high-volume commercial ports. (Figure 19). Western Australia and Queensland, which together account for 57.2% of Australia's coastline, are home to 45.9% of seafarers.

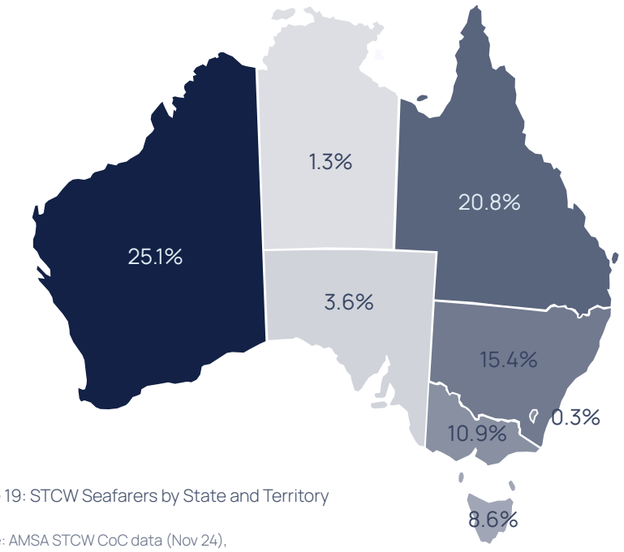


Figure 19: STCW Seafarers by State and Territory

Source: AMSA STCW CoC data (Nov 24), ABS, National, state and territory population (Dec 24)

At first glance, Tasmania appears to be an outlier. It has neither major ports nor a long coastline, but it has the highest concentration of STCW seafarers, with more than 100 certified seafarers per 100,000 residents (Table 4).

Table 4: STCW-Certified Seafarers per 100,000 Residents by State and Territory

State/Territory	STCW-certificate seafarers per 100,000 residents
Tasmania	105
Western Australia	59
Northern Territory	34
Queensland	26
South Australia	14
New South Wales	13
Victoria	11
Australian Capital Territory	5

Tasmania's high per capita rate of STCW seafarers is a result of a unique maritime ecosystem, which includes:

- Regular Bass Strait and coastal trades. Tasmania's reliance on sea freight for the movement of approximately 99% of its goods across the Bass Strait creates a consistent demand for a domestic maritime workforce[36].
- Tasmania accounts for just over half (50.8%) of all STCW graduates through the Australian Maritime College (AMC). Many cadets from other states retain Tasmanian addresses during their sea phases and early careers, which inflates the state's recorded resident workforce.
- High-intensity aquaculture and commercial fishing. Tasmania possesses the highest value seafood industry in Australia, with a combined farm gate value of over $1.4 billion in 2022-2023[37].
- Hobart's role as Australia's Antarctic gateway[38]. Seasonal research and resupply operations create recurring demand for certificated officers and engineers.

The geographic distribution of Australia's STCW-certified seafarers is fundamentally tied to the operational footprint of the maritime industry. The high concentration of seafarers in Western Australia, Queensland, and New South Wales is a direct result of the immense volume of international trade flowing through their ports, driven by the resource and manufacturing sectors. Similarly, Tasmania's high per capita rate of seafarers highlights the importance of its specialised maritime industries.

Next section

Our demographic analysis of existing certificate holders shows that the maritime workforce is ageing rapidly, creating a likely shortfall of senior officers in the future. The impact of this shortfall will be shaped by the pipeline of new workforce entrants.

The next section of this report examines data from the tertiary education system to assess whether it is producing a new generation of seafarers capable of meeting the industry's future needs.

36 Productivity Commission. (2021). Submission 11: Vulnerable supply chains. https://www.pc.gov.au/__data/assets/pdf_file/0008/275498/sub011-supply-chains.pdf
37 Tasmanian Government. (2024, September 11). Supporting sustainable Tasmanian seafood into the future. https://www.premier.tas.gov.au/latest-news/2024/september/supporting-sustainable-tasmanian-seafood-into-the-future
38 Australian Antarctic Division. (n.d.). About us. Retrieved September 11, 2025, from https://www.antarctica.gov.au/about-us/

05

The Training Pipeline

The previous section identified demographic challenges facing the current STCW workforce. This section analyses the profile of the graduates who will be the future workforce. It examines the age, gender and equity-group representation within the training pipeline to assess the extent to which the next generation of seafarers will address the shortfalls and imbalances of the existing workforce.

Headline insights

- Younger graduates: With a median age of 33, graduates are on average 16 years younger than the current STCW-certified workforce.
- Persistent gender gap: No improvement in the proportion of female Deck Officer graduates.
- Some progress in technical roles: Female participation in Engine and Ratings training has doubled, though from a very low base.
- Equity imbalance: First Nations people remain under-represented in officer pathways (Deck and Engine) despite being over-represented in Ratings qualifications.
- Geographic concentration: Over half of all graduates (50.8%) train in Tasmania.

Interpreting training data

Entry into the maritime profession is regulated, and obtaining certain AMSA-issued certificates requires the completion of an approved qualification. These qualifications are delivered through two primary channels: vocational education and training (VET) and higher education.

- **Vocational Education and Training (VET):** The VET sector delivers the bulk of maritime training through qualifications, Skill Sets and Units of Competency, as outlined in the MAR Maritime Training Package. Some qualifications in the training package are directly linked to STCW standards[39], as reflected in Marine Orders. For an STCW qualification to be recognised by AMSA, it must be delivered by an AMSA approved Registered Training Organisation (RTO)[40]. National data on VET activity, including enrolments and completions, is collected by the National Centre for Vocational Education Research (NCVER).
- **Higher Education**: The Australian Maritime College delivers specific STCW qualifications, typically Deck and Engine Officer certificates, as university-level qualifications. Data on this activity is collected separately by the Australian Government Department of Education through the Higher Education Student Data Collection.

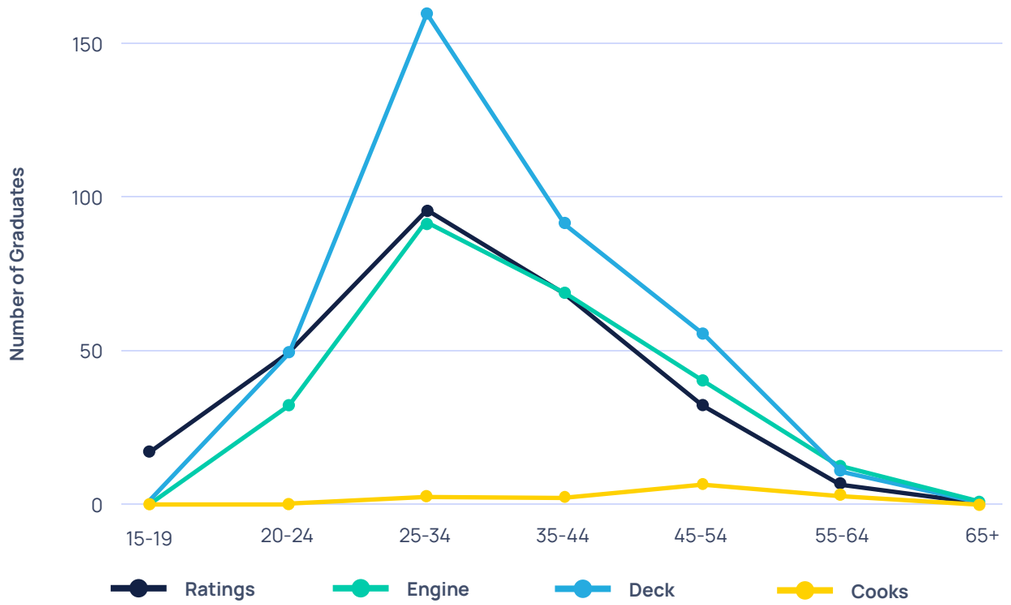
VET and higher education datasets lack shared identifiers and cannot be directly linked. To overcome this limitation, the Study combined official training data with AMSA application data. The AMSA dataset records the qualification used for each application, providing a link between a training outcome and an individual's entry into a specific certified role. Analysis of this data allowed the Study to build a more complete picture of the individuals entering and progressing through the industry.

A simple analysis of qualification completions can be misleading because:

- Seafarers complete multiple qualifications as their careers advance. This means that data on qualification completions does not represent the number of individuals undertaking training.
- Some MAR qualifications include STCW and NC streams but datasets that combine STCW and NC qualification outcomes can hide divergent trends for these sectors.

39 Industry Skills Australia. (2025). 2025 Maritime Workforce Plan (p. 34). Retrieved July 24, 2025, from https://isa-files.azureedge.net/2025-07/2025%20Maritime%20Workforce%20Plan_0.pdf#page=34

40 Australian Maritime Safety Authority. Approved training courses: International qualifications. Retrieved July 24, 2025, from https://www.amsa.gov.au/qualifications-training/international-qualifications/approved-training-courses



Source: NCVER, National VET Provider Collection

Figure 20: Age Profile by Capacity Type

To produce a more accurate analysis, the Study:

- Focuses on records for individual seafarers by combining AMSA data with de-identified Unit Record Files (URFs) from NCVER's National VET Provider Collection. Encrypted Unique Student Identifiers (USIs) allow individuals to be accurately counted and mapped to their distinct pathways through the training system.
- Separates qualification completions by their specific stream where necessary, allowing for a precise evaluation of trends within the STCW cohort.

Graduates are 16 years younger than the current workforce

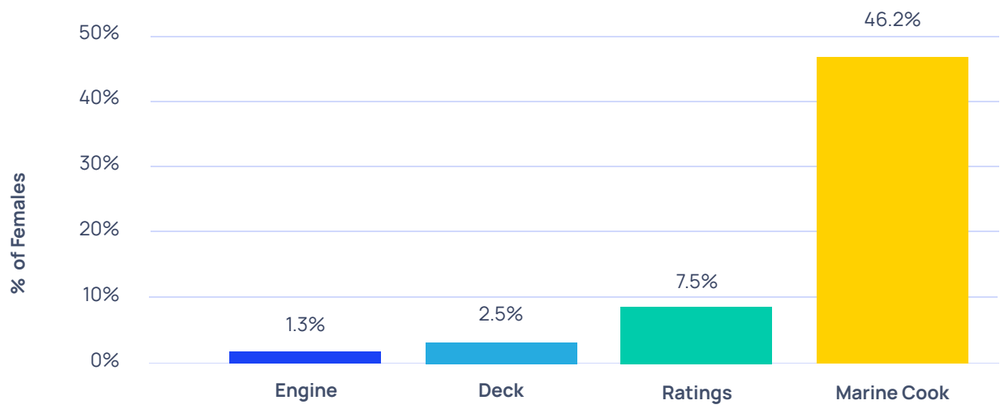
The most notable difference between the training pipeline and the active workforce is age. STCW trainees have a median age of 33, making them on average 16 years younger than certified seafarers. This is an expected outcome that reflects career progression.

Ratings graduates are the only group that appear in the 15-19 age group, likely reflecting shorter training durations. The 25 to 34 age group consistently represents the highest number of graduates across the Deck, Engine, and Ratings departments.

Following this peak, there is a clear and steady decline in the number of graduates as age increases across all specialisations. Cooks consistently have the lowest number of graduates across all age groups. This is primarily because they are not obligated to take the specific MAR marine cookery course, as completion of commercial cookery training is also sufficient.

Gender imbalance persists in the training pipeline

The gender profile of seafarers in training continues to mirror the significant imbalance seen in the current workforce. However, there are modest signs of progress in some technical roles. For example, while the proportion of women completing Engine qualifications remains low at 1.3%, this is more than double the rate of those currently holding an Engine Certificate of Competency (0.6%). A similar doubling is evident among Ratings graduates. Although the numbers are small, they suggest gradual progress in attracting women to traditionally male-dominated areas.



Source: NCVER, National VET Provider Collection

Figure 21: Female Representation among STCW Graduates

In contrast, Deck roles show little change. Women account for 2.5% of Deck graduates, almost identical to their representation in the current Deck CoC population. This suggests that without targeted intervention, the gender imbalance in Deck roles is likely to continue.

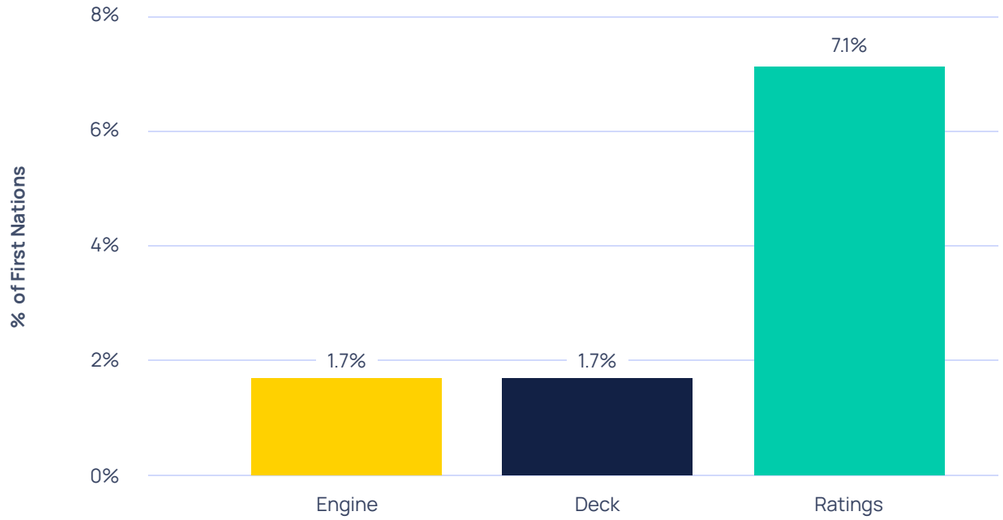
The proportion of females completing Marine Cookery qualifications is significantly higher, which may reflect targeted recruitment efforts. However, it is worth noting that this represents only 6 females out of 13 total Marine Cookery graduates.

Higher education data adds another layer. The Jobs and Skills Atlas reported that women accounted for 19.4% of enrolments in university courses in Marine Engineering in 2023[41]. However, this level of representation is not reflected in AMSA's certificate data. The discrepancy may result from the broad definition of 'Marine Engineering' used in higher education, which can include non-seafaring disciplines such as naval architecture and ocean infrastructure.

41 Jobs and Skills Australia. (2025, July 4). Jobs and Skills Atlas. Retrieved July 24, 2025, from https://www.jobsandskills.gov.au/jobs-and-skills-atlas/region/higher-education?regionType=state&regionValue=aus

First Nations people are underrepresented among Deck and Engine graduates

Training data is the only source that provides insight into equity-group representation among STCW-qualified seafarers. While the Census offers rich demographic data by occupation, it does not distinguish between Near Coastal and STCW roles. In addition, AMSA certificate data does not capture First Nations status or other equity indicators. This makes training data the only available evidence base for assessing equity representation in STCW pathways.

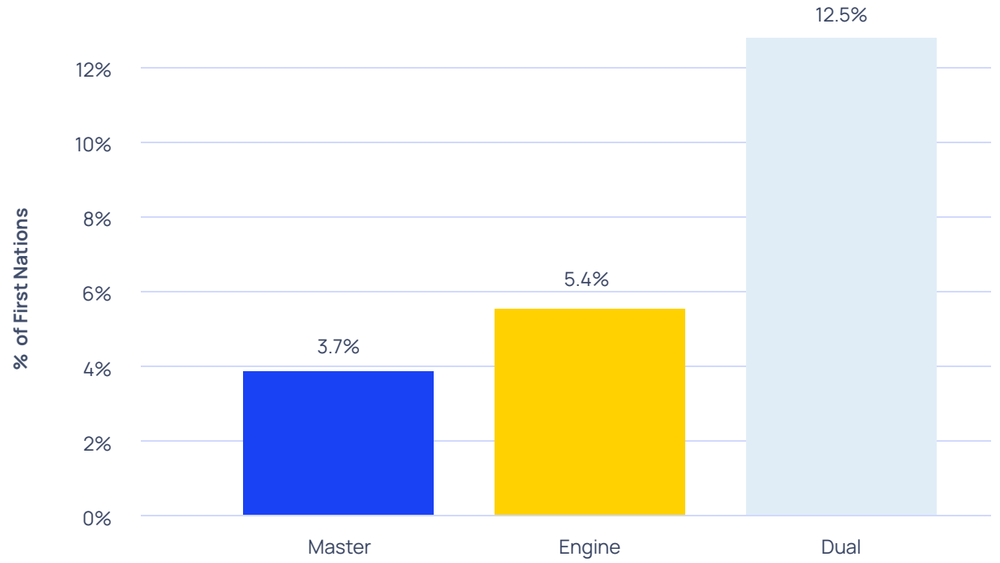


Source: NCVER, National VET Provider Collection

Figure 22: First Nations Representation in STCW Graduates

First Nations people accounted for 3.2% of STCW graduates between 2016 and 2023, higher than their share of the national population (2.3%, 2021 Census). However, representation differs significantly between STCW capacity groups. First Nations seafarers are significantly over-represented among Ratings graduates but remain under-represented in the Deck and Engine officer training pathways. This suggests that while pathways into the industry exist, barriers may be preventing progression into leadership roles.

By comparison, First Nations representation among Near Coastal graduates is substantially higher, exceeding 10% overall, and up to 12.5% for Dual qualifications for Coxswains and General Purpose Hands. This likely reflects the strong influence of sea-going tourism in Queensland and the Northern Territory, where 12.9% and 29.9% of Near Coastal graduates are First Nations people respectively. These regions have higher First Nations populations than other areas and demand for maritime roles is strong.

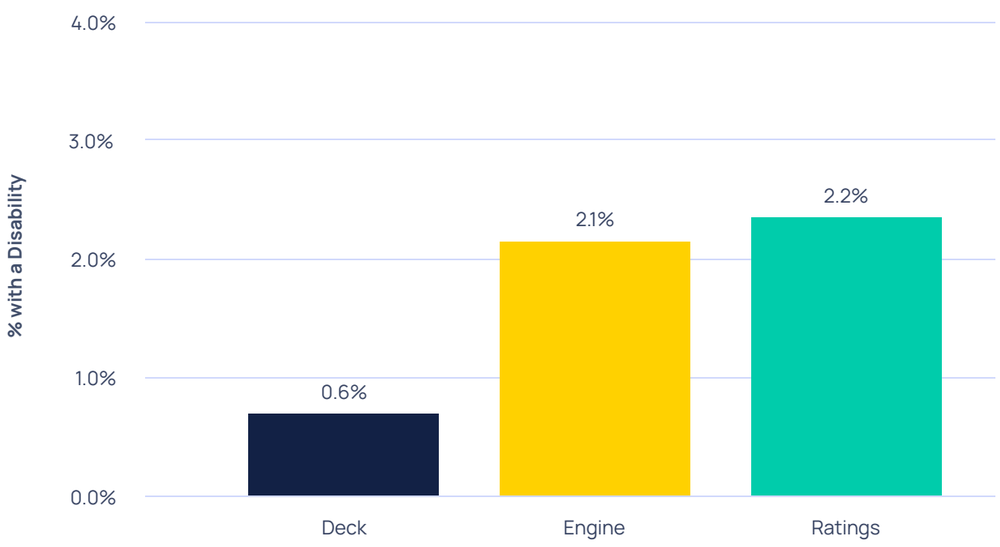


Source: NCVER, National VET Provider Collection

Figure 23: First Nations Representation in Near Coastal Graduates

Disability representation in STCW and Near Coastal training

In the 2021 Census[42], around 1.1% of Australia's workforce reported living with a disability (defined as needing assistance with core activities). Among STCW graduates between 2016 and 2023, this figure was slightly higher at 1.5%. However, this figure represents only 13 individuals so small changes would noticeably impact the percentage.



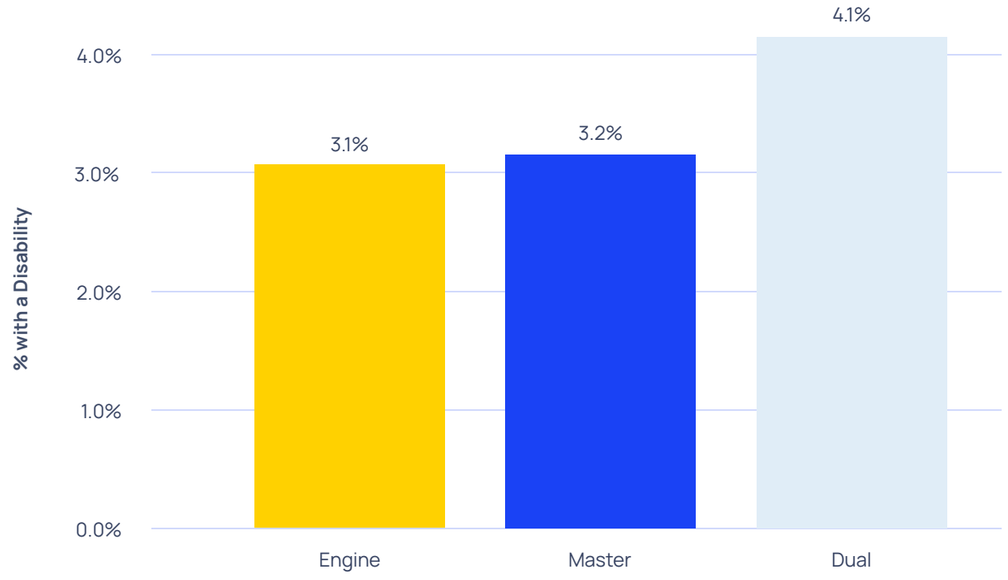
Source: NCVER, National VET Provider Collection

Figure 24: Share of STCW Graduates with Disability

The proportion of Near Coastal graduates with a disability (3.9%) is notably higher than for STCW graduates, primarily related to learning and vision impairments.

42 Australian Bureau of Statistics. (2021). Census of Population and Housing, 2021: TableBuilder dataset [data set]. ABS Website. Accessed 24 July 2025

STCW roles require stricter medical fitness standards[43] than those in Near Coastal due to longer and more remote voyages. Different levels of representation between the sectors for people living with a disability are to be expected. However, it is surprising that Near Coastal graduates show higher rates of disability than the broader labour force. The apparent anomaly may be explained by differing definitions of disability between training data, which capture any declared disability, and the Census, which counts only those needing assistance with core activities, typically indicating more severe limitations.



Source: NCVER, National VET Provider Collection

Figure 25: Share of Near Coastal Graduates living with a Disability

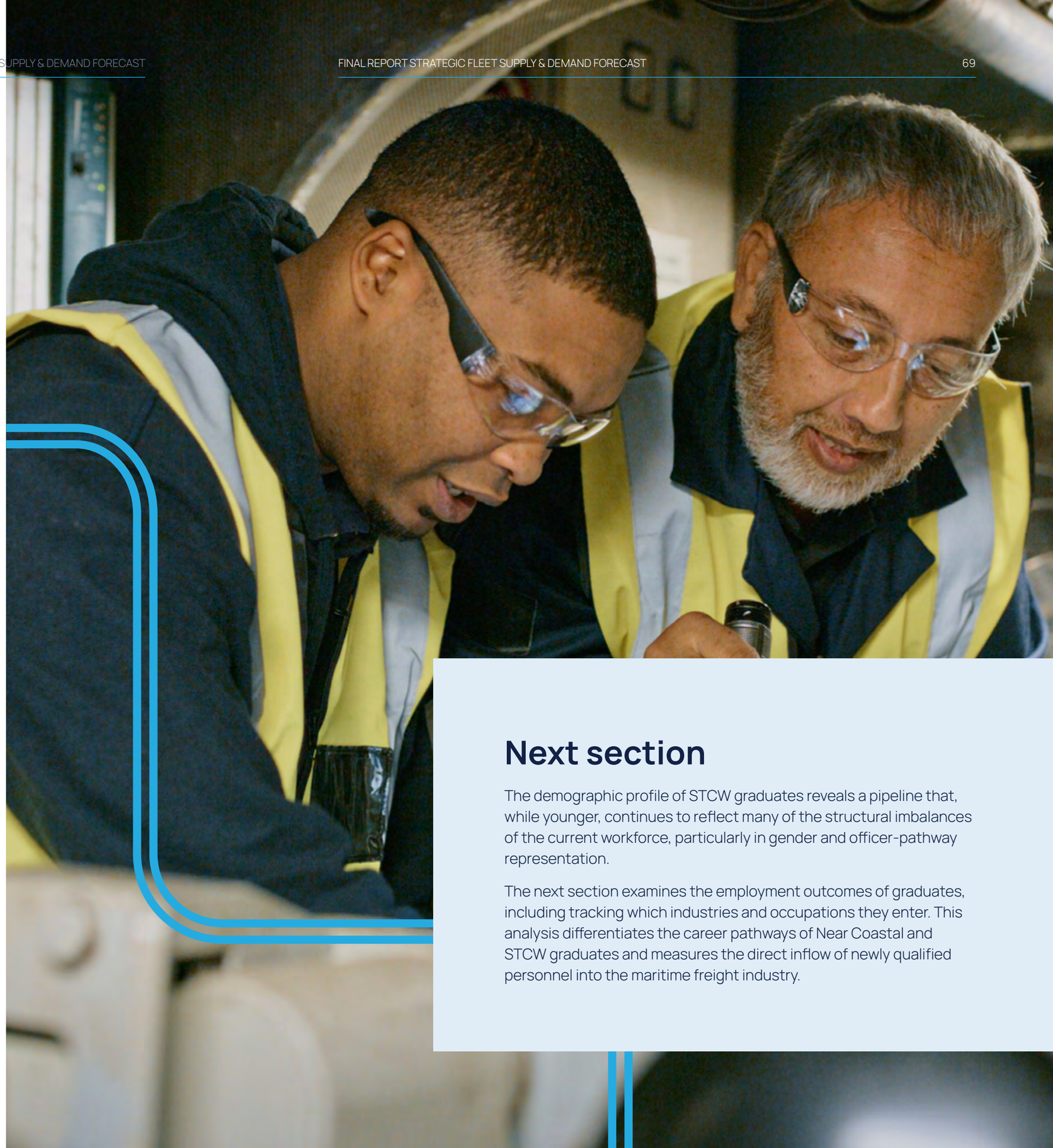
43 Australian Maritime Safety Authority. (2020, December). Standards for the medical examination of seafarers and coastal pilots. https://www.amsa.gov.au/sites/default/files/standards-medical-examination-seafarers-coastal-pilots.pdf

STCW training delivery is concentrated in four states

According to AMSA, 12 organisations are approved to deliver STCW training in Australia. Short-course training is available in all jurisdictions except the Australian Capital Territory and South Australia[44]. However, STCW qualifications are offered in only four jurisdictions: Western Australia, Queensland and New South Wales through their respective TAFEs, and Tasmania through the Australian Maritime College.

This concentration of training providers has a profound impact on where trainees study. Up until 2023, just over half of all STCW graduates (50.8%) completed their qualification in Tasmania, followed by Western Australia (28.2%) and New South Wales (16.7%). Preliminary data for 2024 shows 14 completions for the Integrated Rating qualification at TAFE Queensland. Despite this recent addition, aspring seafarers from other states face significant relocation costs and logistical hurdles to pursue a career at sea, creating a geographic barrier to maritime careers.

44 Australian Maritime Safety Authority. (n.d.). Approved training courses. Australian Government. https://www.amsa.gov.au/qualifications-training/international-qualifications/approved-training-courses



Next section

The demographic profile of STCW graduates reveals a pipeline that, while younger, continues to reflect many of the structural imbalances of the current workforce, particularly in gender and officer-pathway representation.

The next section examines the employment outcomes of graduates, including tracking which industries and occupations they enter. This analysis differentiates the career pathways of Near Coastal and STCW graduates and measures the direct inflow of newly qualified personnel into the maritime freight industry.

06

Graduate Employment Outcomes

The previous section examined qualification completions. This section follows graduates into the workforce to understand and assess how well the training system is meeting the needs of the maritime freight sector.

Using Jobs and Skills Australia's (JSA) Skills Tracker, which links qualification completions with Single Touch Payroll (STP) data, the Study tracked the 2015-2021 cohort of MAR graduates to observe the inflow of seafarers into certain occupations and industries, two years after graduation (between 2017 and 2023).

The relatively small size of this dataset means that the analysis must be interpreted with caution. In line with privacy rules, data is suppressed for occupational pathways with fewer than five completions, and for scenarios where more than 90% of completions are from a single provider. The latter constraint is particularly limiting for vocational STCW qualifications, given there are only three training providers nationwide.

Headline insights

- **Near Coastal qualifications** lead to diverse career pathways, including both traditional maritime jobs and less typical roles like Police Officer and Park Ranger.
- **STCW qualifications** act as a specialised pipeline, with graduates overwhelmingly employed in core maritime roles such as Ship's Engineer and Deck Hand.
- The **tourism sector** is the largest single employer of maritime graduates, well ahead of the freight industry.
- The **Water Freight Transport industry** directly employs a small proportion of graduates.
- **Labour supply and recruitment agencies** employ a significant share of graduates, suggesting that many seafarers work in freight indirectly through labour-hire arrangements.

Near Coastal graduates have broad career outcomes

Graduates with Near Coastal qualifications enter a wide array of occupations. While traditional maritime roles like Deck Hand (14.5%) and Ship's Master (8.1%) were the most common outcomes between 2017 and 2023, many graduates pursue non-maritime roles. Occupations such as Police Officer (2.7%), Park Ranger (2.3%) and Customs Officer (1.8%) feature prominently. This demonstrates that Near Coastal qualifications are valued not only for traditional shipping roles but also for a broad range of work on or near the water.

Table 5 lists the top 10 occupational outcomes for Near Coastal qualification completions between 2017 and 2023.

Table 5: Distribution of Near Coastal Graduates by Occupation

Occupation name	% share
899211 Deck Hand	14.5%
231213 Ship's Master	8.1%
399911 Diver	3.6%
231212 Ship's Engineer	3.0%
441312 Police Officer	2.7%
899212 Fishing Hand	2.4%
234314 Park Ranger	2.3%
231214 Ship's Officer	1.9%
599511 Customs Officer	1.8%
234516 Marine Biologist	1.8%

STCW graduates follow focused pathways into core maritime roles

STCW graduates are overwhelmingly employed in core maritime occupations (Table 6). The data reveals a significant concentration in a few key roles, with Ship's Engineer and Deck Hand accounting for the career outcomes of 22.4% and 22.0% of graduates, respectively. The lower proportion of graduates in Ship's Master and Ship's Officer roles may be explained by the exclusion of university-level inputs from this data. The Australian Maritime College (AMC) trains a majority of the nation's Deck Officers and Masters (57% over the last 8 years) through its degree programs. Conversely, only around a third (37%) of Engine trainees graduate through Tasmania. The STCW graduate data would therefore naturally be more weighted towards engineering and entry-level deck positions.

Table 6: Distribution of STCW Graduates by Occupation

Occupation name	% share
231212 Ship's Engineer	22.4%
899211 Deck Hand	22.0%
231213 Ship's Master	5.4%
231214 Ship's Officer	5.0%
891113 Waterside Worker	1.2%
321212 Diesel Motor Mechanic	0.8%
741111 Storeperson	0.8%

The occupational outcomes for Near Coastal and STCW qualifications show notable differences. Near Coastal graduates enter a broader range of roles, including both traditional maritime occupations and non-maritime positions. This suggests a more diverse application of skills across sectors. In contrast, STCW graduates are more likely to remain within core maritime roles, reflecting the specialised nature of their training.

Few graduates are directly employed in the Water Freight Industry

The wide range of occupational outcomes for MAR graduates[45] is reflected in the variety of industries employing graduates two years after their completion of training. Tourism was the top employing industry between 2017 and 2023, while government and support services also employed a significant share. Employment services, including labour hire and recruitment agencies, were another major employer. Freight transport ranked only just within the top 10 employing industries.

The presence of Labour Supply Services (4.1%) and Employment Placement (3.2%) among the top employing industries is significant (Table 7). This suggests that many graduates working in maritime freight are engaged through labour-hire firms, rather than being directly employed by shipping companies.

Table 7: Distribution of all MAR Graduates by Industry

ANZSIC Class	Industry grouping	% share
5010 Scenic and Sightseeing Transport	Tourism	8.7%
5219 Other Water Transport Support Services	Support Services	5.8%
7520 State Government Administration	Government	5.2%
4820 Water Passenger Transport	Tourism	4.2%
7212 Labour Supply Services	Employment Services	4.1%
7510 Central Government Administration	Government	4.0%
7211 Employment Placement and Recruitment Services	Employment Services	3.2%
4400 Accommodation	Tourism	3.0%
4810 Water Freight Transport	**Freight**	**2.8%**
0201 Offshore Longline and Rack Aquaculture	Offshore farming	2.6%

Graduate outcome data represents the recent 'flow' of new and progressing workers into the industry, which can be compared with the total 'stock' of the workforce as measured by the most recent Census (Table 8).

45 It is not possible to disaggregate STCW and Near Coastal qualification holders in the industry-outcome data due to privacy rules.

While tourism-related industries appear prominently in both datasets, there are important differences between the two.

This comparison is stark for the Water Freight Transport sector. The Census shows that its share of the workforce 'stock' has nearly halved, declining from 11.8% in 2006 to 6.0% in Census 2021. In contrast, the 'flow' of recent graduates directly into the sector is only 2.8%. This gap provides evidence that the freight sector is increasingly reliant on labour-hire arrangements to source new workers, a conclusion supported by the strong presence of labour supply and recruitment services in the graduate outcomes.

Table 8: Distribution of Seafaring Roles by Industry Class

ANZSIC Class	2006	2011	2016	2021
5219 Other Water Transport Support Services	10.5%	14.8%	11.3%	12.7%
5010 Scenic and Sightseeing Transport	11.2%	10.5%	9.7%	9.6%
4820 Water Passenger Transport	7.2%	6.3%	8.3%	9.2%
4810 Water Freight Transport	**11.8%**	**14.2%**	**8.4%**	**6.0%**
5212 Port and Water Transport Terminal Operations	3.2%	4.6%	5.2%	5.0%
4610 Road Freight Transport	2.7%	3.6%	4.5%	4.1%
7600 Defence	8.2%	3.9%	4.5%	4.0%
7520 State Government Administration	1.7%	1.8%	1.1%	2.6%
6922 Surveying and Mapping Services	1.8%	1.8%	2.1%	2.3%
7220 Travel Agency and Tour Arrangement Services	1.0%	0.9%	1.4%	1.6%

Next section

The analysis of graduate destinations reveals distinct entry points into the workforce, with STCW graduates primarily entering specialised maritime occupations and Near Coastal graduates serving a broader economic base. Understanding these entry points is crucial, but it does not explain how the workforce renews its most senior ranks.

The next section explores career progression, examining regulatory frameworks, training structures and career pathway data to understand how individuals advance from entry-level roles to peak qualifications.

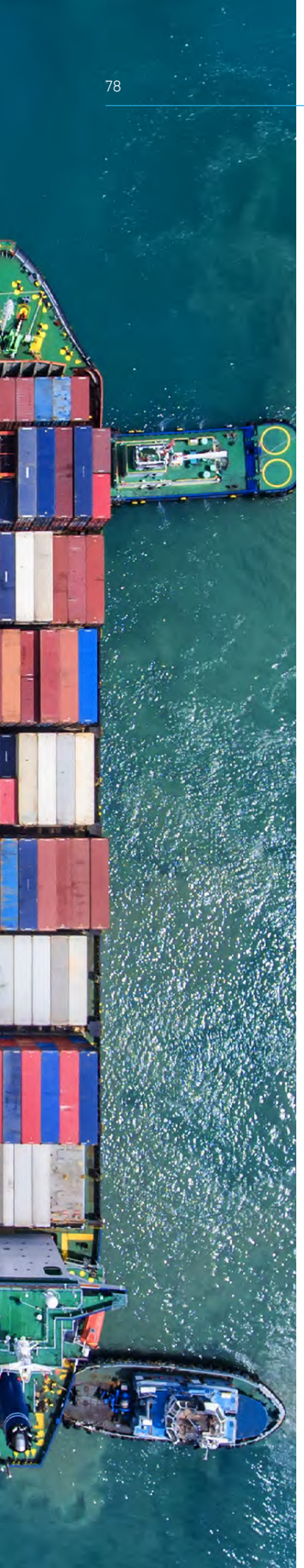
07

Seafaring Career Pathways

The previous section identified graduate entry points into the maritime workforce. This section focuses on career pathways. The Study examined Marine Orders to map formal progression routes through seafaring capacities and drew on training and certification data to understand and track career movements. Through this analysis, the Study highlights common pathways, duration and transitions between roles. Qualification completion data was also reviewed to consider transitions from Near Coastal to STCW qualifications and gauge annual workforce entry rates.

Headline insights

- While regulations outline dozens of potential career pathways, most seafarers consistently follow **one dominant pathway** for each peak qualification.
- Although only **1% of Near Coastal graduates transition to an STCW qualification**, this small group accounts for nearly 7% of all new STCW completions.
- On average, it takes approximately **7.5 years** to progress from an **entry-level certificate to a Master Unlimited, and 6.4 years** to reach **Engineer Class 1**.
- Career progression analysis is constrained by the available data because **83% of seafarers in the dataset hold only a single certificate**.



Marine Order pathways

Marine Orders are legislative instruments that control seafarer certificates in Australia. They are made under:

- The Navigation Act 2012[46] for regulated Australian vessels (those engaged in international voyages or certain domestic operations).
- The Marine Safety (Domestic Commercial Vessel) National Law for domestic commercial vessels[47].

The fundamental purpose of Marine Orders is to specify standards of competence and other conditions that a person must satisfy to be a qualified seafarer, encompassing roles such as Masters, Officers and Ratings. Marine Orders systematically outline the pathways a seafarer can take through various capacities by setting out detailed requirements for obtaining and maintaining specific certificates. These requirements typically encompass approved training, documented qualifying seagoing service, medical fitness, and successful assessments, all interconnected across international and domestic standards.

This section visualises the pathways that individuals can take through STCW capacities, focusing on three peak roles:

- **Master Unlimited**
- **Engineer Class 1**
- **Chief Integrated Rating**

These represent the highest qualifications within their respective streams (deck, engineering, and ratings) and highlight the structured progression available to seafarers under the Marine Orders framework. Mapping these pathways illustrates how each certificate builds on previous qualifications, training and seagoing experience, guiding individuals from entry-level positions to peak professional capacities.

46 Navigation Act 2012 (Cth). Federal Register of Legislation. https://www.legislation.gov.au/Series/C2012A00128

47 Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cth). Federal Register of Legislation. https://www.legislation.gov.au/Series/C2012A00121

Master Unlimited pathway

Figure 26 illustrates 51 distinct pathways to become a Master Unlimited. It includes several entry points from Near Coastal certificates, demonstrating the integration between domestic and international qualifications in Australia's maritime regulatory framework.

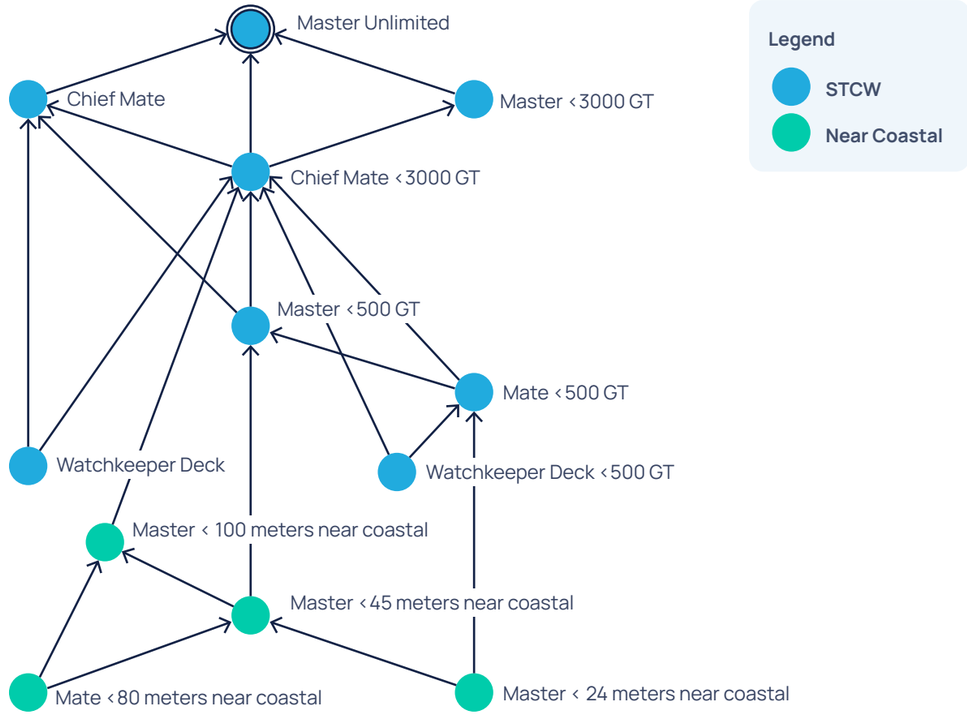


Figure 26: Pathways to Master Unlimited Certification

At the top of the diagram, Master Unlimited is represented by a double-ringed node. Every other certificate in the chart feeds into this peak role. Each node represents a specific certificate, blue for STCW and green for Near Coastal, with arrows showing progression routes defined in AMSA's Marine Orders guidance[48]. Arrows indicate pathways available once the necessary training, sea service and other eligibility criteria are met.

48 Australian Maritime Safety Authority. Seafarer certification guidance documents. https://www.amsa.gov.au/qualifications-training/seafarer-certification-guidance-documents

Two main streams lead to Master Unlimited.

- **Direct STCW route**: This path might begin with the Watchkeeper Deck certificate, progressing through roles such as Chief Mate < 3000 GT, optionally via Master < 3000 GT, and finally reaching Master Unlimited.
- **Near Coastal route**: This pathway offers an alternative entry for domestic skippers. Here, individuals may start with a certificate like Mate < 80 metres near coastal, then progress through Master < 45 metres NC and Master < 100 metres NC. From there, they can bridge into the STCW stream, often via Watchkeeper Deck, and continue toward the Master Unlimited qualification. This route reflects AMSA's recognition of domestic experience and training, and its efforts to maintain flexible, inclusive pathways.

In mapping these 51 pathways, the diagram highlights that there is no single, linear route to the bridge of an unlimited vessel. Whether starting as a coastal skipper, a cadet, or a watchkeeper, the Marine Orders support multiple clear and structured ways to achieve the highest level of certification at sea.

Engineer Class 1 pathway

Figure 27 illustrates the structured pathways to the Engineer Class 1 certificate, the highest engineering qualification (represented in the diagram by a double-ringed node).

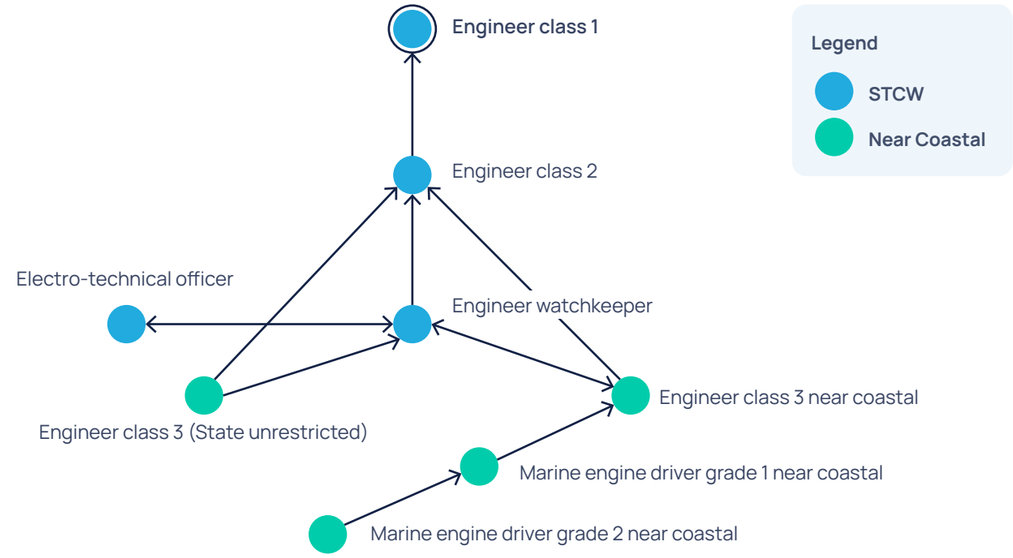


Figure 27: Pathways to Engineer Class 1 Certification

Two primary streams are shown with defined points of integration:

- The **STCW progression pathway** begins with the Engineer Watchkeeper certificate, advances to Engineer Class 2, and culminates in Engineer Class 1. This core route allows for multiple entry points, including through the Electro-technical Officer certificate which can lead to an Engineer Watchkeeper[49] qualification.
- The **Near Coastal pathway** follows a linear progression from Marine Engine Driver Grade 2 to Grade 1, and then to Engineer Class 3 Near Coastal. As with STCW trainee engineers, candidates can achieve an Engineer Class 3 Near Coastal Certificate of Competency while holding an equivalent workshop skills qualification. A critical transition point allows holders of the Engineer Class 3 Near Coastal certificate to move directly into the STCW stream at the Engineer Class 2 level, provided they meet the additional requirements.
  This creates a clear, structured route for experienced domestic engineers to advance to international qualifications.

49 Trainee Engineers must hold a workshop-skills equivalent qualification, such as an Engineer Certificate III or one of the 11 prescribed trade certificates, to meet the entry criteria for the Engineer Watchkeeper certificate

Chief Integrated Rating pathway

Figure 28 outlines the structured progression to the Chief Integrated Rating certificate (represented in the diagram by a double-ringed node) which is the most senior STCW rating qualification.

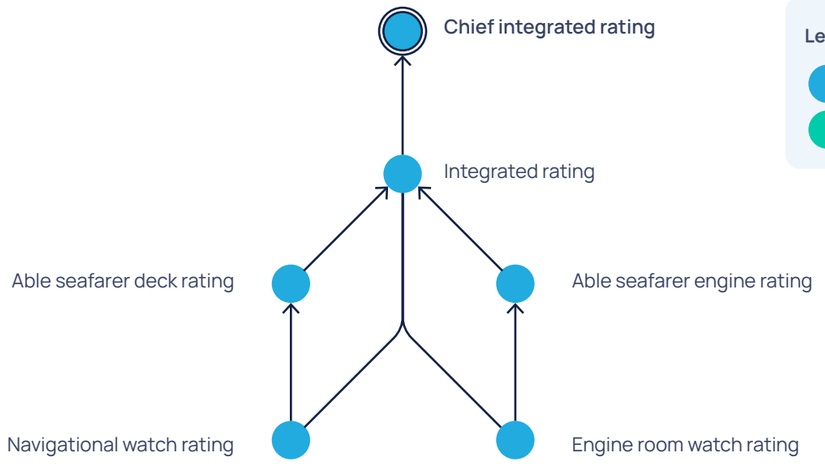


Figure 28: Pathways to Chief Integrated Rating Certification

The progression to Chief Integrated Rating is shown entirely within the STCW framework, as indicated by the uniformly blue nodes. The pathway begins from two distinct foundational certificates, reflecting the two main departments on a vessel.

In the deck department, progression begins with a Navigational Watch Rating, which leads to the Able Seafarer Deck Rating.

In the engine department, seafarers start with an Engine Room Watch Rating, advancing to the Able Seafarer Engine Rating.

A key feature of this structure is the convergence at the Integrated Rating certificate. Seafarers can qualify as an Integrated Rating if they hold either an Able Seafarer Deck rating, an Able Seafarer Engine rating, or a rating that forms part of both a navigational watch and an engine-room watch. This certificate signifies a multi-skilled rating proficient in both deck and engine room duties. From this integrated qualification, the final step is a direct progression to Chief Integrated Rating, which requires additional sea service and training in a supervisory capacity.

The figures in this section illustrates the comprehensive and flexible framework established by the Marine Orders by detailing all permissible pathways to peak maritime qualifications. However, this flexibility, with multiple streams and transition points, can present a complex landscape for new entrants and career advisors to navigate, potentially leading to confusion about the most effective or direct routes.

Certificate pathways

While the Marine Orders define what is possible, they do not describe what is typical. The Study used AMSA certificate data to analyse how seafarers navigate these pathways in practice, identify the most common routes, and estimate the time it takes for individuals to progress through the ranks to achieve the peak capacities.

The Study analysed certificate data spanning an eight-year period (2016 to 2023), which provides only a partial view of career progression in the industry as it does not capture the full trajectory of an individual's working life. Additionally, 83% of the 7,000 STCW certificate holders were excluded from pathway analysis because they possess only a single certificate. This significant excluded group may include individuals who:

- hold advanced qualifications that pre-date the dataset;
- have overseas-acquired qualifications;
- are transitioning from naval pathways.

Additionally, yacht-related certifications were excluded from the dataset to maintain a focus on core maritime pathways. The analysis focuses specifically on complete career progressions, from clearly defined entry-point roles to attainment of peak certificates. Non-prescribed pathways, where higher-level holders revalidate lower-level qualifications or where the career path duration falls below the minimum sea time requirement, have also been removed.

Identified entry-point capacities are defined as positions requiring no prior seafaring qualifications. These are:

- **Deck**
  - Watchkeeper Deck
  - Watchkeeper Deck < 500 GT
- **Engine**
  - Engineer Watchkeeper
  - Electro-Technical Officer
- **Ratings**
  - Navigational Watch
  - Engine Room Watch

The analysis calculates career progression from the date an individual's first certificate is issued until they achieve their peak qualification. From the data, it is not possible to determine the time an individual took to gain their initial certificate because its issuance date is the earliest point at which a seafarer appears in the dataset. The analysis assumes that seafarers met the minimum sea service requirement for their first certificate, as follows:

- Watchkeeper Deck - 18 months[50]
- Engineer Watchkeeper - 9 months[51]
- Navigational/Engine Room Watch - 2 months[52]

All pathways also require completion of Training and Guidance Studies (TAGS) workbooks, however, the time required to complete TAGS is not included in the analysis.

50 Australian Maritime Safety Authority. (n.d.). Marine Order 71 - Certificate of Competency Watchkeeper Deck [PDF]. Retrieved July 20, 2025, from https://www.amsa.gov.au/sites/default/files/WatchKeeperDeck.pdf
51 Australian Maritime Safety Authority. (2024, June). Marine Order 72 - Certificate of Competency: Engineer Watchkeeper [PDF]. Retrieved July 20, 2025, from https://www.amsa.gov.au/sites/default/files/Engineer%20Watchkeeper.pdf
52 Australian Maritime Safety Authority. (2024, June). Marine Order 73 - Navigational Watch Rating: Certificate of Proficiency (CoP) [PDF]. Retrieved July 20, 2025, from https://www.amsa.gov.au/sites/default/files/NavigationalWatchRating.pdf

Master Unlimited pathways

Table 9: Master Unlimited Pathway Durations

Pathway	Count	Years (Med.)	Years (Min.)	Years (Max.)
Watchkeeper Deck > Chief Mate > Master Unlimited	54	7.5	4.6	10.5
Watchkeeper Deck > Chief Mate < 3000 GT > Chief Mate > Master Unlimited	1	8.0	8.0	8.0
Watchkeeper Deck > Master < 500 GT > Chief Mate < 3000 GT > Master Unlimited	1	9.1	9.1	9.1
Total	**56**	**7.5**	**4.6**	**10.5**

Although Marine Orders list 51 pathways to becoming a Master Unlimited only 3 prescribed pathways have been used in practice. Almost all follow the pathway from Watchkeeper Deck to Chief Mate and then to Master Unlimited. For example, the pathway Watchkeeper Deck > Master < 500 GT > Chief Mate < 3000 GT > Master Unlimited is still considered a prescribed pathway because, even though the candidate obtained the Chief Mate < 3000 GT and Master < 500 GT certificates on the same day, the sequence of qualifications meets the prescribed requirements.

The median duration from entry-level certification (such as Watchkeeper Deck) to achieving Master Unlimited is approximately 7.5 years. Eight individuals achieved the theoretical minimum of 4.5 years, while others took up to 10 years. The maximum pathway duration observed in the data was 10.5 years. While ratings can theoretically progress to Master Unlimited, such cases may fall outside the dataset's timeframe and remain undocumented.

Engineer Class 1 pathways

Although Marine Orders defining eight possible pathways to achieve Engineer Class 1 certification, only two distinct pathways were used in practice. The most common pathway was from Engineer Watchkeeper to Engineer Class 2 and then to Engineer Class 1.

The median duration to progress from entry-level certification (such as Engineer Watchkeeper) to Engineer Class 1 is approximately 6.4 years, although durations vary significantly. Two individuals achieved the Engineer Class 1 in the minimum regulatory timeframe of 3.4 years, while at the other extreme, some seafarers took nearly a decade.

Notably, duration estimates here are sensitive to assumptions about initial qualifications. Engineer Cadets require at least 3 years of sea service to achieve Engineer Watchkeeper, whereas a Trainee Engineer holding a recognised trade qualification requires only 9 months, substantially influencing overall duration estimates.

Table 10: Engineer Class 1 Pathway Durations

Pathway	Count	Years (Med.)	Years (Min.)	Years (Max.)
Engineer Watchkeeper > Engineer Class 2 > Engineer Class 1	25	6.7	3.4	9.6
Engineer Watchkeeper > Electro-Technical Officer > Engineer Class 2 > Engineer Class 1	1	6.2	6.2	6.2
Total	**26**	**6.4**	**3.4**	**9.6**

Integrated Rating pathways

Unlike the Master Unlimited and Engineer Class 1 pathways, the dataset does not show any complete progressions from entry-level to Chief Integrated Rating. Consequently, this analysis focuses instead on the Integrated Rating CoP.

The most common pathway is Rating - Engine Room Watch to Rating - Navigational Watch and then to Integrated Rating. This pathway also has the shortest median duration (1.6 years), below the overall median (2.1 years). Four individuals achieved certification close to the regulatory minimum of 9 months, whereas others took nearly 8 years.

Table 11: Integrated Ratings Pathway Durations

Pathway	Count	Years (Med.)	Years (Min.)	Years (Max.)
Rating - Engine Room Watch > Rating - Navigational Watch > Integrated Rating	10	1.6	1.0	7.7
Rating - Engine Room Watch > Rating - Navigational Watch > Able Seafarer - Deck > Able Seafarer - Engine > Integrated Rating	1	4.6	4.6	4.6
Rating - Navigational Watch > Able Seafarer - Deck > Integrated Rating	1	7.8	7.8	7.8
Total	**12**	**2.1**	**1.0**	**7.8**

While certificate data provide valuable insights on career pathways and their duration, the separation of STCW and Near Coastal datasets limits analysis of cross-domain progression. Integrated pathways can be explored through consideration of training data.

Training pathways

Pathways between Near Coastal and STCW

Mapping MAR qualifications to AMSA certificates is complex. Some MAR qualifications lead directly to a single occupation (e.g. Marine Cook or Chief Integrated Rating), while others have multiple pathways (e.g. Diploma of Maritime Operations). Additionally, some graduates complete advanced qualifications (such as Advanced Diploma of Maritime Operations - Master Unlimited) but may recertify at lower-level certificates (Chief Mate) or use lower-level qualifications (Diploma of Maritime Operations) to qualify for higher-level certificates (e.g. Chief Mate < 3000 GT).

Unlike the consideration of certificate pathways, the Study's analysis of MAR qualifications does not aim to map all possible pathways. Instead, it quantifies the conversion rate from Near Coastal to STCW qualifications. As Tasmanian training data is collected separately, the analysis scales results to align with total observed figures, assuming Tasmania follows the same conversion rate as other jurisdictions.

The conversion rate from Near Coastal to STCW completions can be quantified by examining the number of seafarers who held Near Coastal qualifications and later

Figure 29: Pathways Between Near Coastal and STCW Certifications

Source: NCVER, National VET Provider Collection

completed STCW qualifications. Of more than 21,000 MAR qualification completions over the past eight years, more than three-quarters have only ever held one qualification. Nearly 99% of those with multiple Near Coastal qualifications stay within that stream. Although only 1% of Near Coastal qualification holders progress to STCW, this represents a significant inflow into the much smaller STCW-qualified workforce.

Figure 29 shows a decline in overall intake of STCW-qualified seafarers, but an increasing proportion coming from those with Near Coastal qualifications - up from 0.5% in 2016 to 19.6% in 2021.

However, this increase reflects career progression timing rather than a true rise in conversion rates. The data track when a seafarer with a Near Coastal background later obtains a STCW qualification. Naturally, it takes time for individuals to accumulate the necessary experience and complete the further study required for the higher-level STCW certificate.

A seafarer who began their career with a Near Coastal qualification in the earlier years of this period has had more time to complete the requirements for an STCW certificate. For example, someone who gained their Near Coastal qualification in 2016 has had several years to progress, making them more likely to appear in the STCW numbers towards the end of the observed period.

Conversely, a seafarer who obtained their Near Coastal certificate more recently, for instance in 2022, has had a much shorter window to achieve an STCW qualification within the scope of this dataset. This limited timeframe at the end of the observation period creates the illusion of a surge in transitions, when it simply represents the natural career progression of earlier cohorts maturing over time.

Although only 1% of Near Coastal completions progress to STCW, they account for 6.9% of STCW completions. Additionally, 1.8% of STCW holders later obtain Near Coastal qualifications, which can also be observed in Figure 29.

Next section

The analysis of progression pathways suggests that, despite significant flexibility, seafarers use only a small number of specific pathways to progress to peak capacities. Understanding these preferred pathways provides insight into the time required for the career progression required to fill critical workforce roles.

The next section brings together findings and outputs from the analysis of data sources to model future scenarios for the maritime freight workforce.

08

Modelling the Major trading fleet

The preceding analysis has highlighted the critical challenges facing Australia's maritime sector: a declining share of Australian crew on the Major trading fleet, an ageing workforce, and a training pipeline that is both lengthy and constrained. These are not isolated issues but deeply interconnected components of a complex system. To untangle this complexity and understand the forces linking the fleet, the workforce, and future demands, we have developed a system dynamics model that unifies these dynamics within a single, integrated simulation.

This model helps us explore how these components interact over time and identifies the feedback loops and bottlenecks that influence the long-term sustainability of the Major trading fleet.

The model focuses on Australian-crewed vessels, including a small number of overseas-registered ships employing Australian crew. It simulates real-world pressures such as:

- The ageing of vessels and seafaring personnel (Deck, Engine, Ratings, and Cooks)
- The multi-year training and promotion pipeline
- Competitive cost pressures affecting fleet viability

In addition to current dynamics, the model incorporates emerging demands from the proposed Strategic Fleet, as well as upcoming offshore wind and decommissioning projects. By bringing these elements together, the model provides a robust environment for forecasting future trends and evaluating the potential impact of various policy interventions.

Headline insights

- **Strategic Fleet provides a floor, not a fix**: While the Strategic Fleet policy helps prevent a complete collapse of the Australian-crewed trading fleet, it does not address the underlying cost challenges driving the fleet's decline. Any initial gains are quickly offset by broader fleet losses within a few years.
- **Ageing workforce accelerates demand**: With over half of all Masters projected to be over 55 by 2033, accelerating retirements will create a strong and persistent demand for promotions from lower ranks.
- **Offshore energy boom intensifies competition for crew**: Upcoming offshore wind and decommissioning projects will compete for the same limited pool of seafarers, with higher wages likely drawing them away from the trading fleet.
- **Training berths are the critical bottleneck**: The model shows that the lack of available training berths on vessels is the ultimate constraint on renewing the workforce, limiting the effectiveness of all other policy interventions.
- **Near Coastal pathway is a useful but limited lever**: While increasing recruitment from the Near Coastal sector can relieve recruitment pressures, it does not resolve the overall workforce shortage as these recruits still compete for the same limited number of training berths.

The Cost-Driven decline of the Australian Fleet

The primary driver of the Australian-crewed fleet's long-term decline is a significant and persistent cost gap. Estimated at $5-8 million per vessel annually[53] compared to foreign-crewed ships, this gap creates a vicious cycle. Driven largely by higher crewing costs, it erodes the profitability of existing vessels, discourages investment in replacing retiring ships, and ultimately forces disinvestment from the sector. This reinforcing feedback loop is the engine of the decline that has been observed for decades.

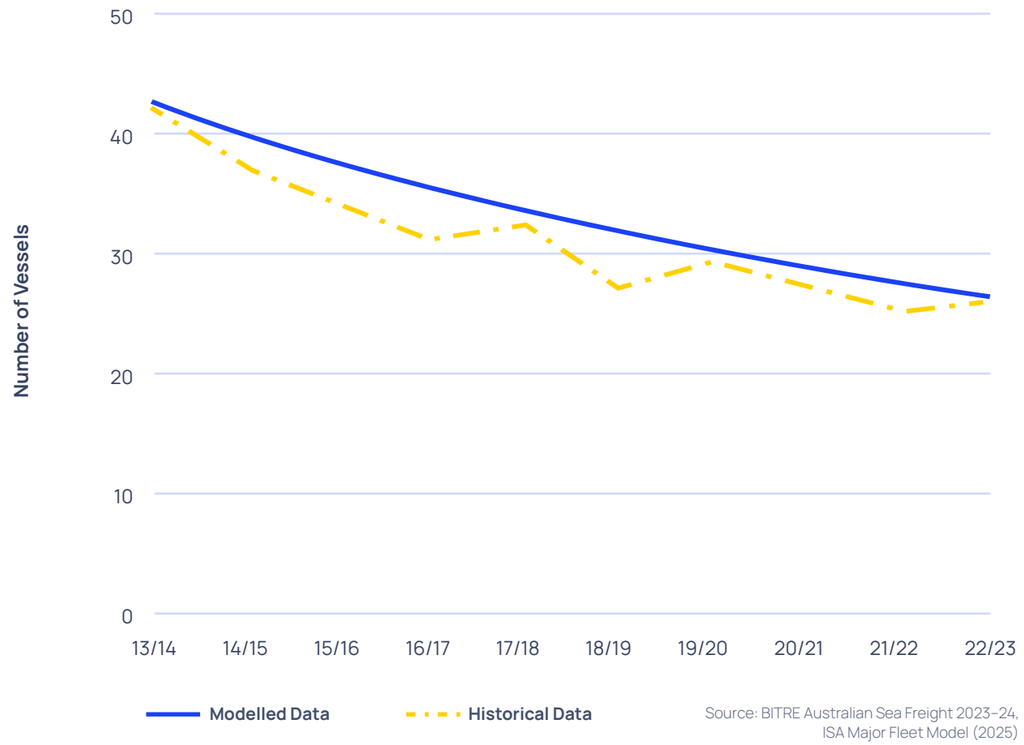
This dynamic is clear in the historical data. The Australian-flagged fleet has shrunk by an average of 1.8 vessels per year over the last 30 years (Figure 30), with a similar rate of decline (1.6 vessels per year) for all Australian-crewed vessels in the last decade (Figure 31).

Source: BITRE Australian Sea Freight 2002-03, 2023–24, ABS Year Book 1995

Figure 30: Trends in Australian and Overseas Registered Major Vessels

53 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. (2023). Strategic Fleet Taskforce: Final report. Commonwealth of Australia. https://www.infrastructure.gov.au/sites/default/files/documents/strategic-fleet-taskforce-final-report.pdf

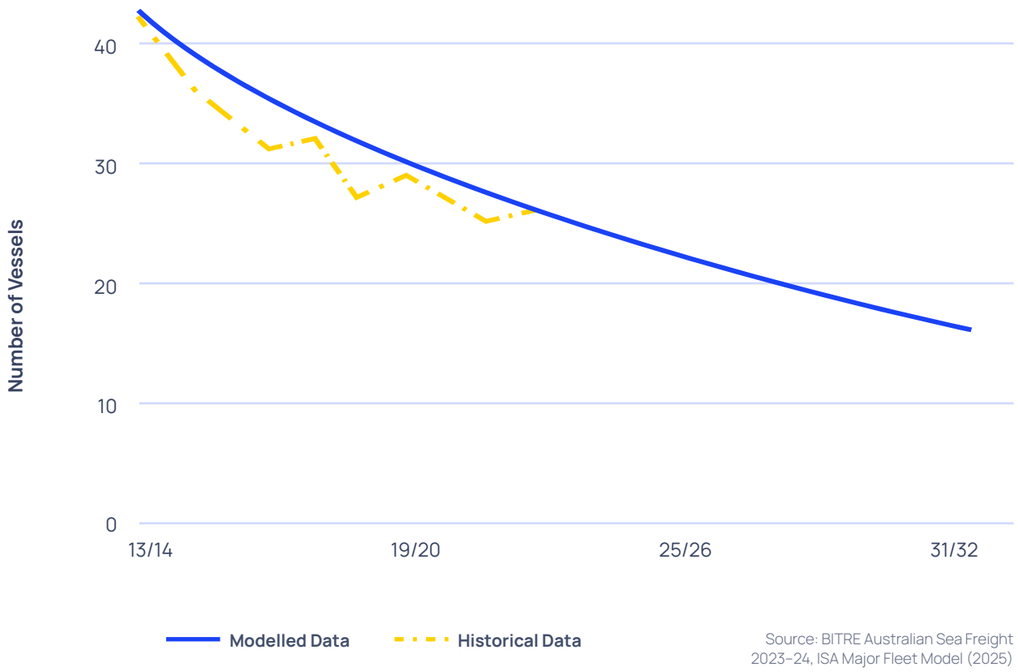
It is important to note that the model's projection is not a simple curve-fitting exercise. Instead, the model is calibrated to replicate the underlying dynamics observed in the fleet over the last decade, including vessel ageing, retirements, and cost-based exits. The model produces a smooth trend line by simulating the continuous stock of vessels as an expected average, which is necessary for stable feedback loops calculations. The close alignment between the model's output and the historical trend supports the model's calibration and provides confidence in its representation of the system.



Source: BITRE Australian Sea Freight 2023–24, ISA Major Fleet Model (2025)

Figure 31: Australian Crewed Major Vessels: Historical and Modelled Projections

With the model validated against the past decade, we can project this trend forward. If current conditions persist, the model forecasts that the Australian-crewed fleet will decline by a further 29% by 2032/33 (Figure 32). This projection represents the status quo, or baseline for the analysis, where overall freight growth is assumed to continue historical trends, but the cost gap is still present, impacting both early exits and new purchases of Australian crewed ships.

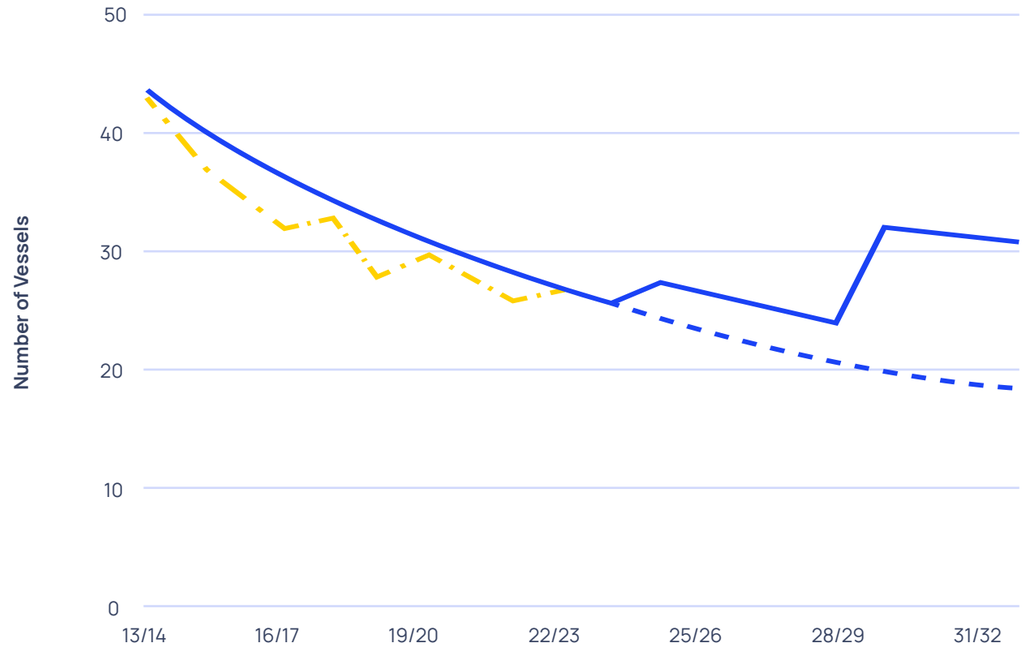


Source: BITRE Australian Sea Freight 2023–24, ISA Major Fleet Model (2025)

Figure 32: Forecast of Australian Crewed Major Vessels Without Strategic Fleet

Modelling the Impact of the Strategic Fleet

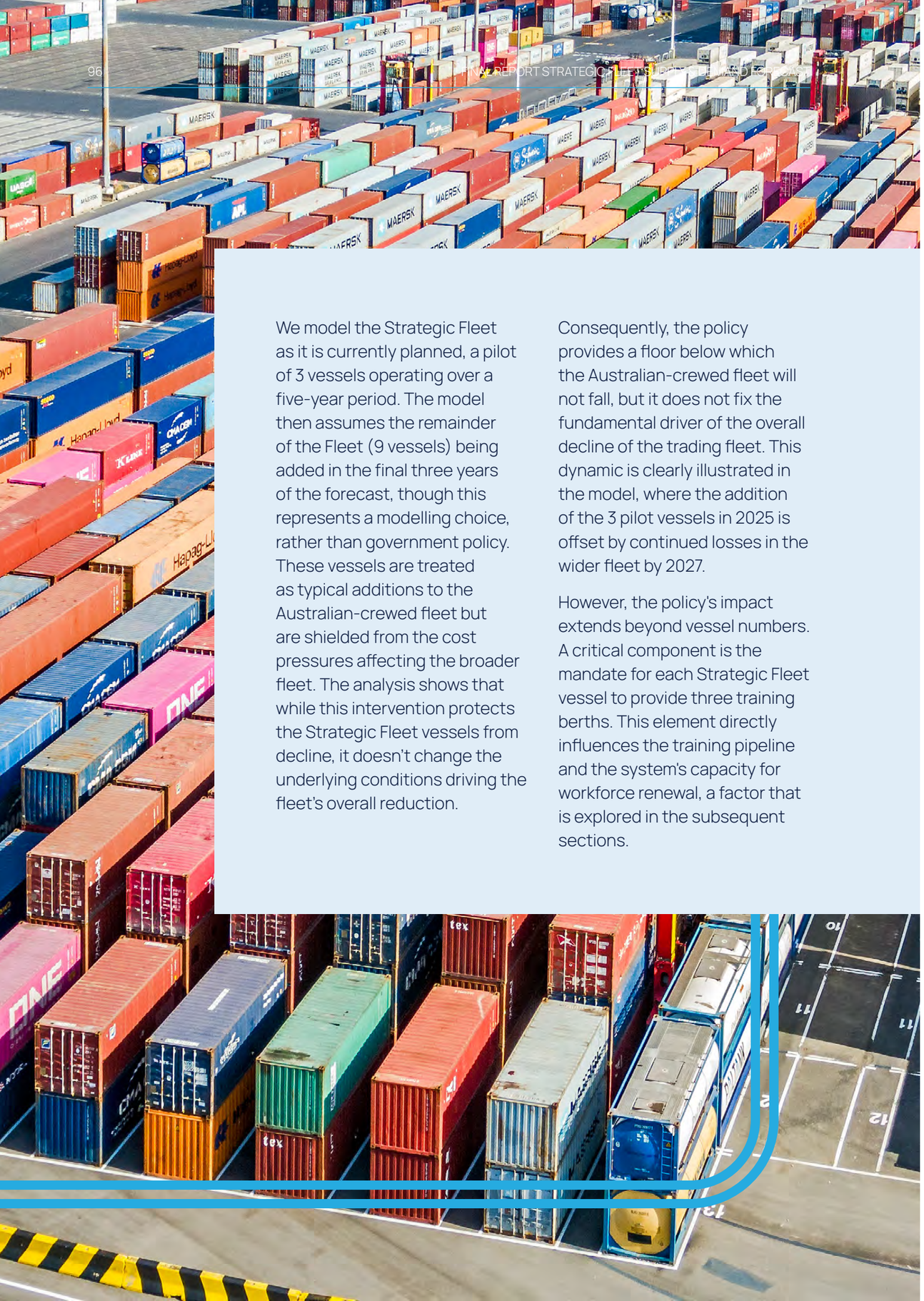
The Strategic Fleet policy is a significant step aimed at reversing the decline of Australia's crewed shipping fleet. A key question is whether this initiative can create a sustainable system, particularly for training new seafarers and rejuvenating the workforce. The tender documents for the Strategic Fleet[54] acknowledge the "commercial cost-gap" between operating Australian versus foreign vessels, which has long been a barrier. To address this, the Commonwealth will provide targeted payments to pilot participants to cover the additional costs of registering and operating Australian-flagged and crewed ships over the life of the pilot program. Crucially, these payments must not be used to subsidise lower service rates, ensuring the Strategic Fleet doesn't undercut existing operators.



Source: BITRE Australian Sea Freight 2023–24, ISA Major Fleet Model (2025)

Figure 33: Forecast of Australian Crewed Major Vessels With A Strategic Fleet

54 Australian Government. (2024, September 13). Australian Government Tenders and Contracts. National Library of Australia Web Archive. https://webarchive.nla.gov.au/awa/20240913085647/https://www.tenders.gov.au/Atm/Show/1c44d781-ee54-4bb4-b37e-6c673001c780



We model the Strategic Fleet as it is currently planned, a pilot of 3 vessels operating over a five-year period. The model then assumes the remainder of the Fleet (9 vessels) being added in the final three years of the forecast, though this represents a modelling choice, rather than government policy. These vessels are treated as typical additions to the Australian-crewed fleet but are shielded from the cost pressures affecting the broader fleet. The analysis shows that while this intervention protects the Strategic Fleet vessels from decline, it doesn't change the underlying conditions driving the fleet's overall reduction.

Consequently, the policy provides a floor below which the Australian-crewed fleet will not fall, but it does not fix the fundamental driver of the overall decline of the trading fleet. This dynamic is clearly illustrated in the model, where the addition of the 3 pilot vessels in 2025 is offset by continued losses in the wider fleet by 2027.

However, the policy's impact extends beyond vessel numbers. A critical component is the mandate for each Strategic Fleet vessel to provide three training berths. This element directly influences the training pipeline and the system's capacity for workforce renewal, a factor that is explored in the subsequent sections.

The dynamics of workforce ageing and renewal

The core of the model translates the number of Australian-crewed vessels into specific crewing requirements by rank. The dominant career pathways for each peak certificate, as discussed previously, are represented for Deck, Engine, Ratings, and Cooks. It uses the 2024 age profile from AMSA's certificate data as a starting point and simulates how the workforce evolves over the next decade.

The simulation includes several dynamic features. Lower ranks are promoted into higher ranks, seafarers retire at observed rates according to age, and crew are laid off or recruited as the vessel count changes. A key feature is dynamic attrition: the rate at which seafarers leave the industry is not a fixed percentage but adjusts based on job market conditions for each role. When jobs are plentiful, the attrition rate decreases, when there is a surplus of crew, it increases.

It is important to note that projected workforce gaps are based on the modelled 'flow' of labour, representing the difference between demand and the supply generated by the domestic training pipeline, once attrition from retirements and competition is factored in. The model does not include potential 'stock' sources of supply for the freight workforce, such as existing certificate holders in the wider labour pool or skilled migration, to conservatively assess the capacity of the domestic system to renew itself.

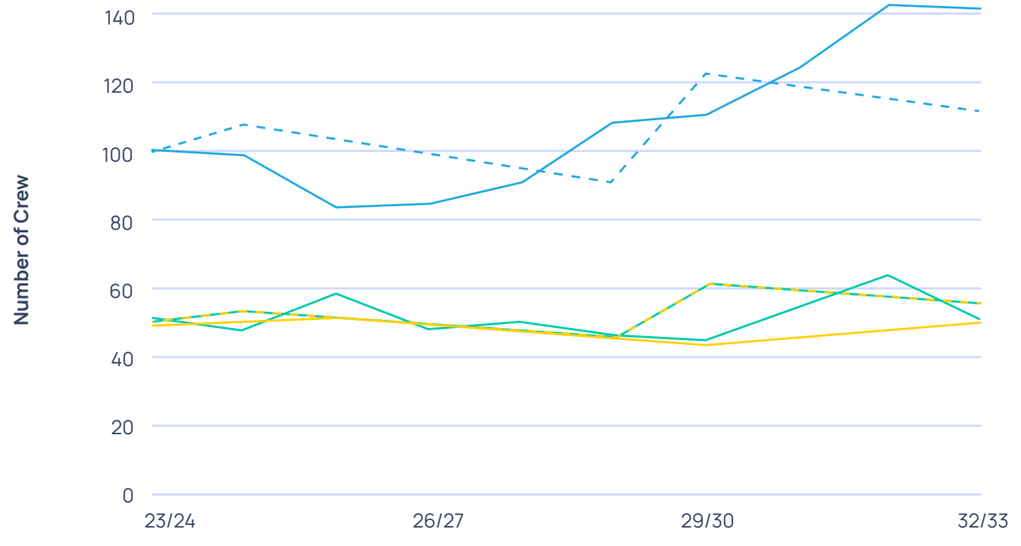
Each department functions as a cascading system of demands. For example, a need for a Master draws from the pool of Chief Mates, which in turn draws from Watchkeepers – creating a ripple effect that drives recruitment at the entry-level. However, delays in training and sea-time mean the system cannot respond instantly to demand, making it prone to persistent shortages or oversupply. In Figure 34, the demand created by the Strategic Fleet is visible both as a pilot and the subsequent ramp up from 2030 onwards. Yet, the supply of qualified crew responds slowly and unevenly across ranks, highlighting the challenges of workforce renewal.

Source: ISA Major Fleet Model (2025)

Figure 34: Projected Demand vs Supply of Crew

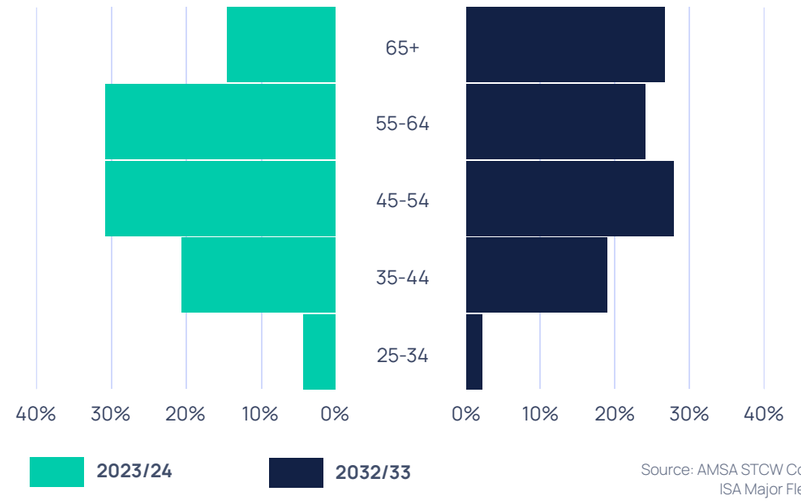
To illustrate, Figure 35 focuses on Deck roles, though similar dynamics occur in other departments. The dotted lines represent crew demand and solid lines represent supply. For Master Unlimited, the response delay is most pronounced, taking four years to meet the demand spike from the Strategic Fleet. The supply of Chief Mates is more volatile, as it is affected by promotions both in and out of the role. While they respond faster to demand, they're also prone to overshooting. As the entry point, Watchkeepers Deck respond fastest, but their supply is affected by promotions to Chief Mate. This creates a temporary oversupply after 2030, as the system tries to fill gaps higher up the career ladder. These dynamics highlight how interconnected the ranks are, and how delays in training and progression can lead to mismatches between supply and demand.

Demand for new entrants is not driven solely by the Strategic Fleet - it's also a result of an ageing workforce. As Figure 36 shows, the model projects that the proportion of Masters aged over 55 will increase from 45% in 2024 to over half (51%) by 2033. This demographic shift creates a steady and growing demand for promotions from lower ranks, placing ongoing pressure on the training and development pipeline. Without timely renewal, the system risks bottlenecks and shortages as experienced crew retire and replacements are needed across all levels.



Source: ISA Major Fleet Model (2025)

Figure 35: Projected Supply vs Demand of Deck Crew by Rank



Source: AMSA STCW CoC data (Nov 24), ISA Major Fleet Model (2025)

Figure 36: Age Profile of Master Unlimited 2024, 2033

Competition for maritime crew

So far, the analysis has focused on the demand generated by the existing Major trading fleet and the addition of the Strategic Fleet. However, the Australian maritime sector is on the cusp of a significant expansion in a new direction with large-scale offshore wind and decommissioning projects planned over the next decade. Unlike the Strategic Fleet, which adds both jobs and new training berths, these offshore energy projects represent a significant external "pull" on the existing pool of experienced seafarers. This demand competes directly with the trading fleet for qualified personnel without contributing to the training pipeline of the trading fleet, creating the potential for a severe labour market squeeze and exacerbating existing workforce challenges.

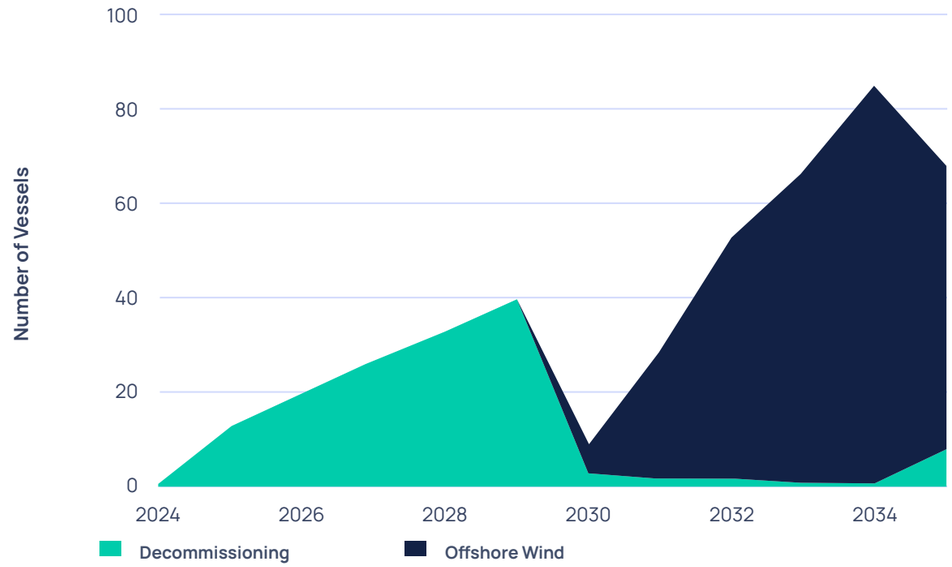
To quantify this new demand, we developed forecasts for both offshore wind and decommissioning activities.

For offshore wind, we analysed a global database of completed projects to establish a benchmark for the number of major vessels required per megawatt of generating capacity. This methodology was then applied to the 15 offshore wind projects currently planned for Australian waters to create a schedule of required vessels and the associated demand for qualified seafarers.

For the decommissioning of oil and gas infrastructure, crewing estimates were sourced from the Centre of Decommissioning Australia (CODA). For both forecasts, we focused specifically on major vessels (such as large barges and support vessels) likely to hire Australian crew, excluding highly specialised vessels that typically arrive with their own international crew. This provides a more realistic estimate of the demand that will be placed on the domestic labour market.

Figure 37 shows the projected vessel demand from these two sectors. A key observation is the lack of significant overlap between the two demand waves. The decommissioning effort peaks at around 40 vessels in 2029 and largely subsides before the offshore wind construction boom begins in earnest.

While the staggered timing helps avoid a combined peak, it also risks creating a false sense of calm around 2030, just before a much larger wave of demand hits.



Source: Custom dataset, CODA 2025, 4C Offshore Global Wind Farm Database (2025)

Figure 37: Projected Vessel Demand for Decommissioning and Offshore Wind

It's important to understand that the rising demand from offshore energy projects will draw from the entire Australian STCW-certified labour pool, not just the Major trading fleet. Therefore, the model treats the demand from offshore energy not as a direct subtraction of roles, but as a "poaching" pressure on the existing workforce. The outflow of experienced crew from the Major trading fleet is calculated proportionally, based on the fleet's share of the total maritime workforce, using Census data.

A key variable in the model is the proportion of offshore energy roles expected to be filled by Australian crew. This can be influenced by policy decisions, such as implementing a crewing mandate. Figure 38 shows two scenarios. One with no crewing requirement, where the trading fleet remains unaffected, and another with an 80% Australian crew mandate. In the latter case, the increased demand causes a persistent shortage in the Major trading fleet, delaying its ability to fully crew the Strategic Fleet.

Source: ISA Major Fleet Model (2025)

Figure 38: Projected Supply of Crew Under Different Scenarios Compared with Demand

The poaching effect is primarily driven by a wage premium, as the offshore sector is expected to offer higher salaries, making these roles more attractive. This creates a dilemma for freight companies: if they raise wages to compete, they worsen the cost gap that's already contributing to the decline of the trading fleet. If they don't, they risk losing skilled staff to offshore projects.

Before examining role-specific impacts, it is important to understand the overall scale of the challenge. Table 12 shows the projected crew requirements for the major trading fleet across three time periods:

Table 12: Major Trading Fleet Crew Requirements

Financial Year	Required Crew
2026/27	834
2029/30	1,038
2032/33	945

These figures represent the total number of crew needed to operate the Major trading fleet under projected conditions. Table 13 summarises the impact of offshore crewing demand on the available workforce across three distinct scenarios:

- **Baseline**: This scenario models the continuation of the current fleet decline, offset by the introduction of the Strategic Fleet.
- **Moderate**: This scenario builds on the baseline by adding a 20% Australian crewing requirement for all offshore wind and decommissioning projects.
- **High**: This scenario models a more significant impact, with an 80% Australian crewing requirement for the offshore and decommissioning sectors.

Table 13: Scenario Impact on Available Crew

Scenario	Year	Available Crew	Shortfall/Surplus (%)
Baseline	2026/27	777	-7.34%
Baseline	2029/30	834	-24.46%
Baseline	2032/33	1028	7.98%
Moderate	2026/27	744	-12.10%
Moderate	2029/30	778	-33.42%
Moderate	2032/33	980	3.57%
High	2026/27	651	-28.11%
High	2029/30	532	-95.11%
High	2032/33	784	-20.54%

Under the baseline scenario the workforce remains in deficit through 2029/30, with demand exceeding supply by nearly a quarter. By 2032/33, this trend reverses as the Strategic Fleet's recruitment pipeline matures, resulting in a modest surplus. The moderate demand scenario shows persistent deficits until late in the period, with only a slight surplus emerging by 2032/33. The high demand scenario reflects severe shortages throughout, particularly in 2029/30, where demand exceeds supply by nearly 95%. This industry-level view highlights the magnitude of the challenge and sets the stage for understanding how these pressures play out across specific roles.

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Table 14 details the projected workforce supply gaps (demand minus supply) for key roles across the same scenarios. The percentages show how far the number of crew available differs from what's needed, based on the size of the current workforce. Negative values indicate a shortfall (undersupply), and positive values indicate a surplus (oversupply). For example, −40% means demand exceeds supply by 40% of the current crew while a value of 25% indicates supply exceeds demand by about a quarter. This helps highlight where shortages intensify for specific roles under the various scenarios.

Table 14: Impact of Offshore Crewing Demand on Maritime Freight Workforce

Scenario	Department	Role	2027/28	2030/31	2033/34
Baseline	Catering	Cook	-3.2%	-28.0%	23.1%
Moderate	Catering	Cook	-8.0%	-28.5%	20.0%
High	Catering	Cook	-24.6%	-62.6%	14.1%
Baseline	Deck	Watchkeeper Deck	-17.8%	-10.7%	21.3%
Moderate	Deck	Watchkeeper Deck	-24.9%	-23.4%	21.3%
High	Deck	Watchkeeper Deck	-43.3%	-85.1%	24.0%
Baseline	Deck	Chief Mate	-1.1%	-36.4%	-9.3%
Moderate	Deck	Chief Mate	-7.3%	-28.6%	-14.0%
High	Deck	Chief Mate	-17.5%	-56.7%	-34.4%
Baseline	Deck	Master Unlimited	1.1%	-40.7%	-11.9%
Moderate	Deck	Master Unlimited	1.2%	-48.8%	-29.0%
High	Deck	Master Unlimited	-7.0%	-102.3%	-158.7%
Baseline	Engine	Engineer Watchkeeper	-15.3%	-16.7%	24.7%
Moderate	Engine	Engineer Watchkeeper	-22.1%	-30.9%	33.6%
High	Engine	Engineer Watchkeeper	-45.2%	-95.5%	25.4%
Baseline	Engine	Engineer Class 2	-8.9%	-19.2%	5.9%
Moderate	Engine	Engineer Class 2	-11.4%	-29.1%	-14.8%
High	Engine	Engineer Class 2	-19.0%	-66.3%	-33.6%
Baseline	Engine	Engineer Class 1	5.1%	-42.1%	-13.4%
Moderate	Engine	Engineer Class 1	0.9%	-48.9%	-30.8%
High	Engine	Engineer Class 1	-11.6%	-114.4%	-179.8%
Baseline	Rating	Watch Rating	-31.2%	0.0%	16.8%
Moderate	Rating	Watch Rating	-55.1%	-15.4%	18.6%
High	Rating	Watch Rating	-123.2%	-69.4%	24.0%
Baseline	Rating	Integrated Rating	1.7%	-43.6%	-6.4%
Moderate	Rating	Integrated Rating	1.6%	-49.9%	-27.7%
High	Rating	Integrated Rating	-8.3%	-151.8%	-197.4%
Baseline	Rating	Chief Integrated Rating	-8.1%	-25.9%	5.6%
Moderate	Rating	Chief Integrated Rating	-10.6%	-21.2%	7.7%
High	Rating	Chief Integrated Rating	-16.9%	-47.1%	-18.3%

The data reveals that while shortfalls are projected across most roles, particularly in the "High" demand scenario, the dynamics play out differently by rank. In the baseline scenario, senior roles, like Master Unlimited and Engineer Class 1, the demand shock that is created by the expansion of the Strategic Fleet should be met by late 2034. By contrast, in a high demand scenario, this will lead to persistent shortages of crew, acting as a blocker for the implementation of the Strategic Fleet. This shortage at the top creates a powerful demand signal that cascades down the ranks, forcing the system to over-recruit at the entry level. Due to recruitment and training delays, this results in a classic 'overshoot', where a severe initial deficit of entry level roles eventually flips to a large surplus in later years as the delayed supply finally arrives.

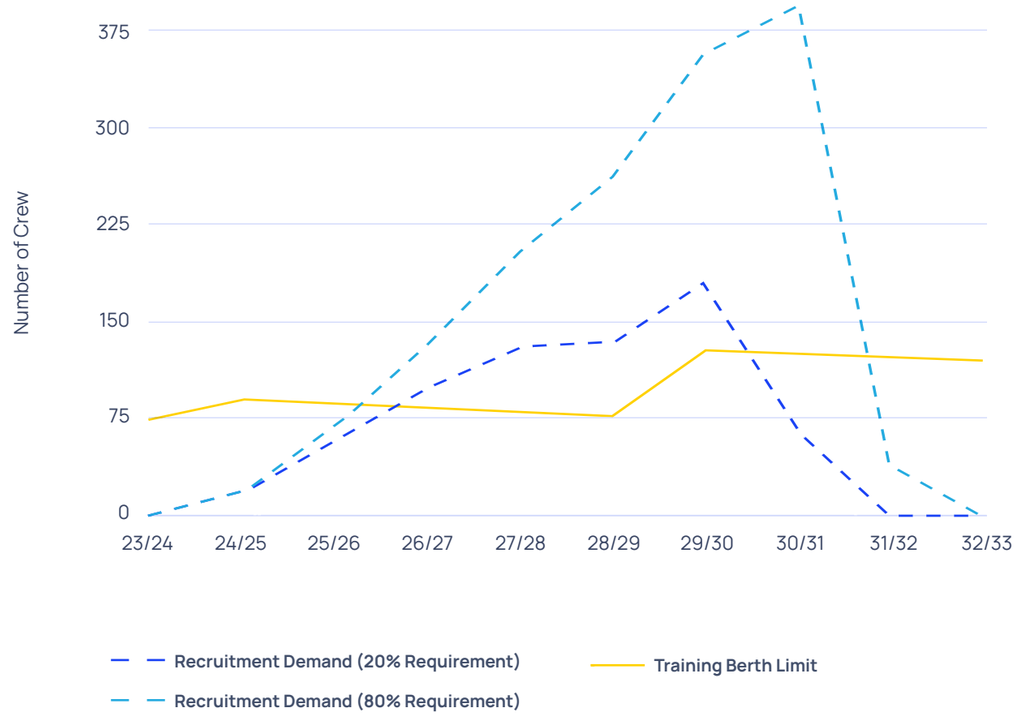
The primary reason the Major trading fleet cannot accommodate the additional demand is the system's key bottleneck: the number of available training berths. As shown in Figure 39[55], the three mandated training berths on each Strategic Fleet vessel are just enough to support the fleet's own growth. Beyond that, the system has very limited capacity to train additional new entrants, leaving little room to respond to broader workforce pressures.

Source: ISA Major Fleet Model (2025)

Figure 39: Training Berth Limits vs Recruitment Demand

Consequently, any attrition caused by crew leaving for the offshore sector creates an internal demand for replacement trainees that immediately outstrips the available berths. Figure 40 highlights this vulnerability. Even a modest Australian crewing requirement of just 20% for offshore projects creates a training demand that already exceeds the system's capacity. An 80% requirement creates a demand that vastly exceeds the number of available training berths, making it impossible to train enough new entrants to sustain the workforce.

55 Recruitment demand starts at zero because the model is initialised with the actual number of crew equal to the desired number, so there is no recruitment demand at the beginning. Where recruitment demand later falls to zero, the actual crew count exceeds the desired level and the demand signal disappears.



Source: ISA Major Fleet Model (2025)

Figure 40: Recruitment Demand and Training Berth Limit Under Different Scenarios

The Near Coastal to STCW pathway as a strategic workforce lever

As highlighted in the Training Pathways analysis, seafarers transitioning from the Near Coastal sector make up a small but significant share of STCW completions, around 7%, despite representing only 1% of Near Coastal graduates. This presents a potential pool of experienced recruits that could be targeted to meet the growing demand in the Major trading fleet. This section explores the potential impact of increasing reliance on this pathway.

While increasing the recruitment of Near Coastal seafarers would relieve pressure on finding new STCW entrants from the general population, the model shows this does not solve the core problem. The critical issue is that both recruitment streams, direct entry and the Near Coastal pathway, compete for the same, strictly limited number of training berths. Figure 41 illustrates the baseline scenario, where the existing training berth capacity already acts as a ceiling on the total number of new recruits the system can absorb.

Source: ISA Major Fleet Model (2025)

Figure 41: Recruitment Sources and Training Berth Limit (Baseline)

This constraint becomes far more severe once the demand from offshore energy projects is included. Figure 42 adds the demand from a modest 20% Australian crewing requirement, revealing a significant gap between the number of trainees required and the system's capacity to produce them. In this scenario, the limited number of training berths becomes a hard ceiling, restricting how many new recruits can enter the workforce and making it impossible to meet growing demand.

Source: ISA Major Fleet Model (2025)

Figure 42: Recruitment Sources and Training Berth Limits (20% Requirement)

Figure 43 explores the impact of a policy intervention that doubles the recruitment rate from the Near Coastal pathway in response to rising demand. While this approach successfully shifts the composition of the trainee pool (more from Near Coastal, fewer from direct STCW entry), it does not increase the total number of trainees. The overall output remains constrained by the same training berth bottleneck.

Source: ISA Major Fleet Model (2025)

Figure 43: Recruitment Sources and Training Berth Limits (Double NC Recruitment)

09

Conclusion

This Study presents, for the first time, a unified evidence base and an integrated system-dynamics model that explains how Australia's fleet settings, labour market and training system interact and what that means for the Strategic Fleet and broader maritime freight capability. Designed to support practical decisions by government, industry and providers, it now offers a clear baseline for future planning.

Three key conclusions emerge:

1. **The Strategic Fleet will temporarily arrest decline**. The modelling shows that while the Strategic Fleet helps stabilise Australian-crewed capacity, it does not reverse the broader decline of the trading fleet. Without wider cost reforms, gains from the pilot program are quickly offset by ongoing losses elsewhere.
2. **Workforce ageing is a critical constraint**. A large share of senior Deck and Engine officers are approaching retirement, with too few junior officers to backfill, intensifying promotion demand across all ranks over the next decade.
3. **Training capacity is the bottleneck**. The number of available training berths is the limiting factor. The mandated three trainee berths per Strategic Fleet vessel are sufficient to stand up the Strategic Fleet itself, but they leave little spare capacity to meet replacement and growth needs in the wider fleet. Additional demand, especially from offshore wind and decommissioning, quickly overwhelms this capacity.

Compounding these pressures, new offshore energy projects are likely to "poach" experienced crew through a wage premium. When modelled as Australian-crew requirements for offshore projects, even a modest requirement significantly reduces the freight sector's ability to renew itself at current berth levels and training constraints.

Pathway levers can help but are limited. Transitions from Near Coastal to STCW are proportionally small (about 1% of NC graduates) yet supply a meaningful share of new STCW completions (~7%). Scaling this pathway changes the mix of entrants but not the overall output, as all recruits compete for the same finite number of training berths.

Ultimately, these challenges are interconnected. The fleet's decline shrinks the training base, the ageing workforce accelerates demand, and new competition from offshore energy intensifies pressure on the remaining skilled labour pool. Addressing any one issue in isolation will not enable the training system to support demand.

Australia is at a critical juncture. To build a maritime workforce capable of supporting the nation's economic and strategic needs, a coordinated national strategy is essential. This strategy must go beyond isolated fixes and tackle the system as a whole, ensuring the viability of the broader trading fleet, expanding training capacity, and aligning labour demands across the maritime sector. Without such action, Australia risks becoming almost entirely dependent on foreign vessels, undermining its ability to control the vital maritime assets required to ensure supply chain resilience, its economic sovereignty and national security.

Appendix

Modelling methodology

Jobs and Skills Australia (JSA) has assisted ISA with the modelling for the workforce needs for the Strategic Fleet. JSA has provided advice to ISA in relation to its overall approach, data sources and methods.

The primary purpose of the model is to understand the long-term effects of various factors, such as cost pressures, retirement rates, and training capacity, on the size and viability of the Australian-crewed Major fleet and the availability of a qualified maritime workforce. It is designed to test policy scenarios, including the introduction of the Strategic Fleet and requirements for Australian crew in offshore wind and decommissioning.

The Maritime Skills and Training Initiative (MSTI) Program[56] which provides financial assistance to organisations that provide berths for cadets and trainees to complete mandatory sea time requirements to obtain STCW certification, is not modelled. While MSTI may influence training capacity, this initiative was announced after the modelling was completed, so its potential impacts were not considered in any scenario.

56 Department of Employment and Workplace Relations. (2025, November 12). New maritime training initiative charts the course for seafarers. Ministers' Media Centre https://ministers.dewr.gov.au/giles/new-maritime-training-initiative-charts-course-seafarers

Simulation Specifications

- **Time Horizon**: 2023/24 to 2032/33
- **Time Step (DT)**: 1 Year

Data-Driven Foundation

The model's parameters and initial conditions are grounded in empirical data wherever possible to ensure a realistic starting point for the simulation.

Key data sources referenced in the model documentation include:

- **Fleet Numbers and Historical Trends**: Initial fleet sizes and historical vessel entry/exit rates are based on data published by the Bureau of Infrastructure and Transport Research Economics (BITRE).
- **Operating Costs**: Cost structures, including wage differentials between Australian and foreign crews, are informed by sources such as the Strategic Fleet Taskforce Final Report.
- **Workforce Demographics and Attrition**: Workforce attrition rates are derived from Jobs and Skills Atlas Pro data, while retirement rates are based on national-level statistics for the relevant age brackets.
- **Training Pipeline Inflows**: The number of graduates from Near Coastal courses who form a potential recruitment pool is based on completions data from the National Centre for Vocational Education Research (NCVER).
- **Crewing Requirements**: The number of crew required per vessel is calibrated against Australian Maritime Safety Authority (AMSA) minimum safe crewing data for typical Australian-crewed major vessels.

This data-driven approach enhances the model's credibility and relevance for analysing real-world scenarios.

Model Architecture and Key Modules

The model is composed of interconnected modules, each handling a specific part of the system.

- **Cost**: This module calculates the operational cost differentials between Australian and foreign-crewed vessels and models the economic pressures that lead to vessels leaving (or not entering) the Australian fleet. Government-owned or subsidised vessels are modelled with the same cost pressures and downstream impacts as other non-Strategic Fleet vessels. This assumption has minimal influence on results within the modelled timeframe because vessel numbers remain above zero throughout the simulation.
- **Australian-Crewed Major Vessels**: This core module simulates the lifecycle of the Major Australian-crewed fleet.
- **Strategic Fleet**: This module allows for the simulation of a policy intervention to introduce a government-supported Strategic Fleet. This fleet is identical to the 'Australian-Crewed Major Vessels', except that it is not exposed to the same cost pressures.

- **Foreign-Crewed & New Vessels**: These modules model the dynamics of the foreign-crewed fleet operating in Australia and the overall demand for new vessels.
- **Crew**: Taking the 'Australian-Crewed Major Vessels' as input, this is the most detailed module, modelling the entire career pathway of seafarers across different ranks, departments, and age groups.
- **Training**: This module represents the pipeline for new seafarers, from recruitment to graduation.
- **Offshore Demand**: This module simulates the "pull" for qualified seafarers from the offshore energy sector, creating competition for the existing crew pool.

Core Dynamics and Sub-Models

Fleet Dynamics: An Ageing Chain

The model represents the Australian-crewed Major fleet as a series of stocks representing different age brackets (e.g., "Vessels 0 to 5 years," "Vessels 5 to 10 years," etc.). This structure is known as an "ageing chain."

- **Inflows**: The chain is fed by an Inflow of new vessels, determined by the New_Vessels module. Cost pressures influence decisions to flag and crew new vessels.
- **Ageing**: Vessels move from one age bracket to the next through 'ageing flows'. The rate of ageing is determined by the number of vessels in a bracket divided by the duration of that bracket (e.g., Vessels_0_to_5 / 5 years).
- **Outflows**: Vessels exit the fleet through several mechanisms:
  - → **Age-Based Retirements**: A fraction of vessels in the older age brackets (20-25, 25-30, 30+) are retired each year.
  - → **Cost-Based Early Exits**: Vessels are removed from service when the operating cost of an Australian vessel becomes uncompetitive compared to a foreign one. This creates a balancing feedback loop where high costs reduce the fleet size.

Crew Workforce Dynamics

The crew module is a multi-dimensional model of the Australian seafarer population. The workforce is divided into three ranks and four departments (Deck, Engine, Ratings, Cook) and further disaggregated into six age brackets.

- **Career Progression**: A seafarer's career is modelled as a progression through this structure. New entrants join at the lowest rank, for example Watchkeeper Deck, via the Training module. They then advance through the age brackets within that rank.
- **Promotions**: When vacancies arise in a higher rank (e.g., Chief Mate), a "pull" is created that promotes eligible individuals from the rank below. Promotion eligibility is based on the average time spent in the lower rank.
- **Workforce Outflows**: Crew members can leave the workforce through:
  - → **Retirement**: Based on age-specific retirement fractions.
  - → **Normal Attrition**: A baseline rate of personnel leaving for other careers. This rate is dynamically adjusted;

if there are more jobs than people (a high "opportunity ratio"), attrition decreases, and vice-versa.

- → **Surplus Attrition**: If there is a surplus of crew for the number of available jobs, an additional attrition flow is activated.
- → **Offshore Poaching**: A dedicated outflow, models the loss of experienced crew to the higher-paying offshore sector, linking the Crew module to the Offshore_Demand module.

Training and Recruitment Pipeline

The supply of new seafarers is handled by the Training module.

- **Demand Signal**: The primary driver is a signal calculated in the Crew module based on the gap between the desired crew size and the actual crew size, plus any accumulated historical shortfall.
- **Recruitment Sources**: The model sources new trainees from two pools:
  - → **Direct Recruits**: STCW graduates sourced from the general population.
  - → **Near Coastal Recruits**: Sourced from a pool of individuals who have already completed Near Coastal qualifications.
- **Capacity Constraint**: The total number of trainees that can be recruited is limited by the number of training berths available on both the regular fleet (assumed 1.5 per vessel) and the Strategic Fleet vessels (3 per vessel). This creates a critical bottleneck in the system.

Economic and Policy Dynamics

The model incorporates several economic variables and policy levers to test different scenarios.

- **Relative Cost Ratio**: The Cost module calculates the cost premium of running an Australian-crewed vessel. This is a central variable that drives vessels leaving the fleet and shipowners' preference for foreign-crewed vessels when ordering new builds.
- **Strategic Fleet**: The Strategic Fleet module injects a specified number of vessels into the fleet at set times, simulating the initial pilot of three vessels and subsequent ramp up to 12 vessels overall. These new vessels increase the total Australian-crewed fleet size and, importantly, add to the training capacity, as they are assumed to have three training berths each.
- **Offshore Crew Mandate**: The crewing mandate fraction in the Offshore Demand module can be set to simulate policies requiring a certain percentage of Australian crew on offshore industry vessels, thereby increasing the demand and competition for qualified seafarers.