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NSW marine estate economic contribution and market insights report

Department of Regional NSW –
Department of Primary Industries

2023

Deloitte
Access Economics

Contents

Acronyms

Acronym	Full name
ABS	Australian Bureau of Statistics
AIMS	Australian Institute of Marine Science
ANZSIC	Australian and New Zealand Standard Industrial Classification
ANZSCO	Australian and New Zealand Standard Classification of Occupations
DPI	NSW Department of Primary Industries
EBITDA	Earnings before interest, tax, depreciation and amortisation
FER	Functional Economic Region
FTE	Full-time equivalent
GDP	Gross domestic product
IO	Input-Output
IOIG	Input Output Industry Groups
MEMS	Marine Estate Management Strategy
MIMP	Marine Integrated Monitoring Program
NSW	New South Wales
OECD	Organisation for Economic Cooperation and Development
TARA	Threat and Risk Assessment

The economic contribution of the NSW marine estate

Deloitte Access Economics was engaged by the NSW Department of Primary Industries (Fisheries), to develop a framework to estimate the economic value of the NSW marine estate and conduct an economic contribution analysis. The development of such a framework is to support ongoing management and investment within the marine estate. Estimating the economic contribution of the NSW marine estate today is to establish a 'baseline' assessment of the economic significance of the NSW marine estate, to track economic trends and highlight traditional and emerging sectors that may require government support.

The economic contribution is substantial

2017–18

$16.3 billion
in value added
= 3.0%
of NSW economy

114,721 jobs
in FTE
= 2.9%
of NSW employment

2021–22

$16.2 billion
in value added
= 2.5%
of NSW economy

103,801 jobs
in FTE
= 2.4%
of NSW employment

Marine estate industries are diverse

27

industries are dependent on the marine estate

- Boatbuilding
- Marine biotechnology
- Marinas & boating infrastructure
- Sand dune mining
- Commercial fishing
- Recreational activities other than fishing
- Marine estate management
- Oil and gas exploration and production
- Tourism
- Water transport
- Dredging
- Search and rescue
- Defence
- Sewerage and drainage
- Scientific research and education
- Other water transport services
- Stevedoring services
- Port and water transport terminal operations
- Undersea cables
- Offshore renewables
- Shipbuilding
- Seabed mining
- Salt production
- Marine equipment retailing
- Desalination
- Recreational fishing
- Aquaculture

Value added

While Tourism is the largest industry connected to the marine estate contributing

$4.3 billion
in value added

there are 17 other industries that have at least

$40 million
in value added

It is valuable to regional areas

Central Coast and Lake Macquarie, Newcastle and Shoalhaven are the regions outside Sydney with the largest income from marine industries. Tourism, Port and water transport terminal operations and Recreational activities other than fishing are the key economic drivers in these regions.

Source: Deloitte Access Economics

Executive summary

Photo by Tommy Wainwright

This report assesses the NSW marine estate's contribution to the NSW economy over five years from 2017–18 to 2021–22 to inform marine estate management and track the economic health of marine industries.

The marine estate plays a vital role in the New South Wales (NSW) economy. It is an important source of food and has the potential to be a significant energy provider for NSW, as well as being a place for recreation, and providing opportunities for trade, commerce, and scientific research. It sustains ongoing First Nations cultural practices and connections to nature and ancestors. Through economic activity occurring around or facilitated by the marine estate, jobs are created, incomes are earned, and the state and regional economies are supported. The marine estate's importance to the NSW economy is recognised by the NSW Government. The 2014 and 2022 Marine Estate Community surveys commissioned by the NSW Department of Primary Industries (DPI or the Department), concluded that the marine estate was integral to the overall wellbeing (social, cultural and economic) of the NSW community.[1] This report contributes to enhancing understanding of the economic benefits provided by the marine estate, as part of the Marine Integrated Monitoring Program (MIMP).[2]

Despite its importance, there has historically been no framework to measure and track the NSW marine estate's economic value in a way that encompasses all marine industries and sectors, and all NSW coastal regions. Prior to the Marine Estate Management Strategy (MEMS) there was no systematic monitoring of economic, social, and cultural dimensions of the marine estate and inadequate data was identified as a critical knowledge gap in the statewide Threat and Risk Assessment (TARA).[3]

This work also informs our understanding of the loss or decline of marine industries, which was identified as a moderate risk in the statewide TARA and provides consistency of metrics allowing comparison between industries.

In this context, Deloitte Access Economics was engaged by the NSW Government to develop a framework to estimate the economic value of the NSW marine estate, conduct a valuation over a five-year period, and analyse the future economic challenges and opportunities for the NSW marine estate. This economic contribution and market insights report presents the results, covering 27 industries and 15 regions. The development of this framework supports ongoing management and investment within the NSW marine estate.

This study forms part of the first stage of a three-stage project that DPI is undertaking to develop a comprehensive and robust valuation framework across the NSW marine estate.

Stage 1 | Economic value

Aims to estimate the market contribution of the marine estate to the NSW economy (this report).

Stage 2 | Natural capital accounting

Also known as environmental-economic accounting, is a framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment, and the stocks and changes of environmental assets, as they bring benefits to humanity.

Stage 3 | Social and cultural value

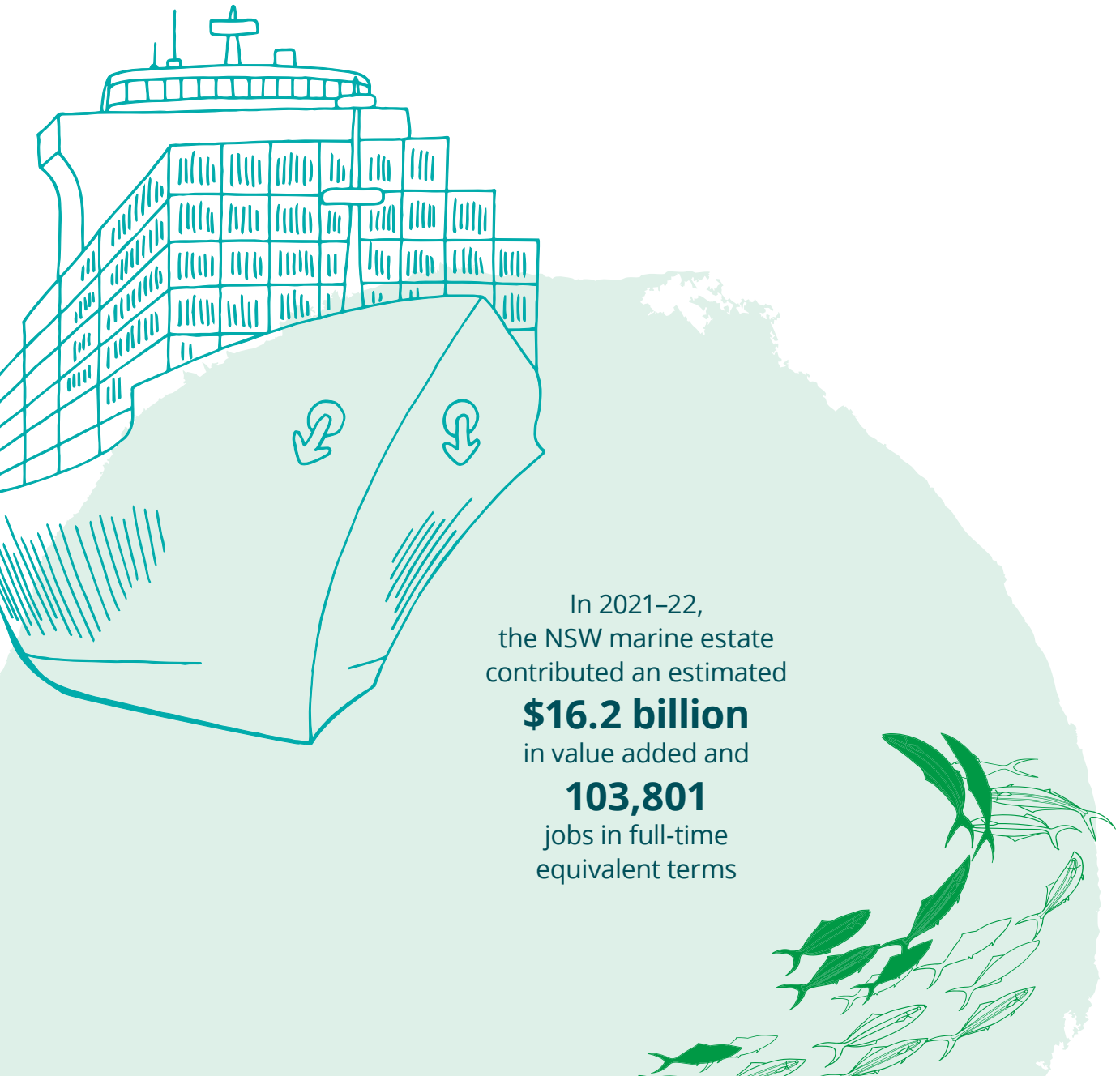
Will estimate marine estate ecosystem service benefits, and where appropriate monetise the social and cultural values they provide.

KEY FINDING 1

The economic contribution of the marine estate is substantial

The marine estate is important for the NSW economy. In 2021–22, income generated by marine estate industries was $20.6 billion. In nominal terms, income has remained relatively stable over the past five years. It peaked at $21.9 billion in 2018–19. It increased in size by 1.7% over the five years from 2017–18 to 2021–22. In real terms, adjusting for inflation using the Consumer Price Index (CPI), however, there was a 9% decline in income.

In value added terms, a measure to allow comparison to gross state product (GSP), the NSW marine estate contributed an estimated $16.2 billion in 2021–22. Approximately 103,801 jobs in full-time equivalent (FTE) terms were supported by the marine estate industries directly and indirectly, equal to 2.4% of total NSW employment. In relative terms, marine estate industries accounted for 2.5% of NSW's economy. This was a decline from 3.0% of GSP in 2017–18.



In 2021–22,
the NSW marine estate
contributed an estimated
$16.2 billion
in value added and
103,801
jobs in full-time
equivalent terms

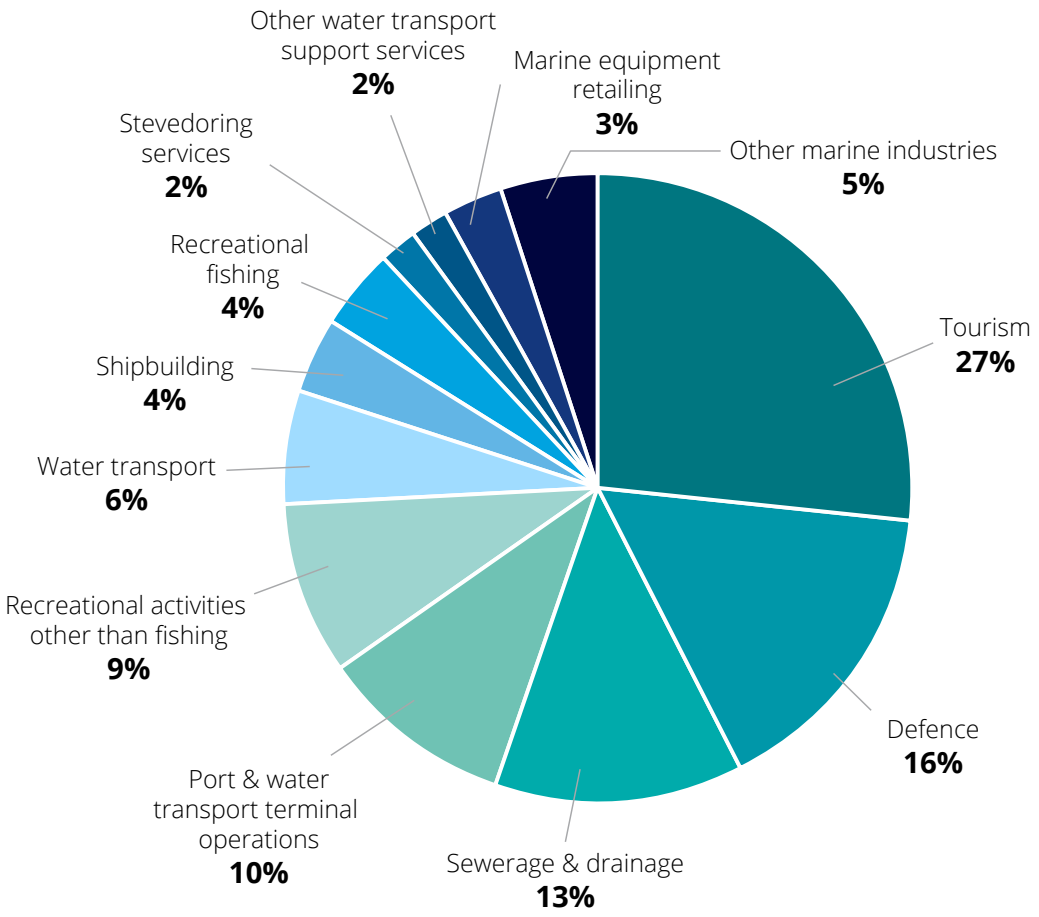
KEY FINDING 2

NSW marine estate industries are highly diverse

The NSW marine estate contributes to the economy through a wide range of activities. Chapter 3 of this report analyses the economic contribution of the NSW marine estate by industry, and how the performance of industries has varied over time.

A comprehensive review of the relevant literature identified 27 industries that are dependent on the marine estate. They are: Aquaculture, Boatbuilding, Commercial fishing, Marine biotechnology, Marine equipment retailing, Recreational fishing, Desalination, Dredging, Seabed mining, Oil and gas exploration and production, Sand dune mining, Salt production, Offshore renewables, Recreational activities other than fishing, Other water transport services, Port and water transport terminal operations, Search and rescue, Shipbuilding, Stevedoring services (loading or offloading cargo), Tourism, Undersea cables, Water transport, Marinas and boating infrastructure, Marine estate management, Scientific research and education, Defence, and Sewerage and drainage. Other activities supported by the marine estate such as habitat restoration are also discussed in this report.

Chart i: Industry income generated in the NSW marine estate as a proportion of total income, 2021–22 (%)



Source: Deloitte Access Economics

In 2021–22, industries dependent on the NSW marine estate generated $20.6 billion in income from 21 out of the 27 identified marine-dependent industries for which there was adequate data. Industries with little or no activity in NSW during the study period and those with insufficient data were excluded from the study. While noting that Tourism is the largest industry (27%) and that the top five industries account for almost three quarters of the marine estate, we describe it as diverse for two reasons. First, another ten industries generate over $100 million in income per year. Secondly, there is significant variety in the nature of the 27 industries. The marine estate includes consumer activities like Tourism and Recreation, industrial activities like Shipbuilding and Stevedoring, and government-funded activities like Naval defence and Scientific research.

The marine estate's economic significance is also reflected in the upstream industries (71 sub-industries identified) that indirectly depend on the marine estate. The largest industries in this category were Construction services, Finance, and Transport support services and storage.

KEY FINDING 3

Industries within the marine estate have experienced a period of significant change

There were considerable changes in the economic performance of marine-dependent industries in NSW. Some of these changes could be attributed to external factors such as COVID-19 lockdowns, global economic conditions, demographic changes, and extreme weather events. For instance:

- The biggest change occurred in the Tourism industry, which experienced a significant decline in income of $2.8 billion (or 32%) between 2017–18 and 2021–22, largely because of unprecedented international and domestic travel restrictions associated with COVID-19 and because of the impact of extreme weather events such as bushfires and floods. Other industries that declined included Other water transport support services (such as navigation, pilotage, salvage, and towing services) (down 22%).
- The most significant increase in income was for Recreational activities other than fishing (including beach visits, boating, and surfing) which increased by $1.1 billion or 126% over the five years. Defence increased by almost $1 billion (37% over five years), with the Defence budget's navy allocation increasing from 14 to 18% of total departmental resources in the period. Port and water transport terminal operations increased by $516 million (30% growth over five years), in part because of greater demand for goods during COVID-19 – sea trade export volumes increased 2.5% over the analysed period.
- Some industries experienced considerable volatility over the period while others were relatively resilient. Five industries that had notable volatility were Recreational fishing, Boatbuilding, Tourism, Port and water transport terminal operations, and Water transport. Defence and Sewerage and drainage, by contrast, increased somewhat steadily over the period. These industries are considered essential, meaning their operations were impacted less by the restrictions implemented during COVID-19 than Tourism or Recreational fishing. For the same reason, Search and rescue and Scientific research also experienced lower volatility.

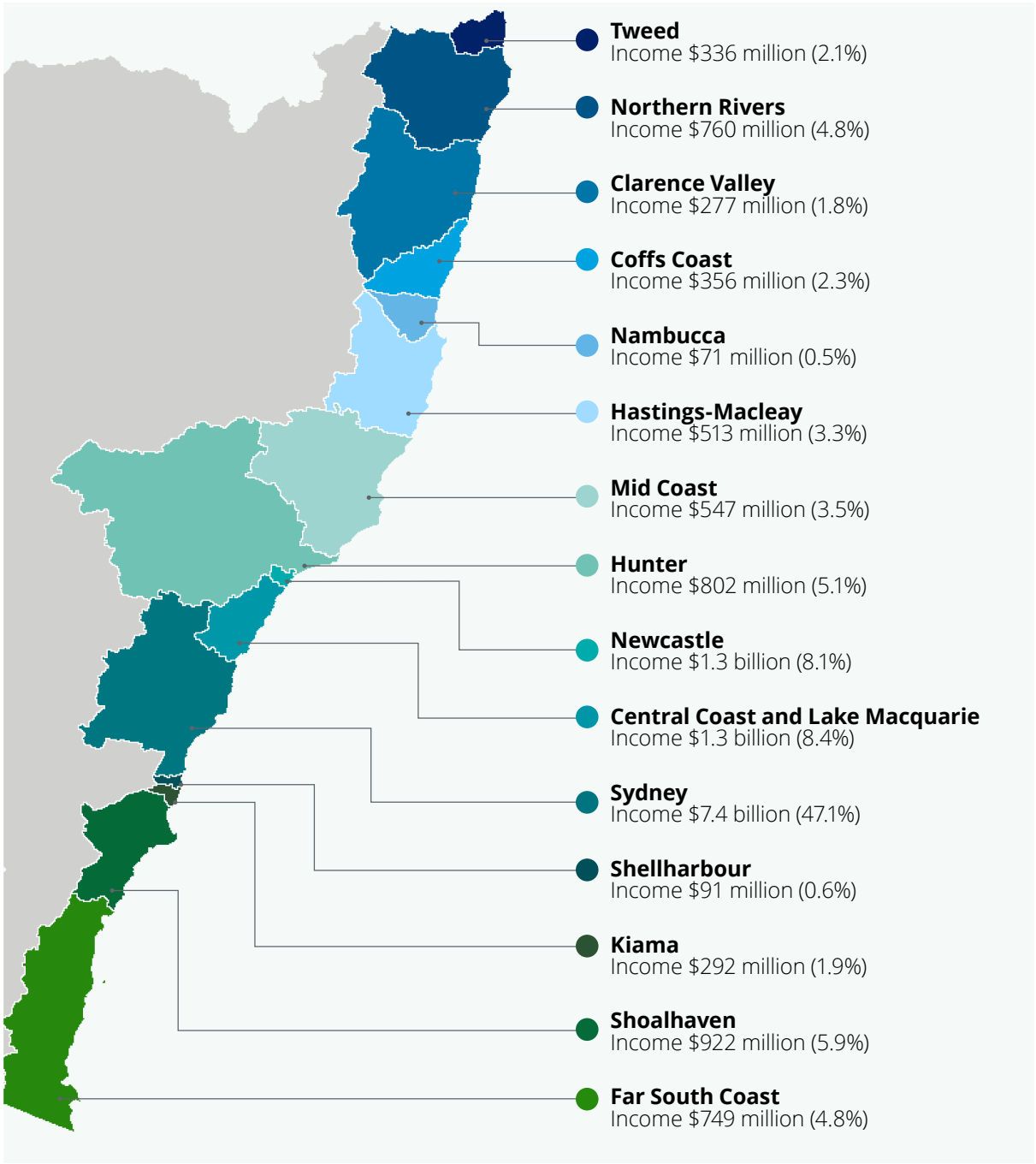
The analysis demonstrates that income for some marine industries (and hence employment) can be greatly impacted by short-term events and external factors, while others can weather these factors and grow moderately over time. These findings may have implications for policy makers – to recognise both the magnified impacts of industry change at the regional level, and how other industry changes can provide opportunities for regional communities, as will be discussed further in Chapter 3.

KEY FINDING 4

The marine estate is important to regional economies

The marine estate is valuable to regions across NSW, spanning coastal as well as inland communities through upstream activities generating supply chain benefits and employment opportunities. Of the income generated from the NSW marine estate in 2021–22, just under half (47%) was generated in Sydney, while 53% was generated in the 14 other NSW coastal regions. In 2017–18, the shares were 52% for Sydney and 48% for other coastal regions, suggesting a modest shift in income over the five years.

Figure i: Income and income share of coastal regions generated by marine estate dependent industries, 2021–22



Source: Deloitte Access Economics

The regions with the largest income from marine industries outside of Sydney are Central Coast and Lake Macquarie ($1.3 billion), Newcastle ($1.3 billion) and Shoalhaven ($922 million). Tourism, Port and water transport terminal operations, Recreational fishing, and Recreational activities other than fishing are the main industries that contribute to the economic activity in these coastal regions.

In addition to these industries:

- Commercial fishing is an important industry for Clarence Valley generating $12.9 million in income in 2021–22, as well as Coffs Coast ($6.9 million).
- Aquaculture is an important industry for the Far South Coast generating $15.9 million in income in 2021–22, and Mid Coast ($8.2 million).

Boat building and Shipbuilding are important to Central Coast and Lake Macquarie, together generating $68.9 million in income in 2021-22. The relative importance of the marine estate to regions can also be demonstrated by looking at income on a per capita basis. The region with the highest marine estate income per capita was Kiama ($12,720 per person). Far South Coast and Shoalhaven were the next two largest. These figures are not comparable with commonly reported income per capita figures, which would divide total regional income by population.

Income per capita also experienced changes over the five years. In the Clarence Valley and Northern Rivers regions, income per capita from marine estate industries declined by 29% (or $2,123 per capita) and by 27% ($1,784 per capita) respectively. By contrast, income per capita increased in Shellharbour and Kiama by 108% and 42% respectively. The changes were largely due to the impact of unprecedented external events such as COVID-19 and extreme weather.

Inland regions also benefit from the marine estate through upstream activities induced by marine industries. For example, some inputs used by marine estate industries like construction and finance can be sourced from non-coastal regional suppliers, generating indirect value added and employment in these regions.

KEY FINDING 5

Around two-thirds of income generated by the marine estate depends on the health of the marine estate

Some industries are not just dependent on the marine estate, but also dependent on a healthy marine estate, defined as exhibiting clean water and biologically diverse marine life.[4] For example, fishing industries depend on healthy habitats and unpolluted water. Recreational activities, including surfing, boating and beach visits, depend on good water quality and sound management of foreshores and infrastructure according to a report commissioned by Sydney Water.[5] There are a range of views on which industries depend upon a healthy marine estate. An initial assessment indicates this includes 16 of the 27 industries assessed (14 of which are quantified in this analysis, while the other two had insufficient data). The two industries with the largest income which were dependent on a healthy marine estate in 2021–22 were Tourism and Port and water transport terminal operations, which generated $6.1 billion and $2.3 billion in income, respectively. Tourism in the marine estate is strongly linked to the quality of the water and ecosystems as a number of activities (e.g. diving) require these characteristics to be competitive with other tourist locations. Likewise, Port and water transport terminal operations provide infrastructure to support cruise boats, which would visit NSW less frequently if the health of the marine estate was to deteriorate.

Overall, almost two-thirds, or 63% of income, was dependent on a healthy marine estate, highlighting the need for careful management and protection of this environmental asset to support continued economic activity. Industries dependent on a healthy marine estate are set out in the appendices in Table A.2.

KEY FINDING 6

A range of external factors are likely to have an impact on the economic performance of marine dependent industries

The NSW marine estate's future is one of both challenge and opportunity. A number of consultations and workshops were held to identify and distil the primary external factors that will impact the marine estate.

Some of the key external factors or drivers that are likely to affect the health of the marine estate and the economic performance of industries dependent on it include climate change, future regulations, research and development, emerging technologies, energy transition, changing consumer preferences, First Nations knowledge, food security, demographic shifts, and global linkages.

These 10 drivers have the potential to significantly impact the future shape of marine-dependent industries both in NSW and globally. They should be managed carefully to ensure NSW is well positioned to mitigate risk and maximise the potential benefits. Each of the 21 marine-dependent industries included in this report are likely to be directly impacted by at least one of the drivers identified, while a further 71 upstream sub-industries are likely to be indirectly impacted. Marine industries likely to be most affected by changes include Aquaculture, Commercial and Recreational fishing, Tourism, Recreational activities other than fishing, Offshore renewables, Water transport, Marine estate management, and Defence.

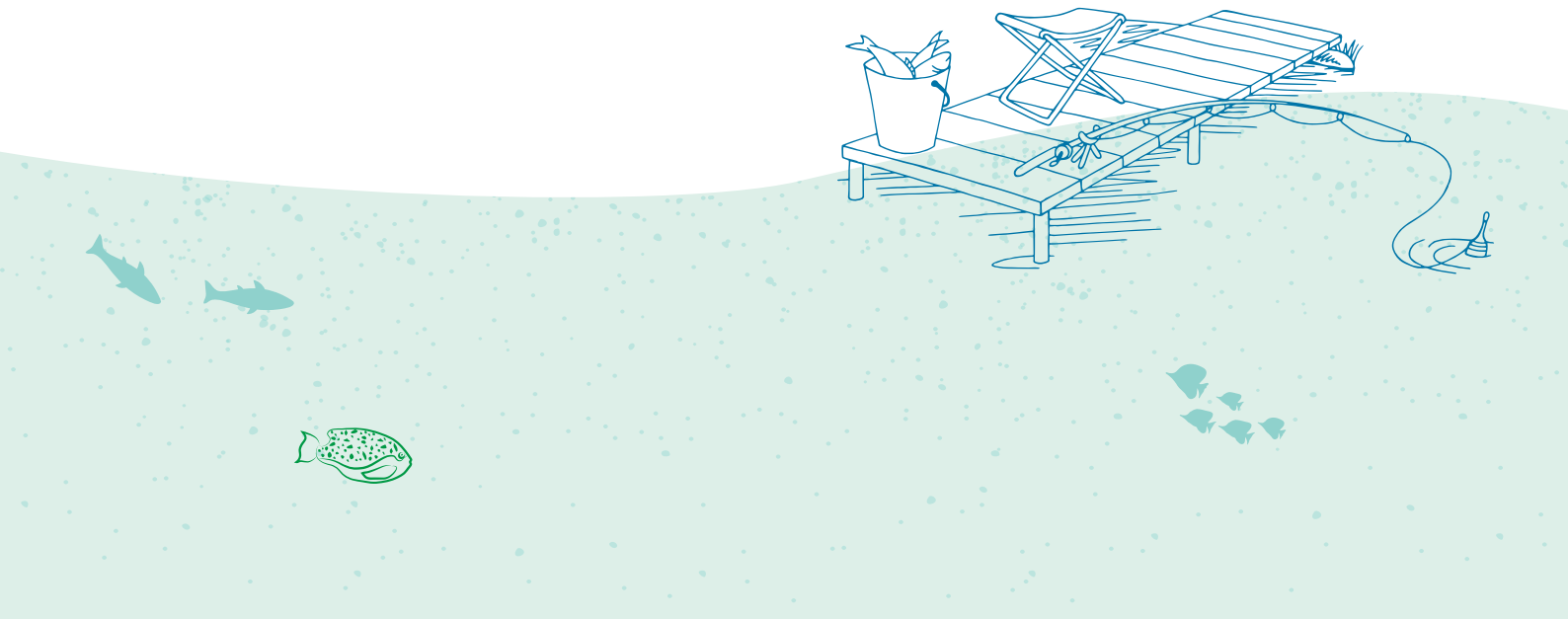
Conclusion

This report's key findings are that the marine estate's economic contribution is considerable, is highly diverse across industries, has changed over time, is important to regional economies, depends on the health of the marine estate and will be impacted by a range of external factors and trends in coming years.

An important outcome of this work is the establishment of a framework to monitor economic benefits for the market components of the marine estate, particularly to understanding the loss or decline in marine industries (identified as a stressor in the statewide TARA), as well as emerging industries. The report and its findings will be crucial to aid and inform the development of marine estate management policies and frameworks.

The true value of the NSW marine estate extends beyond that quantified in this report. As an area of natural beauty and cultural significance, the NSW marine estate provides important environmental, cultural, and social benefits which are not quantified in this work, such as supporting a range of recreational and lifestyle benefits for residents, ongoing First Nations cultural traditions and supporting marine ecosystems to thrive.

This report provides a foundation for future work to build upon. Stages 2 and 3 of this work will extend beyond the economic contribution of the NSW marine estate to assess both the relationships between the economy and the environment through natural capital accounting, and the social and cultural value provided by the NSW marine estate. Areas of potential further study are set out in the conclusion, including examining the contribution of the many Indigenous-owned and operated businesses within the NSW marine estate.



01 | Introduction

Photo by Tommy Wainwright

This report analyses the economic contribution of the NSW marine estate, acknowledging its importance to NSW communities' way of life in providing food, enabling recreation, driving economic prosperity, bolstering environmental resilience to climate change including through carbon sequestration, and sustaining First Nations cultural practices and connections.

This report analyses the economic contribution of the NSW marine estate, and in doing so acknowledges the many broader benefits to the Australian economy, community, and environment beyond those quantified in this report such as emotional, physical, and mental health, socialising, recreation, and cultural identity.

The opinions and views expressed in this report do not necessarily reflect the views or positions of the NSW Government.

The NSW marine estate is defined in the Marine Estate Management Strategy 2014 as:

- the coastal waters of the state up to three nautical miles from the mainland and including islands
- estuaries affected by coastal tides up to the highest astronomical tide
- lakes, lagoons, and other partially enclosed bodies of water that are open to the sea
- coastal wetlands (including saltmarsh, mangroves, and seagrass)
- lands in the immediate proximity of the coastal waters of the state that are subject to oceanic processes.[6]

1.1 Importance of the NSW marine estate

The marine estate is an important economic contributor to NSW, generating local income and employment, supporting seafood-related industries, and facilitating trade. As an island nation, the majority of the value of NSW's international trade occurs through sea freight — roughly 70% in 2020–21.[7] It also provides community benefits through opportunities to socialise and engage in outdoor leisure activities and water sports. Marine ecosystems have important cultural and spiritual significance for all Australians including First Nations people, who for millennia have relied on resources provided by Sea Country.

The marine estate's social, economic, environmental, and cultural values are recognised by the NSW Government. A Marine Estate Community Survey commissioned by DPI in 2022, found the NSW marine estate is integral to the NSW community's social and cultural wellbeing through the provision of food, as a place for recreation and further intangible benefits such emotional and mental health, socialising and cultural identity.[8]

In 2018, the NSW Government, with a vision for '*a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future',* announced the NSW Marine Estate Management Strategy (the Strategy).[9] As the centrepiece of NSW marine reforms, the Strategy provides an overarching framework for coordinated management of the NSW marine estate, addressing threats to the natural environment along with social, cultural and economic benefits the community derives from the marine estate.

1.2 The marine estate industries

The marine estate supports the NSW economy through various marine-dependent industries. Following a comprehensive review of comparable literature — including *The Ocean Economy in 2030*,[10] *The Second World Ocean Assessment*,[11] and *The AIMs Index of Marine Industry 2020*[12] — 27 industries were identified as dependent on the ocean. They are: Aquaculture, Boatbuilding, Commercial fishing, Marine biotechnology, Marine equipment retailing, Recreational fishing, Desalination, Dredging, Seabed mining, Oil and gas exploration and production, Sand dune mining, Salt production, Offshore renewables, Recreational activities other than fishing, Other water transport services, Port and water transport terminal operations, Search and rescue, Shipbuilding, Stevedoring services, Tourism, Undersea cables, Water transport, Marine estate management, Scientific research, Defence, Sewerage and drainage, and Marinas and boating infrastructure.

Further discussion of criteria applied and the list of the 27 marine-dependent industries is provided in Appendix A. These economic activities can be categorised into five types, as per the World Bank and United Nations report *The Potential of the Blue Economy*. This report categorises marine industries as follows (Figure 1.1): [13]

Figure 1.1: Marine industry categories

Harvesting of living marine resources	Activities related to extraction of living organisms from the ocean for consumption or production of biotechnology products
Harvesting of non-living marine resources	Extraction of minerals, oil and gas to meet demand for materials used in production and growing energy demands
Commerce and trade	Activities related to trade of goods and services such as shipping, as well as tourism and recreation-based industries
Use of renewable non-exhaustible natural forces	Generation of off-shore renewable energy such as wind, wave, tide or ocean thermal energy conversion
Environmental protection, regulation and research	Industries which support the continued protection and sustained use of the marine environment

Source: World Bank and United Nations

Based on these categories, Table 1.1 overleaf groups each of the 27 measured marine-related NSW industries according to their relationship to the environment. This table also provides definitions of each industry. All industries reflect national and international precedents as well as emerging industries identified in previous studies.

Table 1.1: Glossary of industries dependent on marine resources

	Harvesting of living marine resources, involving the extraction of organisms for consumption or biotechnology products
Industry	**Definition**
Aquaculture*	The cultivation and harvesting of marine life through marine-based aquaculture farming operations. This excludes hatchery and land-based aquaculture.
Boatbuilding	From the Australian and New Zealand Standard Industrial Classification (ANZSIC) code 2392, which includes workforce activities such as Boatbuilding, manufacturing, and repair. This differs from Shipbuilding as it includes manufacturing or repairing vessels of under 50 tonnes (whereas Shipbuilding focusses on vessels over 50 tonnes). Income estimated to be attributable to inland regions of NSW was excluded from the estimate.
Commercial fishing*	Activities related to wild capture fisheries up to the first point of sale, which does not include retail and wholesale activity. Includes the contribution of fisheries in Commonwealth waters that are offloaded in NSW.
Marine biotechnology*	Explores the form, structure, physiology, and chemistry of marine organisms to produce new materials.
Marine equipment retailing*	From the ANZSIC code 4245, which includes workforce activities such as marine accessory retailing and boat retailing. Does not include economic activity attributable to inland regions in NSW.
Recreational Fishing*	The expenditure of recreational fishers in NSW on items such as accommodation, bait, and fees & licences (not including items spent on other marine industries like marine equipment retailing).
	Harvesting of non-living marine resources, including minerals, oil, gas and renewable natural forces to meet production and energy demands
Industry	**Definition**
Desalination*	The removal of salt and impurities from seawater to produce fresh water for drinking or irrigation.
Dredging	The removal of silt and other material from the bottom of bodies of water in along coastal Functional Economic Regions (FERs) in NSW.
Oil and gas	Oil and gas exploration that occurs in offshore environments in NSW.
Sand dune mining	The extraction of sand from the coastal fringe.
Salt production	The process of evaporating seawater to produce salt.
Seabed mining	Harvesting of minerals from the ocean floor.
	Use of renewable non-exhaustible natural forces
Industry	**Definition**
Offshore renewables*	The production of offshore renewable energy.

Commerce and trade in and around oceans, covering trade, tourism, and related services	
Industry	**Definition**
Recreational activities other than fishing*	Includes visits to the beach (and beach-related activities), surfing visits, and boating activities which excluded recreational fishing. These recreational activities were quantified to estimate the expenditure by coastal residents who undertake these activities.
Other water transport support services*	From the ANZSIC code 5219, which includes workforce activities such as navigation services, salvage services, and water-towage services.
Port and Water Transport Terminal Operations*	From the ANZSIC code 5212, which includes workforce activities, such as terminal operations for freight and passenger services, as well as ship mooring services.
Shipbuilding	From the ANZSIC code 2391, which includes workforce activities involving manufacturing or repairing vessels of 50 tonnes and over displacement (whereas Boatbuilding is under 50 tonnes), as well as submarines or major components for ships and submarines not elsewhere classified.
Search and rescue*	Includes the revenue generated from Surf Lifesaving NSW, NSW Marine Rescue and Southern Region SLSA Helicopter Rescue Service Pty Ltd (Westpac Helicopter).
Water transport*	From the ANZSIC code 48, which includes workforce activities related to freight and passenger transport, from coastal and international transport between national and international ports through to passenger ferry and water taxi services. Cruises are not included and instead are captured in the tourism industry.
Stevedoring services	From the ANZSIC code 5211, which includes workforce activities such as loading and unloading ships and other stevedoring services.
Tourism*	The value of domestic and international marine-based tourism is estimated as the total expenditure of trips that involve marine-based activities – such as going to the beach, whale watching and cruises.
Marinas and boating infrastructure*	Involves activities related to managing, operating, and maintaining marinas and boating facilities. It includes services such as mooring, boat storage, sales, rentals, maintenance, marine retail, and yacht clubs.
Undersea cables	Manufacturing, construction, and maintenance of undersea cables used for telecommunications.

Environmental protection, regulation, and research, supporting the marine environment's protection and sustainable use	
Industry	**Definition**
Defence	Naval defence industry activities in NSW (not including shipbuilding).
Marine estate management*	Funding for the Marine Estate Management Strategy. This includes a range of activities such as habitat restoration, spatial management, initiatives to improve water quality and planning for climate change.
Sewerage and drainage	Portion of wastewater attributable to the sewerage and drainage industry within NSW.
Scientific research*	Research conducted by a NSW research institution or with NSW origin under the Australian Research Council's (ARC) and Fisheries Research and Development Corporation's (FRDC) grants related to the NSW marine estate.

Source: Deloitte Access Economics

Industries shown in grey are those which are not quantified in this report due to insufficient publicly available data. Industries marked with an asterisk (*) are those that are categorised as being dependent on a healthy marine estate. Please see Appendix A for further detail on methodology and inclusion criteria.

Many industries interact with and derive benefit from the marine estate; however a small subset of these are directly dependent on marine resources for their livelihood. These industries are therefore dependent on a 'healthy marine estate'. A healthy marine estate is defined as exhibiting *'clean water and biologically diverse marine life.'*[14]

There are differing views on which industries are dependent on a healthy marine estate; however this report identifies 16 industries as dependent, based on Australian and international research[12] and discussions with sector experts. In a report commissioned by Sydney Water, the relationship between improved water quality at Sydney's coastal beaches and visitation is examined. Cleaner beaches were found to be important for marine industries such as Tourism and Recreational activities other than fishing.[15]

The industries that are dependent on a healthy marine estate (listed in Table 1.1) represent 63% (or $14.5 billion) of the marine estate's income in 2021–22.

This proportion has remained relatively stable over the past five years. More broadly, the Australian Conservation Foundation has found that 49% of Australia's GDP has a moderate to remarkably high direct dependence on nature including the NSW marine estate.[16]

1.3 Purpose of this report

The purpose of this report is to:

1. Identify and estimate the market contribution of marine estate industries to the NSW economy over a five-year period from 2017–18 to 2021–22.
2. Investigate drivers for economic changes and trends in the marine estate over the last five years across a wide range of industries and regions.
3. Identify external factors that are likely to influence the marine estate and consequently the industries and regions that are dependent on it.

The report does not seek to quantify broader community benefits provided by the NSW marine estate, such as those related to ecosystem services or aesthetic value. This kind of value is covered by natural capital accounting and similar approaches which are out of scope for this report.

The results of this study will provide important information and data to support justification for ongoing investment in the management of the marine estate. It also establishes critical baseline economic data to fill key knowledge gaps and help monitor the current state and future economic prospects of the marine estate across industries and regions. The presented information will inform current and future management and assess management effectiveness of the Strategy.

1.4 Study approach

This report was informed by the development of a marine estate industry framework, economic modelling of the NSW marine estate and stakeholder engagement to identify trends impacting the marine estate. The development of this report was informed by numerous stages of analysis and draws on a variety of methods and sources, which are further discussed in the appendix.

Marine estate industry framework

To estimate the economic contribution of the NSW marine estate, the relevant marine industries included within it were first characterised. 27 industries were identified as being dependent on marine resources based on international precedents and discussions with DPI. Twenty-one industries were quantified in this study due to industry scale and availability of data. Industries which are not quantified either did not have sufficient publicly available data (Marine biotechnology, Sand mining and Undersea cables) or did not record significant economic activity for the analysis period (Seabed mining, Offshore wind farming and Salt production) (refer to Appendix A and Table 1.1).

Data

Data has been collected from multiple sources including industry/company reports, the ABS and academic journals. Data collated included income, expenditure, Earnings Before Taxation, Interest, Depreciation and Amortisation (EBITDA) and employment, supplemented by secondary research where industry data was unavailable. Please refer to Appendix C for the full list of data sources and specific methodology applied to each industry. Unless otherwise stated, figures reported in this report are in nominal terms.

Economic modelling

The analysis aimed to develop a methodology that could be applied across multiple sectors to value the economic contribution of diverse industries. To achieve this, modelling is used to estimate the economic contribution of each industry using the data collected. Input-Output (IO) modelling is a form of quantitative economic modelling that represents interdependencies between different economic sectors or industries. Deloitte's model is based on the ABS IO tables and provides estimates for the direct contribution of each industry for income ($), value added ($) and full-time equivalent (FTE) jobs from 2017–18 to 2021–22.

These results were split by industry and geographic region. Fifteen regions were analysed at the Functional Economic Region (FER) level, focussing on regions along the NSW coastline.

Statistical trend analysis of five years of data revealed changes occurring in the marine estate at the industry, regional and aggregate levels, which are expressed in terms of percentage and absolute change.

Stakeholder engagement

A series of stakeholder workshops and industry and thematic sessions were conducted with a diverse range of stakeholders to identify key trends, opportunities and challenges impacting industries in the marine estate, in order to complement the economic contribution results.

1.5 Structure of this report

The report is structured as follows:

- **Chapter 2** sets out the considerable economic contribution of the marine estate to the NSW economy.
- **Chapter 3** analyses the economic contribution of the NSW marine estate by industry and regions. It examines market trends over the five years to 2021–22 and assesses drivers of change.
- **Chapter 4** provides a high-level view on factors that will impact the future health and economic contribution of the NSW marine estate.
- **Chapter 5** summarises the key findings and their implications for stakeholders and sets out potential areas of further work.

02 | Contribution to the economy

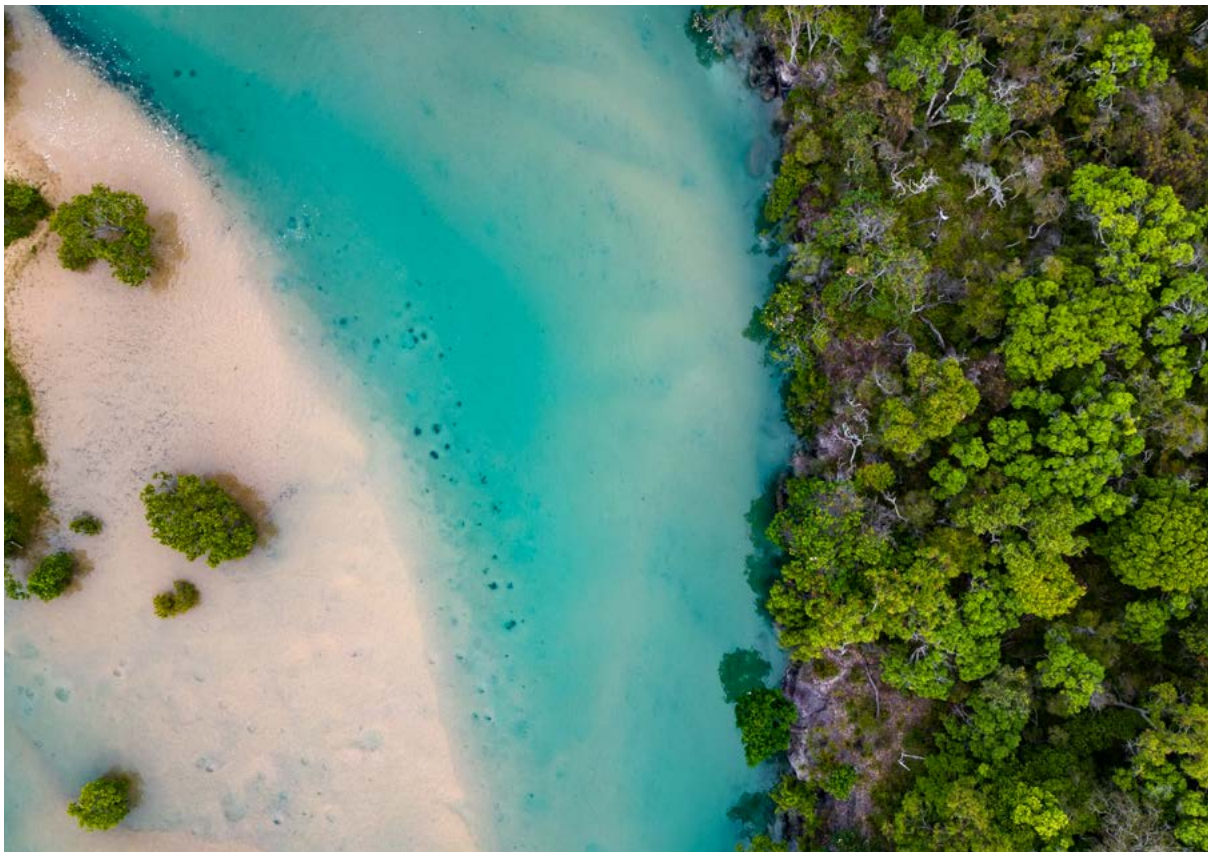


Photo by Tommy Wainwright

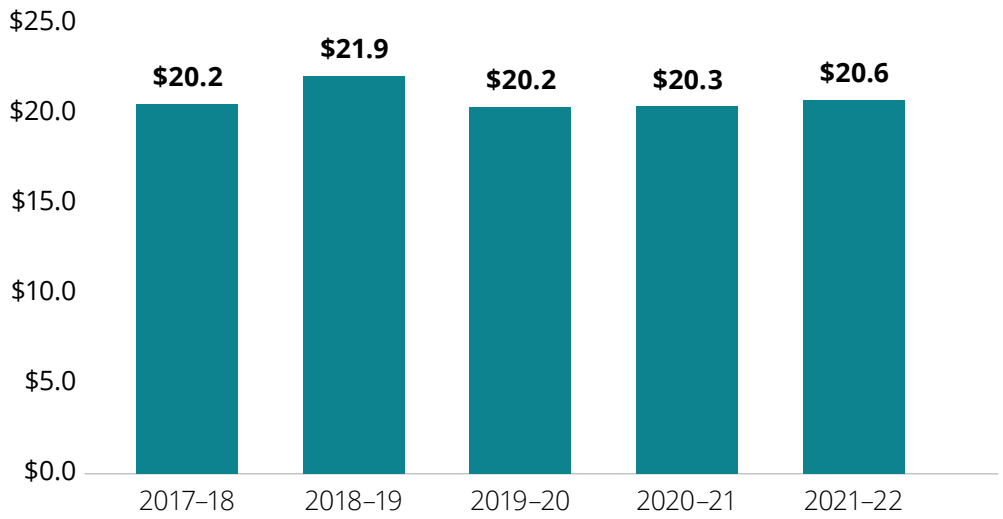
The economic contribution of the NSW marine estate is substantial – generating $20.6 billion in income in 2021–22, $16.2 billion in total value added (equivalent to 2.5% of gross state product) and supporting 103,801 jobs in full-time equivalent (FTE) terms (equivalent to 2.4% of total NSW FTE employment). The marine estate encompasses a diverse range of industries and regions.

This chapter outlines the economic contribution of industries within the marine estate in the five-year period from 2017–18 to 2021–22, measured through income, value added, and employment. The contribution is analysed at both the industry and regional level. The major trends and factors that have influenced marine industries are discussed in Chapter 3.

2.1 Income generated in the marine estate

The income derived from industries operating in the marine estate is substantial. In 2021–22, the total income generated by the NSW marine estate was $20.6 billion. This figure includes 21 out of the 27 identified industries dependent on the NSW marine estate (Chart 2.1).

Chart 2.1: Income of NSW marine estate ($ billion)



Source: Deloitte Access Economics

The total income level of the NSW marine estate has remained relatively stable over the past five years in nominal terms. Income peaked at $21.9 billion in 2018–19 and increased in size by 1.7% over the five years from 2017–18 to 2021–22 (see Chart 2.1). However, in real terms, after taking into account inflation, income declined by 9%.

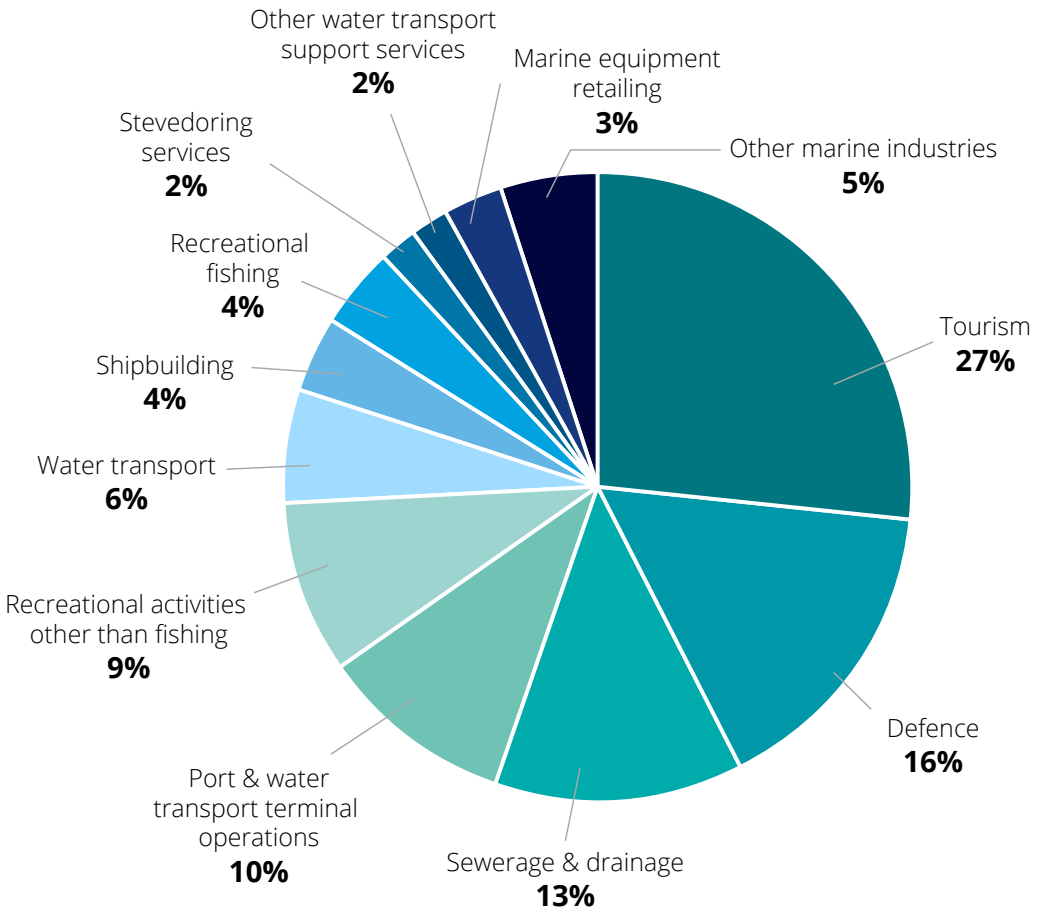
Notwithstanding the overall apparent stability of the NSW marine estate industries, there was considerable change between industries. Seven of the 21 industries experienced a decline in income generated, 14 industries saw an increase in income, and many experienced volatilities between different years within the period.

Five industries are most significant for marine estate income: Tourism, Defence, Sewerage and drainage, Port and water transport terminal operations and Recreational activities other than fishing— which combined, make up approximately three-quarters of total income (Chart 2.2). Nonetheless, there are numerous other contributing industries, like Shipbuilding and Recreational fishing, which together generated $1.9 billion in income in 2021–22. We describe the marine estate's industries as diverse not only because of the number of industries and their proportional shares of value added, but also the variety of activities – the marine estate is important not only for recreational activities like Fishing and Recreation, but also for rather different activities like Naval defence, trade-related services and Scientific research. The Tourism industry generates the most income in the NSW marine estate, accounting for 27% ($6.1 billion) of total income in 2021–22. For context, Tourism linked with the marine estate was worth about 18% of the total value of NSW Tourism in 2019–20 (using total state Tourism income from a separate study).[17] In the marine estate, Tourism has declined by $2.8 billion (-32%) from 2017–18 to 2021–22 due to COVID-19. It was not the only industry to fall in value, but its economic impact relative to other industries was significant. Other water transport support services and Recreational fishing recorded the second and third largest losses — $126 million and $66 million, respectively.

Other industries' growth offset the decline in Tourism. Recreational activities other than fishing experienced a $1.1 billion increase in income between 2017-18 and 2021-22, the largest growth of any industry. Defence is the second largest industry in the NSW marine estate, accounting for roughly 16% ($3.7 billion) of total income in 2021–22. It also grew by 37% ($987 million) in income from 2017-18 to 2021-22. Growth was also recorded for income from Port and water transport terminal operations, Water transport, and other industries.

The trends in income across all industries from 2017–18 to 2021–22 are further discussed in Chapter 3, along with specific external factors that have driven these changes.

Chart 2.2: Industry income generated in the NSW marine estate as a portion of total income, 2021–22 (%)



Note: Income at the industry level is not additive. The non-additive total income has been employed to estimate the proportional distribution of income among different industries in the NSW marine estate.

Source: Deloitte Access Economics

2.2 Value added

The industry income detailed in section 2.1 is used to determine the value added by the NSW marine estate to the NSW economy (see Appendix D). Value-added estimates can be used to compare NSW marine estate industries to aggregate economic indicators such as gross state product (GSP). Value added can be broken down between two elements – direct value added, and indirect value added.

Direct value added

Direct value added is the value of the economic activities of marine industries — for example, the value of the Shipbuilding industry. The total direct value added of all of the NSW marine industries can be used to compare the economic significance of the NSW marine estate to the State's economy and other industries, such as Manufacturing.

Indirect value added

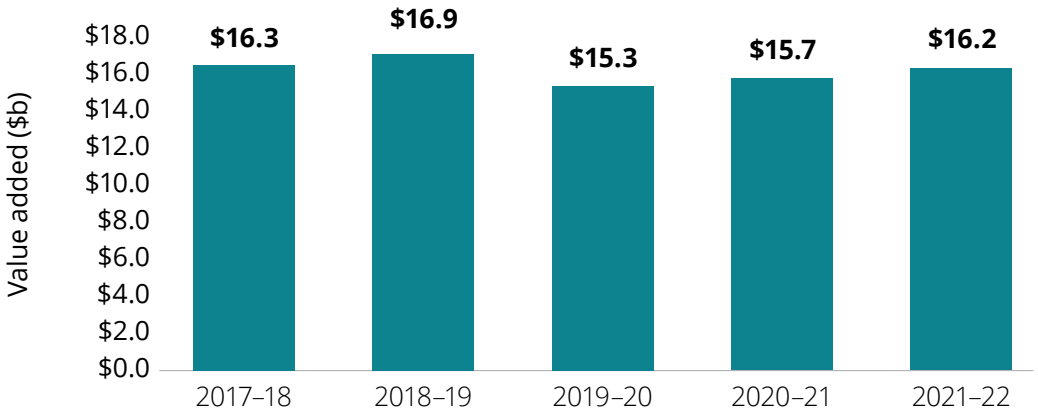
Indirect value added is the value of upstream economic activities that are induced by marine industries — for instance, the production of fishing equipment and bait are upstream activities of the commercial fishing industry.

The nature of economic activities facilitated by the NSW marine estate requires economic contributions of industries to be measured through both a supply and demand-side approach, depending on the industry. For example, the Shipbuilding industry can be measured through a supply-side approach while the Tourism industry is measured using a demand approach. To fairly represent the contributions of individual industries, the reported figures represent the full contribution of each industry. However, there is a risk of double counting when a measured demand-side activity consumes a measured supply-side activity. In the data collected for this study, double counting is addressed when estimating the total economic contribution of the marine estate (see Appendix D.2) . The value added of each industry in the value chain can be summed without the risk of double counting across industries, which would happen if including the value added by other industries earlier in the production chain.

The contribution of the marine estate to the NSW economy is estimated by Deloitte Access Economics' model, described further in Appendix D. This is based on standard Input-Output modelling that uses the most recent 2021-22 ABS Input-Output tables.[18] While including upstream activities, the analysis does not consider downstream activities. For example, downstream values associated with Commercial fishing products include transport, retail, and restaurants. This is a consistent approach applied across the 21 quantified industries. Facilitated economic activity, such as the value of trade that is linked to ports, is also excluded from analysis to have a consistent approach across industries.

The total value added by the NSW marine estate in 2021–22 was $16.2 billion. There was almost no change in nominal terms over the five years. The peak nominal value added was $16.9 billion in 2018–19 (Chart 2.3). In real terms, value added declined by 11% over the five years. In relative terms, the marine estate's value-added declined from 3% of GSP in 2017–18 to 2.5% of GSP in 2021–22.

Chart 2.3: Total value added by NSW marine estate by industry from 2017–18 to 2021–22 ($b)



Source: Deloitte Access Economics

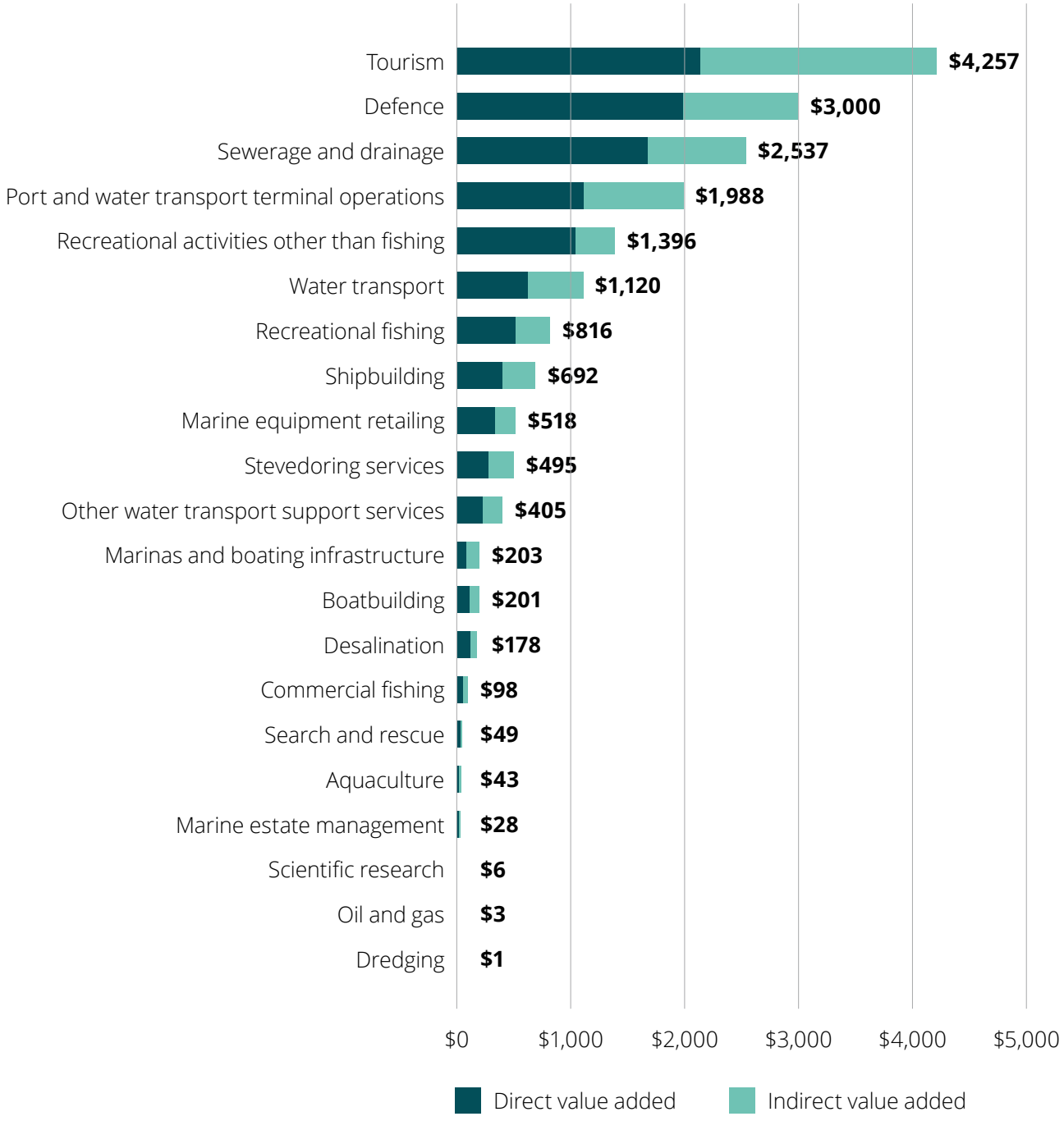
Despite the modest decline over the period, the 2.5% contribution to NSW GSP is substantial. For context, consider that Australia has 19 ANZSCO industries, each representing approximately 5% of the economy. The economic contribution results are also broken down by direct and indirect value by industry as illustrated in Chart 2.4. The direct value added by the NSW marine estate was $9.7 billion while the indirect value added was $6.5 billion in 2021–22. Direct value added was around 60% of the total value added and has been roughly stable at this proportion since 2017–18.

The NSW marine estate's economic contribution is around 15% of the size of the national marine estate measured by total value added (using 2020–21 data from the AIMS Index study).[19]

Nationally, the marine estate also comprised a greater proportion of the economy (representing 5.2% of GDP). This can be explained by the significance of Oil and gas exploration and extraction nationally, which increased 37% between 2017–18 and 2020–21.

Tourism and Defence are the greatest contributors to total value added by the NSW marine estate (see Chart 2.4). Tourism recorded $4.3 billion in total value added in 2021–22. The indirect contribution of Tourism is also significant, making up around half of the total value added by the industry in 2021–22. Defence is the second largest contributor to the marine economy, providing $3.0 billion in total value added in 2021–22. There are many indirect benefits from the Defence industry (some of these are described further in section 3.4), noting that indirect value added is over a third of the total value added for the industry in 2021–22.

Chart 2.4: Value added by NSW marine estate by industry in 2022 ($m)



Note: Value added at industry level is not additive
The direct and indirect value added of these industries are provided below as they are concealed in the chart:
Search and rescue: $34.9 million direct value added | $14.4 million indirect value added
Aquaculture: $20.0 million direct value added | $22.6 million indirect value added
Marine estate management: $17.1 million direct value added | $10.4 million indirect value added
Scientific research: $3.5 million direct value added | $2.6 million indirect value added
Oil and gas: $1.6 million direct value added | $1.1 million indirect value added
Dredging: $0.3 million direct value added | $0.3 million indirect value added

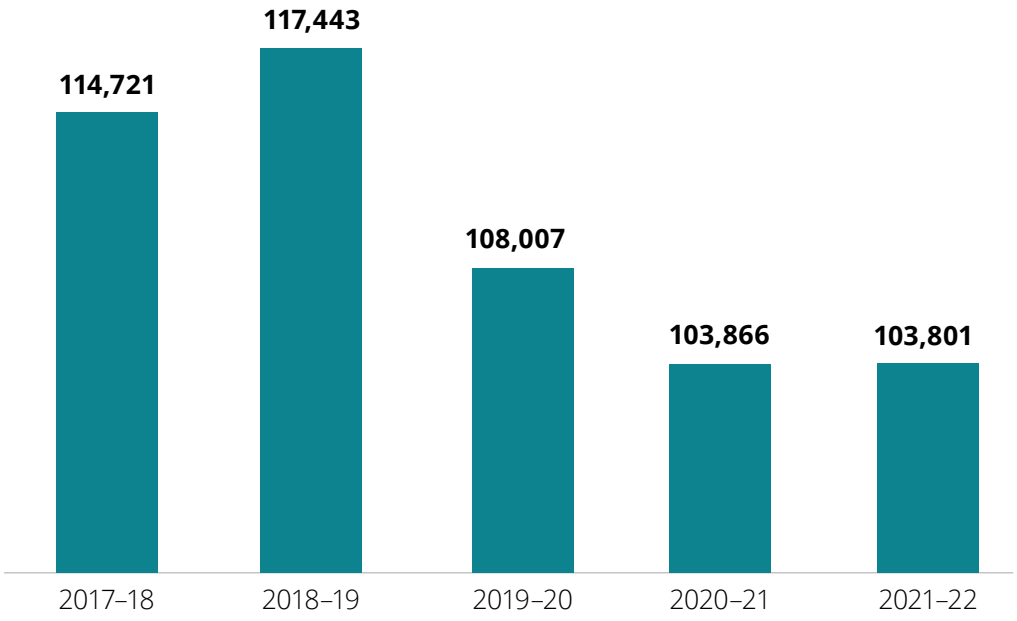
Source: Deloitte Access Economics

2.3 Employment

The NSW marine estate supports considerable employment across the state. Direct employment in full-time equivalent (FTE) terms has been estimated based on the ratio of employment per output provided by the ABS.[20] Direct employment refers to those occurring in a NSW marine industry (e.g. commercial fishing). Indirect employment is generated by upstream industries (e.g. production of bait) as they are derived from marine industry demand. It has been calculated using the Deloitte Access Economics' model, described further in Appendix D.

In 2021–22, the total FTE jobs generated by the NSW marine estate was 103,801, or around 2.4% of total employment in NSW. This was 12% (or 13,641 FTE) lower than the peak in 2018–19 and 10% (or 10,919 FTE) lower than 2017–18 (Chart 2.5). The peak in employment was in 2018–19, recording 117,443 FTE jobs.

Chart 2.5: Employment generated by NSW marine estate (FTE)



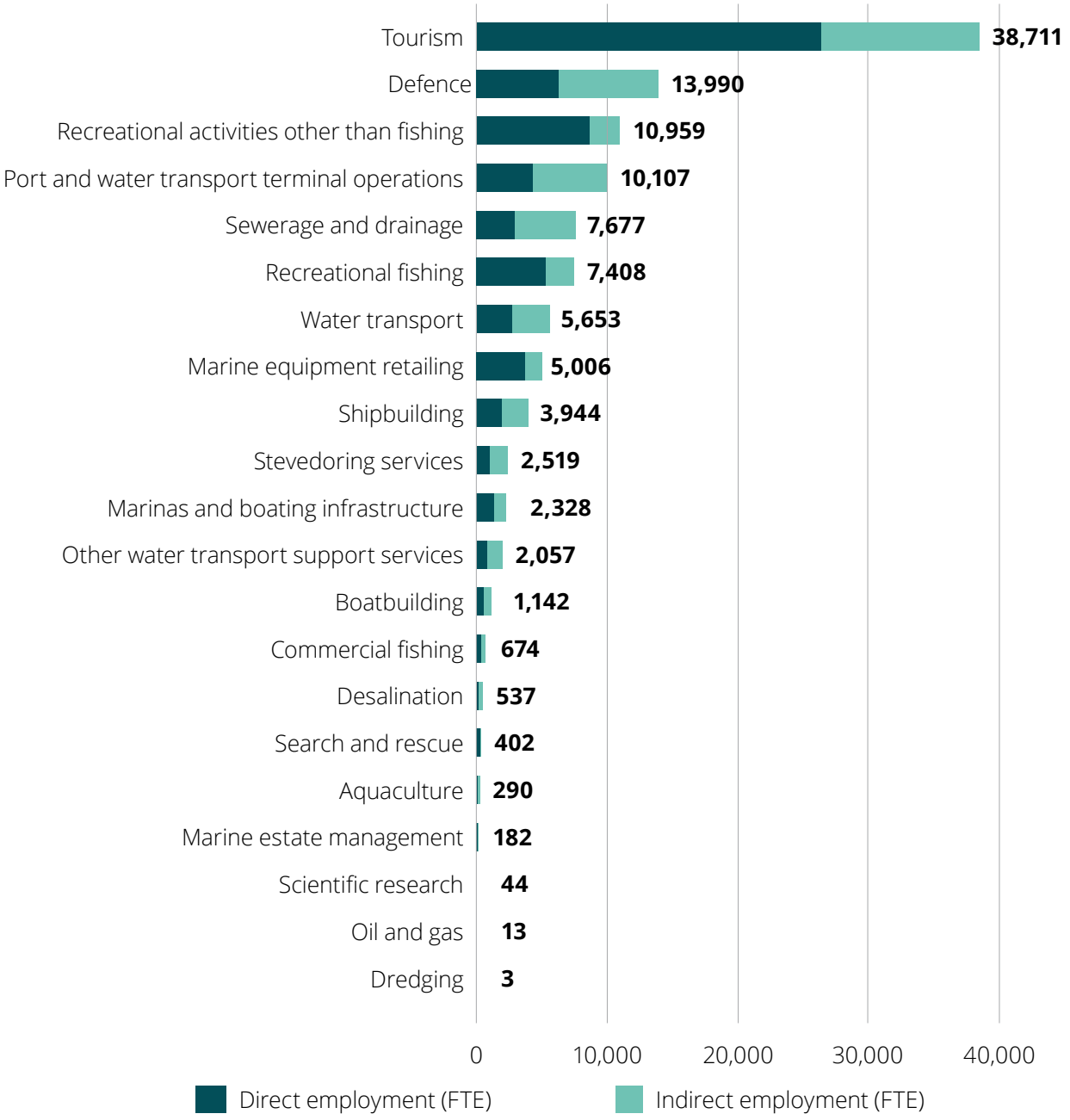
Source: Deloitte Access Economics

Total FTE can be split into direct FTE and indirect FTE for the NSW marine estate. Direct FTE decreased by 13% from 2017–18 to 2021–22, whilst indirect FTE only decreased 4% in the same period. This is due to the large reduction in Tourism economic activity, which involves a high degree of direct employment.

Industries across the marine estate have differing levels of employment for a given level of income depending on how labour or capital intensive they are. Service and retail industries, such as Recreational fishing and Marine equipment retailing, for example, are relatively more labour intensive than other marine industries, so they support more jobs per million dollars of income. Industries in the utilities and manufacturing sectors are relatively more capital intensive and support less jobs per million dollars of income.

In 2021–22, the marine estate supported 63,008 direct FTE and 40,793 indirect FTE, which are broken down for each industry in Chart 2.6. These results reaffirm Tourism's importance to the economy, with the industry supporting 38,711 jobs directly and indirectly. As is discussed further in Chapter 3, the COVID-19 pandemic impacted the contribution of Tourism, with direct employment generated by the sector declining 25% from its peak in 2018–19. Defence is the second largest contributor of employment. Despite representing less than a quarter of the number of direct jobs generated by Tourism, the number of jobs directly created by Defence has grown 21% since 2017–18.

Chart 2.6: Employment generated by NSW marine estate by industry, 2021–22 (FTE)



Note: The direct and indirect full-time equivalent employment for these industries are provided below since they are concealed in the chart:
Search and rescue: 293 direct FTE | 109 indirect FTE
Aquaculture: 128 direct FTE | 163 indirect FTE
Marine estate management: 111 direct FTE | 71 indirect FTE
Scientific research and education: 26 direct FTE | 18 indirect FTE
Oil and gas: 6 direct FTE | 7 indirect FTE
Dredging: 1 direct FTE | 2 indirect FTE

Source: Deloitte Access Economics

2.4 Regions

The NSW marine estate is found to have economic impacts on regions across NSW, spanning coastal as well as inland communities, through upstream activities which generate supply chain benefits and employment opportunities. Of the income generated from the NSW marine estate in 2021–22 that was attributable to regions, just under half (47%) was generated in Sydney, while the rest (53%) was generated in the 14 other NSW coastal regions. In 2017–18, the shares were 52% for Sydney and 48% for other coastal regions, suggesting a modest shift in income over the five years.

The distribution of the NSW marine estate's economic activity varies across coastal regions, based on the size and presence of marine industries in each area (see Appendix B). These are impacted by a range of factors, including the characteristics of marine environments in each region (e.g. the Far South Coast has favourable aquaculture conditions) and broader economic drivers (e.g. Sydney has the largest population size, and a correspondingly greater demand for Recreational fishing). It should be noted that seven industries were unable to be disaggregated at the regional level; the estimates will therefore understate true amounts (see Appendix B).

Sydney accounted for the largest amount of income generated by NSW marine activities in 2021–22 ($7.4 billion), while Nambucca was the smallest ($71 million). Sydney generates demand across a range of industries as it has a large population, is a hotspot for Tourism, and hosts the majority of Water transport and Port operation activities in NSW. However, while some areas generate a significant proportion of total income, others may rely on the marine estate to a higher degree due to the relative size of the region, and its degree of economic diversification.

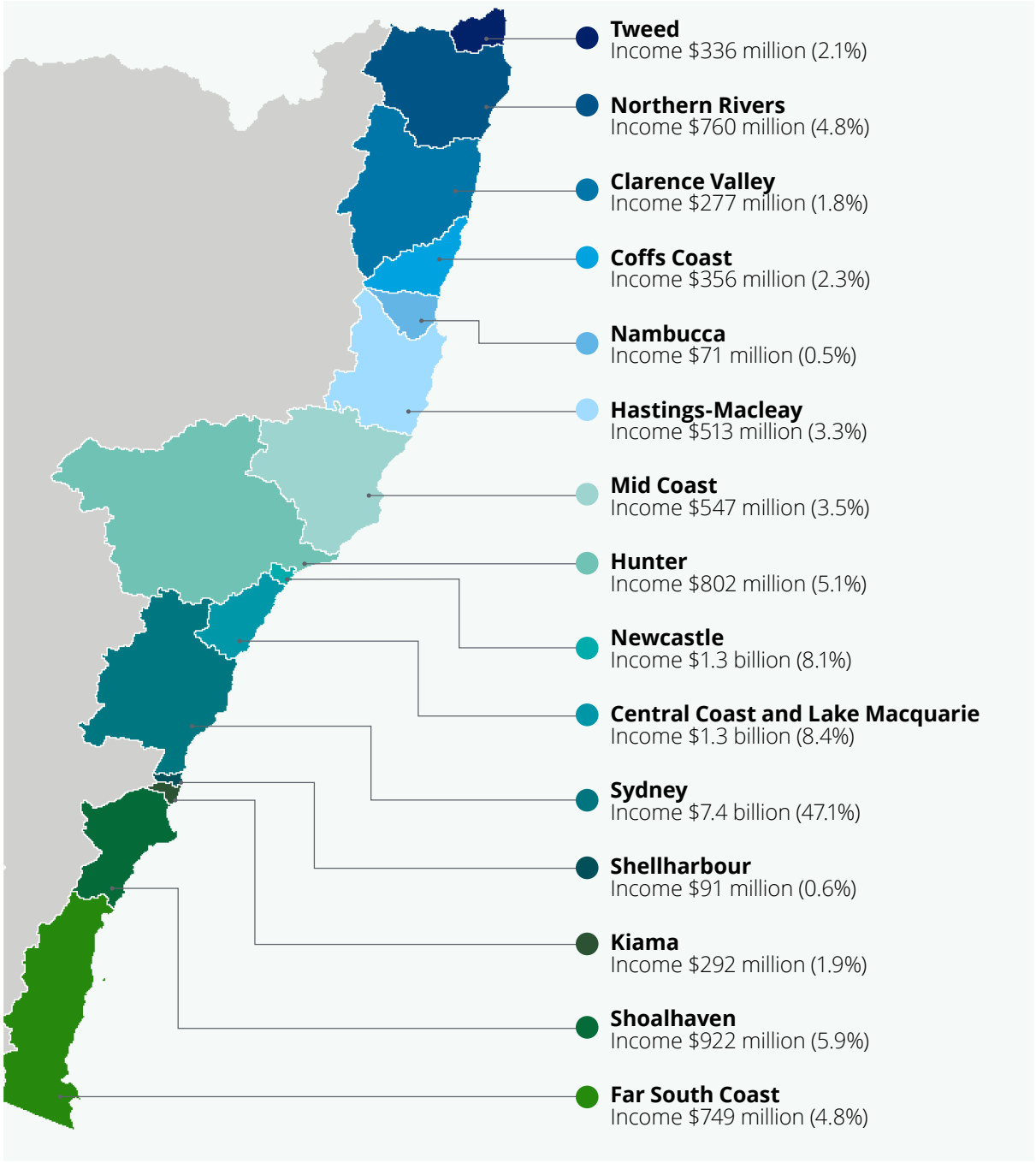
A snapshot of industry drivers of income levels in different regions in 2021–22 is provided in Table 2.1. Chapter 3 discusses changes in income at the regional level over the five years from 2017–18 to 2021–22.

Reliance on the marine estate can be better reflected by comparing income for each region with the size of the region's population. This report refers to this measure as income per capita, which is calculated by dividing the annual income to a region derived from the marine estate by the size of the region's population. While useful to understand the relative importance of the marine estate to a region, it is not comparable with commonly reported income per capita figures, which would divide total regional income by population. The income per capita for each region will be lower than elsewhere reported, as marine estate derived income is only a portion of total economic activity in a region. For example, median weekly personal income within Clarence Valley in 2021 was $578 (i.e. $30,056 annually), while the marine-estate derived income per capita for the same year was $5,869.

We note that the income generated in marine estate industries will not go to all residents. In any region, many will be employed in other industries, and a proportion of marine estate income will reflect gross operating surplus (profit), which could be distributed beyond a region depending on the business. Future analysis could compare regional income with employment to ascertain the average annual income for workers in the marine estate.

Income per capita is larger in every region when compared to Sydney's apart from Shellharbour. Income per capita derived from the NSW marine estate was greatest in Kiama in 2021–22 at $12,720 per person. Kiama had four industries that generated economic activity in 2021–22 (out of those that were allocated at the regional level). Tourism accounted for 57% of the region's total marine income. Tourism is the largest industry in all coastal FERs except Sydney and Newcastle, where Port and water transport terminal operations is the biggest industry. Areas outside of Sydney and Newcastle had smaller populations and tended to rely more on Tourism and Recreational activities other than fishing.

Figure 2.1 Income and income share of coastal regions generated by marine estate dependent industries, 2021–22



Source: Deloitte Access Economics

Table 2.1: Income from the marine estate to coastal regions in 2021–22

Region	NSW marine estate benefits
Tweed	**Income/income per capita:** The total income generated in Tweed in 2021–22 was $336 million. Income per capita in Tweed was $3,442 in 2021–22. **Prominent industries:** Tweed generates a relatively modest amount of income through Tourism compared to other regions – approximately $198.2 million in total. It is also supported by Recreational activities other than fishing ($82.6 million), Recreational fishing ($33.5 million), as well as smaller industries such as Marine equipment retailing ($6.5 million) and Commercial fishing ($4.3 million). **Trends:** Income in 2021–22 has declined by 4% since 2017–18, while income per capita has declined by 6%.
Northern Rivers	**Income/income per capita:** The total income generated in Northern Rivers in 2021–22 was $760 million. In 2021–22, income per capita from the marine estate was $4,737 in the Northern Rivers region. **Prominent industries:** 56% ($423.1 million) of income is attributed to the Tourism sector. The region benefits from its proximity to Southeast Queensland, with its nearby coastal location making it an appealing destination for tourists. Northern Rivers has considerable recreational participation in the marine estate. Income generated by Recreational activities other than fishing was $191.7 million in 2021–22, the third largest of any region. Recreational fishing also recorded $116.4 million – the fourth largest of any region. Commercial fishing was also significant ($9.5 million). This aligns with the region's specialisation in agriculture, farming and fishing, though the benefits from the NSW marine estate are likely smaller than from agricultural practices in this region.[21] **Trends:** Total income in the region has declined 25% since 2017–18, and income per capita has declined the second fastest of any region by 27%.
Clarence Valley	**Income/income per capita:** Clarence Valley generated $277 million in income in 2021–22 within the marine estate. In terms of income per capita, this was $5,075. **Prominent industries:** Clarence Valley value was a close third in terms of income from the Commercial fishing industry, receiving $12.9 million. The region received the third largest income from Boatbuilding of any region (including Sydney), generating $13.9 million. The region received $7.6 million in income from Shipbuilding. This reflects the region's specialisation in each of these industries.[22] **Trends:** Income in Clarence Valley declined by 25% from 2017–18 to 2021–22. In income per capita, it experienced the fastest decline between 2017–18 and 2021–22 of 29%.
Coffs Coast	**Income/income per capita:** Coffs Coast generated $356 million in income and an income per capita of $3,839 in 2021–22. **Prominent industries:** Coffs Coast's regional airport is amongst the busiest in the state, helping to attract domestic and international travellers, which generates $274 million in Tourism income. This is further facilitated by the pristine beaches along the region's coast as well as the Coffs Harbour "all-weather" port and foreshore areas which support increased accessibility of natural and built amenity in the area.[23] **Trends:** Coffs Coast income declined by 19% from 2017–18 to 2021–22, while its income per capita declined by 22%. This was the third largest percentage decline in income per capita of any region.
Nambucca	**Income/income per capita:** Nambucca received $71 million in income in 2021–22, which was $3,451 in terms of income per capita. Nambucca has the smallest marine estate income in absolute terms. **Prominent industries:** $58 million of income was attributable to Tourism, which accounted for 82% of Nambucca's income in 2021–22. **Trends:** Income increased by 2% while income per capita decreased by 2%.

Region	NSW marine estate benefits
Hastings-Macleay	**Income/income per capita:** Hastings-Macleay recorded $513 million in income in 2021–22, which was $4,304 in income per capita terms. **Prominent industries:** Tourism income from the marine estate in the Hastings-Macleay region is estimated at $356 million, or approximately 69% of the total income for the region. This reflects the benefits of the region's natural endowments, with high quality beaches across Port Macquarie, Southwest Rocks, Crescent Head and Camden Haven. These benefits have positioned the region well to specialise in industries which facilitate tourist activities such as food and accommodation services.[24] **Trends:** Income declined by 14% since 2017–18, while income per capita has declined by 19%. The decrease in income per capita was the fourth fastest decline of any region.
Mid Coast	**Income/income per capita:** The Mid Coast generated $547 million in income in 2021–22. In income per capita, the Mid Coast ranks fifth highest at $5,634. **Prominent industries:** The Mid Coast benefits from several naturally occurring estuaries which are prime for Aquaculture-based activities, facilitating it in becoming the third largest beneficiary of income from aquaculture ($8.2 million). Commercial fishing generated $6.9 million for the region. This reflects the specialisation of the region in these industries.[25] The region also generates significant marine estate-related Tourism income, approximating $416 million (76% of the total income for the Mid Coast). **Trends:** Income declined by 7% since 2017–18, and income per capita declined by 11%.
Hunter	**Income/income per capita:** Hunter has a diverse range of NSW marine estate industries, recording $802 million in income in 2021–22. In terms of income per capita, Hunter is the fourth lowest ($2,660). **Prominent industries:** Due to much of the region being comprised of LGAs which are not directly adjacent to the coast, it is not specialised in industries dependent upon the NSW marine estate.[26] The region receives the second largest proportion of Shipbuilding income ($143.72), fifth largest proportion of Recreational fishing income ($62.4 million) and the third largest proportion of Marine equipment retailing income ($26.1 million). **Trends:** Income increased by 51% since 2017–18. Meanwhile, income per capita has increased 39%.
Newcastle	**Income/income per capita:** Newcastle recorded the third largest income in the marine estate ($1.3 billion), which translated to an income per capita of $7,423. **Prominent industries:** Newcastle benefits from being strategically positioned as a major hub for port and water transportation. Port and water transport terminal operations was the largest industry in the region, generating $614 million in income. Along with Water transport, Stevedoring services and Other water transport support services, these industries are important economic enablers of the region, facilitating trade and improving connectivity to the rest of Australia and the world. The other major source of income for the region was Tourism – a relatively less prevalent industry in Newcastle. Twenty-one percent ($271.5 million) of the income from the marine estate in Newcastle is from Tourism. **Trends:** Income has increased 17% since 2017–18, while income per capita increased by 12%.
Central Coast and Lake Macquarie	**Income/income per capita:** Central Coast and Lake Macquarie recorded the second largest income from the marine estate - $1.3 billion. This translated to an income per capita of $2,341. **Prominent industries:** The region receives the largest proportion of income from Boatbuilding in the state aside from Sydney. Of the total marine estate income in the Central Coast and Lake Macquarie region, $40.7 million, or 3% is from Boatbuilding. This reflects the region's relative specialisation in manufacturing services,[27] with another $11.0 million generated in income from Shipbuilding – the fifth most of any region in NSW (including Sydney). As an intermediary point between Newcastle and Sydney, the region also attracts income from Stevedoring, Port and water transport terminals, Water transport as well as Other water transport activities, receiving $78.7 million in income across these four industries. **Trends:** Income increased by 34% since 2017–18, while income per capita increased by 29%.

Region	NSW marine estate benefits
Sydney	**Income/income per capita:** Sydney is the largest beneficiary of the NSW marine estate ($7.4 billion); however it has the second smallest income per capita ($1,435). This reflects the size of the population and importance of other industries. **Prominent industries:** The region receives income from a wide range of economic activities such as Tourism ($1.4 billion), Port and water transport terminal operations ($1.5 billion), and Water transport ($1.2 billion). As a diversified economy, Sydney is relatively less reliant on Tourism than other NSW regions. The majority of Water transport and Port and water transport terminal operations in NSW takes place in Sydney, making the city the economic gateway of the state. **Trends:** Sydney has seen a 11% decline in income since 2017–18. Income per capita declined 15% since 2017–18.
Shellharbour	**Income/income per capita:** Shellharbour is one of the smallest beneficiaries of the NSW marine estate receiving $91 million in income and $1,167 of income per capita in 2021–22. **Prominent industries:** $44 million was generated in income through marine estate-related tourism activities, or 48% of Shellharbour's total income. **Trends:** Income per capita has grown the fastest of any region (108%) since 2017–18. Income to the region increased 125% in the same period.
Kiama	**Income/income per capita:** Kiama had the highest income per capita ($12,720). It is, however, the fourth smallest beneficiary of the marine estate in aggregate terms, receiving $292 million in income in 2021–22. **Prominent industries:** The region draws in $167 million through Tourism. **Trends:** Income per capita increased 42% since 2017–18. This was the second fastest of any region. Income to the region also increased by 42%.
Shoalhaven	**Income/income per capita:** Shoalhaven is the fourth major beneficiary of the NSW marine estate in aggregate terms ($922 million). The income per capita of Shoalhaven was $8,426, the third largest of any region. **Prominent industries:** The region receives income from Recreational fishing ($143.4 million), Aquaculture ($3.1 million), Boatbuilding ($11.7 million), Shipbuilding ($9.7 million), Marine equipment retailing ($14 million), Water transport ($5.6 million) and Tourism ($613.5 million). Part of these benefits is attributable to the region having approximately 165km of coastline – the longest of any region in NSW.[28] **Trends:** Income per capita increased by 10% from 2017–18, while income increased 16%.
Far South Coast	**Income/income per capita:** The Far South Coast economy received $9,758 in income per capita in 2021–22 (the second highest amount of any region). Income to the region in 2021-22 was $749 million. **Prominent industries:** 79% ($590.5 million) of the Far South Coast income is from marine estate-related Tourism. The region is on the border of Victoria, benefitting from being a nearby interstate tourist location with a more temperate climate than its southern neighbours. The region is also specialised in Aquaculture activity,[29] receiving $16 million from the industry (the most of any region). The region generated the second highest income from Commercial fishing compared to any other region ($14 million). **Trends:** Income per capita decreased by 6% since 2017–18, while income decreased by 1%.

Source: Deloitte Access Economics

03 | Drivers of change

Photo by Tommy Wainwright

The NSW marine estate has experienced significant change between 2017–18 and 2021–22, as market trends and external factors have influenced both industry composition and regional economic activity.

This chapter provides an overview of major economic changes to the NSW marine estate over the five years from 2017–18 to 2021–22. We begin by analysing the changes in the largest industries (in terms of income), then the industries that experienced the most significant changes, with a focus on market trends. The third section distinguishes between those industries that have experienced volatility over the five years and those that have been more resilient.

The chapter includes a discussion of indirect economic impacts – how some industries have a greater reach across the supply chain, and a discussion of impacts at the regional level. The chapter concludes with a discussion of the key external factors that have driven change overall within NSW marine estate industries.

3.1 Trends in the marine estate's top industries

Table 3.1 shows the income of each of the 21 marine estate industries for which adequate data is available, over the period 2017–18 to 2021–22. Changes to income are also displayed in aggregate and percentage terms. Below, we discuss changes in the largest four industries in income terms: Tourism, Defence, Sewerage and drainage, and Port and water transport terminal operations.

Table 3.1: Income generated in the NSW marine estate ($m), 2017–18 to 2021–22

Industry	2017–18 ($m)	2018–19 ($m)	2019–20 ($m)	2020–21 ($m)	2021–22 ($m)	Change from 2017–18 to 2021–22 ($m)	Change from 2017–18 to 2021–22 (%)	Sparkline
Harvesting and trade of marine living resources								
Aquaculture	56.2	60.2	61.1	60.3	60.1	3.9	7%	
Boatbuiding	242.3	281.3	267.2	264.6	272.5	30.2	12%	
Commercial fishing	130.4	140.9	139.3	129.4	129.1	-1.3	-1%	
Marine equipment retailing	393.9	393.6	389.8	508.4	589.4	195.5	50%	
Recreational fishing	1,032.2	1,045.7	1,172.9	982.6	966.6	-65.6	-6%	
Extraction and use of marine non-living resources (non-renewable)								
Desalination	173.4	199.0	239.4	205.4	207.9	34.5	20%	
Dredging	1.1	0.8	0.9	0.7	0.7	-0.3	-32%	
Oil and gas exploration and production	10.3	8.1	4.4	3.5	3.1	-7.2	-70%*	
Commerce and trade in and around the oceans								
Recreational activities other than fishing	864.2	1,072.8	1,579.1	1,597.4	1,949.3	1,085.1	126%	
Other water transport support services	586.1	594.6	535.1	488.8	460.1	-126.1	-22%	
Port and water transport terminal operations	1,744.4	1,718.1	1,622.8	2,118.9	2,260.8	516.4	30%	

Industry	2017–18 ($m)	2018–19 ($m)	2019–20 ($m)	2020–21 ($m)	2021–22 ($m)	Change from 2017–18 to 2021–22 ($m)	Change from 2017–18 to 2021–22 (%)	Sparkline
Commerce and trade in and around the oceans (continued)								
Search and rescue	42.2	43.8	49.7	55.7	54.6	12.2	29%	
Shipbuilding	612.4	667.5	698.8	845.3	941.1	328.7	54%	
Stevedoring services	478.5	479.9	489.3	540.8	563.3	84.8	18%	
Tourism	8,967.5	10,100.4	8,185.2	6,971.9	6,139.4	-2,828.0	-32%	
Water transport	885.0	1,045.4	795.3	905.0	1,321.8	436.8	49%	
Marinas and boating infrastructure	308.1	338.2	316.3	294.4	289.8	-18.4	-6%	
Environmental protection, regulation and research								
Defence	2,704.5	2,597.2	2,632.9	3,418.3	3,692.3	987.8	37%	
Marine estate management	4.1	19.9	26.8	28.1	30.7	26.6	655%*	
Scientific research	5.3	5.9	6.1	6.7	6.9	1.6	30%	
Sewerage & drainage	2,632.5	2,656.5	2,598.6	2,999.9	2,971.5	339.0	13%	

Note: Income figures presented above are nominal, and the changes calculated are also in nominal terms.
* Some industries appeared to have significant changes in size that reflected data issues and/or the small size of the industries. For example, Marine estate management activities appeared to grow by $26.6 million between 2017–18 and 2021–22. However, this is because comprehensive data for marine estate management is not available. Marine estate management is not in and of itself an industry, and this growth is more indicative of government resource allocation to sustainable marine estate management activities in the period. The Oil and gas industry experienced the fastest decline in income in the same period (-70%) but it was also small overall.

Source: Deloitte Access Economics

Tourism

Tourism is the largest industry in the marine estate. Income for tourism declined $2.8 billion (or 32%) between 2017–18 and 2021–22 — the largest amount of any industry in absolute terms. It is also the largest direct employer, supporting 26,621 direct FTE in 2021–22.

Tourism was one of the economy's most severely affected sectors when travel restrictions were implemented to limit the spread of COVID-19. All non-essential international travel was banned for almost two years, contributing to a 31% decline in income between 2018–19 and 2020–21. International tourism output declined an average 74% annually in the three years leading to 2020-21. Domestic travel to and within NSW was permitted intermittently throughout 2020-2022 and supported recovery in the sector. By 2021–22, income from marine-related tourism had only recovered to $6.1 billion – 61% of its pre-pandemic level ($10.1 billion in 2018–19). International and domestic overnight tourism were yet to fully recover by the end of the analysis period. Tourism was also affected by extreme weather events (such as bushfires in the South Coast in late 2019 and Northern River floods in early 2022).[30] Severe weather events impacted the capacity of regions to facilitate tourism due to disruptions to business operations, temporary displacement of regional workers, and the impact on the tourism 'brand' of each region.

Marine-related industries are also still recovering from COVID-19's longer-term impact on employment, skills, and labour shortages. The closure of marine tourism and recreational businesses during COVID-19 led to reduced visitation, affecting businesses within the NSW marine estate such as marinas and yacht clubs, for example on food and beverage sales. It also led to subsequent job losses and by August 2020, tourism related businesses faced the lowest employment rates since 2013, down 15% since December 2019.[31] Labour and skills shortages persisted until the end of 2021–22, in part because of the continued impacts of exceptionally low immigration levels during 2020–21 and 2021–22.

Defence

Defence is the marine estate's second largest industry and has played a vital role in supporting economic activity during turbulent economic conditions. Income in Defence increased by just under $1 billion (or 37%) throughout the period 2017–18 to 2021–22, the second largest growth rate of any NSW marine estate industry in absolute terms. Increased income for Defence offsets roughly a third of the decline in income over five years from Tourism. The expansion in Defence is partially attributable to a general increase in federal budget spending (32% over the period).[32] Also, the national Defence budget's navy allocation increased from 14 to 18% of total departmental resources in the five years to 2020–21.[33] Naval defence has received significant interest from government in recent years amidst rising global and regional geopolitical tensions. It also supports significant employment, around 6,362 direct FTE.

Sewerage and drainage

Sewerage and drainage is the third largest industry in the marine estate in income terms, totalling slightly less than half that of Tourism in 2021–22. Sewerage and drainage increased moderately by $339 million (13%) over the five-year period, driven primarily by population growth across NSW and the concentration of settlement along the coastline. The NSW population increased 2.4% between 2018 and 2022,[34] and 83% of that population in 2022 lived within 50 km of the coast.[35] This caused a rise in demand for essential services like Sewerage and drainage, making income in this industry more consistent during an era of disruptions such as COVID-19. Sydney Water reported increased uptake of services due to residents spending a greater amount of time at home during COVID-19 lockdowns.[36]

Port and water terminal operations

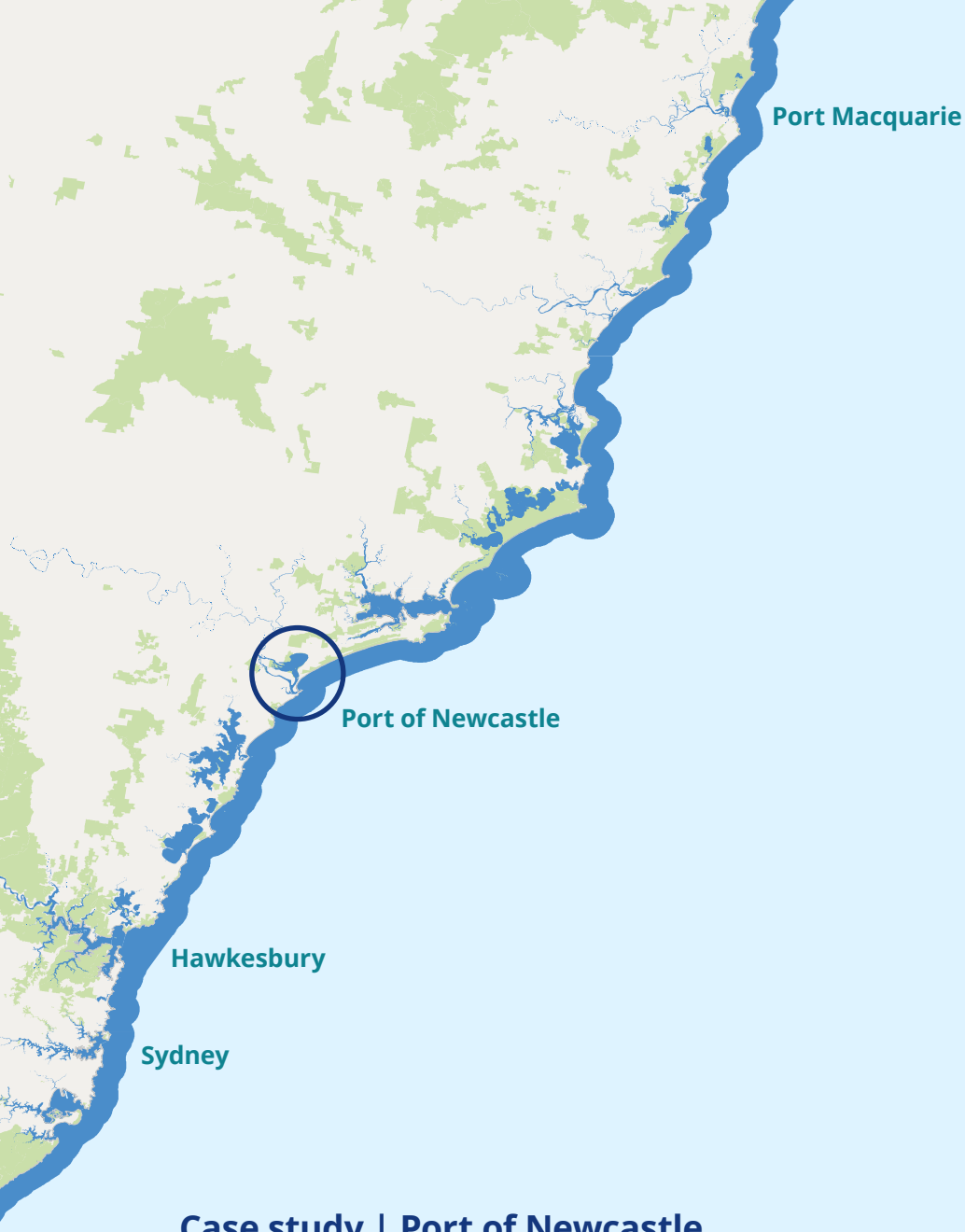
Port and water terminal operations is the fourth largest industry of the marine estate. Income for this industry increased significantly between 2017–18 and 2021–22, by 30% or $516 million — the third largest marine industry increase in absolute terms. However, there was change within the five-year analysis period. Port and water terminal operations income declined by 7% from 2017–18 to 2019–20, a loss of approximately $122 million partly because of COVID-19 lockdowns beginning in March 2020, which impacted the operation of ports.

Increased income over the subsequent two years to 2021–22 was supported by a shift in demand from services to goods during COVID-19 as NSW residents were unable to spend money on travel. This facilitated growth in Port and water terminal operations despite various disruptions. Total sea trade export volumes increased 2.5% over the

analysed period, stimulating demand for Port and water terminal operations.[37] The expansion occurred despite other challenges, most notably those arising from the Russia-Ukraine war. Trade sanctions and changes to hull and cargo policies disrupted logistics and port operations and affected marine insurance costs.[38]

It should be noted that income for Port and water terminal operations in 2021–22 was a projection due to data availability, and therefore these changes may differ to the real figures.

Ports are a critical component of Australian national infrastructure and as such have the potential to support policy change on a national and global scale. For example, the Port of Newcastle has committed to the Clean Energy Precinct project with the Australian government and 15 other multi-national organisations, which will support large-scale clean energy production.[39] The economic contribution of Port of Newcastle and its clean energy initiatives are discussed in the Port of Newcastle case study.



Case study | Port of Newcastle

Port of Newcastle has been selected as a case study because it demonstrates the complex ways in which the NSW marine estate generates value, and how adapting to changing markets can lead to economic growth. As well as generating income through tenant leases, moorage fees, and freight and cargo servicing fees, ports are valuable strategic assets facilitating critical global trade connections and supporting a diverse network of related activities.

Port of Newcastle has contributed to the economy of NSW for over 220 years, and over that time has evolved significantly to meet new and emerging commercial opportunities.[40] This case study examines how the Port has been resilient to change and contributed to overall sector growth.

The significant economic impact of Port of Newcastle

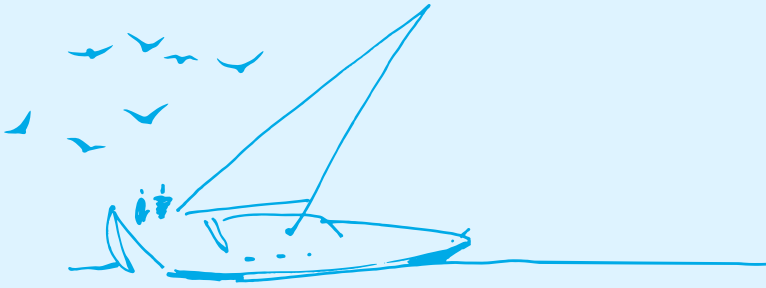
Port of Newcastle is the largest deepwater gateway and bulk shipping port on the east coast and is currently Australia's largest terminal for coal exports. In 2022, it facilitated over:[41]

$71 billion
worth of trade to the national economy each year

$1 billion
in Gross Regional Product

$29 million
annual revenue in 2022

145 million
tonnes of cargo



Port of Newcastle is also a major employment, cargo, and transportation hub. It has 135 onsite employees, and 5,700 further jobs are generated through Port activity.[42] The Port has 47 tenants across a diverse range of trades including coal, grain, fertilisers and cements.[43]

Ports have adapted to weather major challenges posed by global socio-economic events

Port of Newcastle has overcome socio-economic events and is strategically preparing to secure commercial viability into the future. COVID-19 drove global volatility in the supply and demand of products, impacting the movement of containers through Australia's ports. Port of Newcastle was protected in part by its diverse operations.

River ports including Port of Newcastle were further impacted by La Niña flooding throughout 2022. Shifting energy supply movements in the 18 months following the Russian invasion of Ukraine have disrupted the pricing and demand of coal exports, Port of Newcastle's primary commodity. This represents an opportunity for the Port as it seeks to build long term growth.

Port of Newcastle is diversifying to support major renewable energy initiatives

Port of Newcastle is embarking on diversification initiatives to transition from a traditional manufacturing enterprise into a renewable energy hub. The proposed clean energy precinct will include 220 hectares of utilities, storage, transport, and export infrastructure for clean energy projects in the Hunter Region. The precinct is projected to create 5,800 jobs and add $4.2 billion in Gross Regional Product.[44]

The Port is in the process of delivering renewable and sustainable initiatives involving switching energy contracts, investing in hybrid cranes, and reviewing opportunities for loading infrastructure to improve productivity and reduce emissions. The Port is positioning itself to support the development and implementation of offshore renewable energy zones, with further work required to accommodate shipping activities and understand the construction requirements.

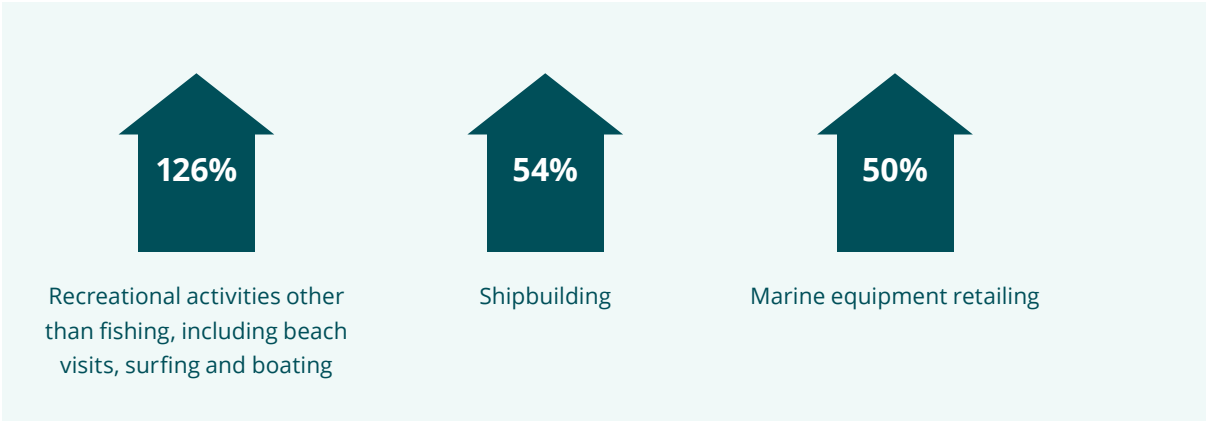
The Port is committed to building long-term growth for the NSW marine estate and beyond

The Port is diversifying its trade to provide new business opportunities for surrounding Newcastle communities, and ensure it continues to underpin the prosperity of Australia's and NSW's marine estate. The Port is committed to growth, economic diversification, and social cohesion in the Hunter Region, pledging to collaborate with the University of Newcastle on areas such as research and development.[45] It has also joined forces with 10 global energy enablers to support hydrogen innovation through the Platform Zero Global Partnership.[46]

3.2 Industries experiencing significant changes

Analysing the growth rate of marine industries, a clear group of well-performing industries over the last five years was identified.

High growth industries between 2017–18 and 2021–22 included:



Recreational activities other than fishing

Recreational activities other than fishing, including visits to the beach, surfing, and boating, experienced a $1.1 billion expansion in income from 2017–18 to 2021–22. This was an increase of 126% over five years — the highest expansion in percentage terms (other than for marine estate management activity). The industry is also the second largest employer in direct FTE terms, supporting 8,540 direct FTE in 2021–22. Income generated by Recreational activities other than fishing was driven by more beach visits from 2018 to 2021, as well as a 3% increase in the number of recreational vessels in coastal areas. Higher participation in recreational activities is likely due to the pandemic, which restricted NSW people from international and interstate travel. Instead, people took advantage of local marine environments and the associated recreational activities that were intermittently permitted.

It should be noted that income for Recreational activities other than fishing in 2021–22 was a projection due to data availability, and therefore these changes may differ slightly to the actual figures.

Shipbuilding

Shipbuilding increased 54% over the past five years, the second largest in percentage terms. As the NSW marine estate's eighth largest industry, Shipbuilding's growth significantly contributes to total income, with $328.7 million added in total between 2017–18 and 2021–22. The notable expansion of the Defence industry and of Port and water transport terminal activities are two key drivers of the Shipbuilding industry expansion.[47] Higher capital expenditure by the Royal Australian Navy drives demand for upgrades and maintenance of existing naval fleets, along with other activities. A growing demand for water freight (discussed in section 3.1) in turn benefits the industry through demand for ships and repairs. The domestic steel price index also increased 32% over the analysis period.

Steel is a primary input to Shipbuilding production and is passed on to customers due to inelastic demand in the industry, leading to higher incomes. This strong industry growth occurred despite supply chain issues, limits on the movement and availability of materials and parts, and high employee workplace absences due to the spread of COVID-19 variants.

Marine equipment retailing

Marine equipment retailing increased $195.5 million in the five-year period, the fourth highest expansion in percentage terms (50%). It is now the ninth largest industry in the marine estate. A shift in focus during the pandemic away from travel towards higher utilisation of local marine destinations, created significant demand for marine equipment retailers. NSW also may have benefitted from its ageing population, with a high share of retirees seeking recreational lifestyles along the coastline.[48] The percentage of retirees in Australia increased 2.3% between 2016-17 and 2020–21.[49]

Industries experiencing decline over the five years

The main industry to experience a decline over the five years was Tourism, discussed in section 3.1. Declines were also recorded in some small industries such as Dredging and Oil and gas. The only other decline with a significant impact on marine estate income was Other water transport services, which primarily contains towage and navigation services. It experienced a $126.1 million (or 22%) decline in income between 2017–18 and 2021–22. The decline was most likely driven by disruptions from COVID-19 that restricted water passenger and freight transport. Import volumes were reduced in the two years to 2020–21, with Australian merchandise exports and imports decreasing 66% from 2019 to 2021.[50] In combination with the two-year cruise ban from 2020 to 2022 under the Biosecurity Act 2015,[51] demand for Other water transport support services was significantly reduced over the period. It should be noted that income for Other water transport support services in 2021–22 was a projection due to data availability, and therefore these changes may differ slightly to the actual figures.

3.3 Volatility and resilience

NSW marine estate income at the aggregate level was relatively unchanged between 2017–18 and 2021–22; however this masks variations that occurred at the industry level over the five-year period.

For some industries, the total percentage change in income was quite moderate. The change in income between 2017–18 and 2021–22 was moderate for Marinas and boating infrastructure (-6%), Commercial fishing (-1%), and Aquaculture (7%). In extension to these relatively unchanged industries, some industries were resilient – they experienced low volatility within the five-year period. Defence and Sewerage and drainage, for example, increased somewhat steadily over the period. These industries are considered essential, meaning operations were impacted less by the restrictions implemented during COVID-19. For the same reason, Search and rescue and Scientific research also experienced lower volatility.

While some industries had consistent growth trajectories over the five years, others experienced volatile movement in economic activity. Five industries that had notable volatility were Recreational fishing, Boatbuilding, Tourism, Port and water transport terminal operations and Water transport. Tourism and Port and water transport terminal operations are discussed in section 3.1 and can be explained through the impact of COVID-19 on demand for the services in each industry. In the same vein, Boatbuilding, having peaked in 2018–19 at $281 million in income, declined by $17 million (6%) over the two years to 2020–21. Lockdown restrictions on non-essential work is likely to have impacted the capacity for the industry to operate. Recreational fishing increased by 14% between 2017–18 and 2019–20 before declining by 16% in the subsequent year.

3.4 Indirectly impacted industries

There are a variety of industries that experienced upstream demand from economic activity in marine industries; for example, recreational fishers purchasing equipment from marine equipment retailers. Interdependencies like these generate significant indirect value added across the economy.

The ABS's IO tables provide linkages between industries and categories that are known as Input-Output Product Groups (IOPGs), which are a collection of product classifications organised according to the industry to which each product is primary. A total of 71 IOPGs are linked indirectly to industries in the marine estate. The size of the indirect contributions of the marine estate to the NSW economy is estimated by Deloitte Access Economics' model, described further in Appendix D. The IOPGs which benefitted the greatest in terms of indirect value in 2021–22, were:

1. **Construction services: $815 million**
   (11% of marine estate indirect value added)
   Construction received $549 million in indirect value added from Defence (navy), $154 million from Sewerage and drainage, and $55 million from Port and water transport terminal services. As infrastructure-intensive industries, each of these experienced significant growth as discussed in section 3.2.

2. **Finance: $531 million**
   (7% of indirect value added)
   Finance, including activities like banking, and asset investments, received $244 million from Sewerage and drainage, $100 million from Port and water transport terminal services, and $80 million from Water transport. Finance is a ubiquitous service required by the majority of private sector organisations. Indirect value created for finance has therefore been driven by some of the biggest industries in the marine estate.

3. **Transport support services and storage: $401 million**
   (6% of indirect value added)
   Transport support services and storage received $185 million from Port and water transport terminal services, $47 million from Defence (navy), and $46 million from Stevedoring services. Transport support services and storage is linked to supporting sea freight and port operations, and this is reflected in the industries from which it has derived its indirect value.

These are the same three industries with the most positive indirect impact to the NSW economy in 2017–18, the benefits of which have seen growth of around 2-3%.

The most important industries for creating indirect economic activity were the largest industries. Defence had $1.0 billion in indirect value added in 2021–22. Sixty-one different IOPGs received a positive indirect benefit from Defence economic activity in the marine estate, with construction services ($549 million), professional services ($117 million) and heavy civil engineering construction ($111 million) benefitting the most.

Port and water transport support services also provided considerable indirect benefits to the NSW economy, recording $868 million in indirect value added in 2021–22. These benefits accrued to 70 IOPGs. The major beneficiaries were transport support services and storage ($186 million), professional, scientific, and technical services ($125 million) and finance ($100 million).

The number of sub-industries that benefit indirectly from a marine industry is dependent on where it sits in the supply chain. The industries that supported the largest number of sub-industries included Stevedoring services, Port and water transport terminal operations, Other water transport support services, Dredging, and Scientific research. These industries indirectly benefitted 70 IOPG categories, typically having wider scope and sit at the end of the supply chain.

Sewerage and drainage had the fourth highest overall indirect value added in 2021–22 ($867.7 million); however these indirect benefits accrued to only 54 IOPGs. Sewerage and drainage services are capital intensive, and reliant on a slightly lower spread of industries.

A list of the number of IOPGs which received positive indirect value from various marine industries in 2021–22 is provided in Table 3.2.

Table 3.2: Number of IOPGs which received positive indirect value from marine industries in 2021–22

Industry	Number of IOPGs which benefitted indirectly from marine industry activity in 2021–22
Stevedoring services	70
Port and water transport terminal operations	70
Other water transport services	70
Recreational fishing	70
Dredging	70
Scientific research	70
Boatbuilding	69
Shipbuilding	69
Marine equipment retailing	68
Water transport	66
Search and rescue	66
Marine estate management	64
Oil and gas	64
Marinas and boating infrastructure	62
Defence	61
Commercial fishing	54
Desalination	54
Sewerage and drainage	54
Aquaculture	48

Source: Deloitte Access Economics

3.5 Regional trends

Over the five-year period, 9 out of 15 regions experienced a decline in income per capita (see Table 3.3). Regions north of Newcastle experienced greater declines, accounting for 7 out of the 9 regions with declining incomes per capita. These regions suffered mainly due to lower tourism activity in the area. Regions to the south of Sydney fared better over the past five years. The strongest performing regions – Shellharbour and Kiama – are located close to Sydney, which is the largest market of domestic travellers to NSW.[52]

Table 3.3: Income per capita generated in the NSW marine estate by region ($m), 2017–18 and 2021–22

Region	2017–18 ($ per capita)	2018–19 ($ per capita)	2019–20 ($ per capita)	2020–21 ($ per capita)	2021–22 ($ per capita)	Change from 2017–18 to 2021–22 ($)	Change from 2017–18 to 2021–22 (%)	Sparkline
Tweed	3,651.5	3,334.1	3,924.7	3,848.2	3,441.9	-209.5	-6%	
Northern Rivers	6,521.4	7,768.8	6,930.2	6,047.0	4,737.1	-1,784.2	-27%	
Clarence Valley	7,197.6	7,595.8	6,248.0	5,868.8	5,074.9	-2,122.6	-29%	
Coffs Coast	4,895.6	5,831.1	4,567.6	4,906.4	3,839.3	-1,056.3	-22%	
Nambucca	3,528.1	3,699.4	4,419.8	3,427.8	3,450.9	-77.2	-2%	
Hastings-Macleay	5,313.4	7,308.0	4,605.6	5,185.4	4,303.6	-1,009.7	-19%	
Mid Coast	6,316.0	6,072.8	5,386.5	6,514.5	5,634.2	-681.8	-11%	
Hunter	1,907.3	2,304.6	2,284.7	2,720.6	2,660.2	752.9	39%	
Newcastle	6,622.0	7,442.2	6,495.9	7,431.1	7,423.2	801.2	12%	
Central Coast & Lake Macquarie	1,809.7	2,046.6	2,163.0	2,305.6	2,341.4	531.7	29%	
Sydney	1,692.0	1,705.4	1,551.1	1,265.5	1,435.3	-256.7	-15%	
Shellharbour	562.2	813.2	968.6	1,324.9	1,166.8	604.6	108%	
Kiama	8,941.3	10,913.6	9,871.6	14,025.6	12,719.6	3,778.2	42%	
Shoalhaven	7,632.0	8,713.2	7,317.9	9,428.5	8,426.0	794.0	10%	
Far South Coast	10,396.9	10,691.1	9,060.7	10,324.8	9,758.0	-638.9	-6%	

Note: Regional trends are discussed in terms of income per capita to better reflect local impacts, which are better captured when considering the size of the population to which income is distributed.
Source: Deloitte Access Economics

The two highest growth regions in terms of income per capita were:

Shellharbour (108%)

Shellharbour, experiencing the largest growth rate in income per capita, has benefitted from higher tourism expenditure throughout the analysis period. Considering Shellharbour had the smallest income per capita in 2021–22 ($1,167), this increase is significant to the region. The marine tourism industry increased $23 million over the past five years (110%), one of the regions where Tourism income did not decline during COVID-19. Shellharbour, in this case, benefitted from higher intrastate travel. An emerging shipbuilding industry also contributed an extra $3.4 million to the region between 2017–18 and 2021–22.

Kiama (42%)

Kiama reported the second strongest rate of growth in income per capita due to rising income from Tourism, which increased $35 million (26%) over the five years. The largest contribution to growth in Kiama's income per capita, however, was Recreational activities other than fishing. Income derived from Recreational activities other than fishing increased $53 million in the five-year period, a growth rate of 126%.

The two lowest growth regions in terms of income per capita were:

Clarence Valley (-29%)

Clarence Valley experienced the fastest decline in income per capita of any region, declining 29% over the past five years. The region experienced a significant decline in Tourism income of $123.2 million (-45%). Smaller declines in Shipbuilding (-24%) and Port and water transport terminal operations (-24%) were also material to the loss.

Northern Rivers (-27%)

Northern Rivers had the second largest decline in income per capita from 2017–18 to 2021–22, contracting by 27%. This reflects Tourism's significant contribution to the local economy (56% of total income in 2021–22), and its reduction throughout COVID-19 along with La Niña-related flooding events. Tourism income declined $355.6 million (46%) over the period. Local areas within the region were likely to be more negatively affected than Sydney, where Tourism represented just 20% of income generated by marine activities. Indeed, during the pandemic around 2,150 jobs were lost in Byron Bay Shire.[53]

3.6 Key external factors

The NSW marine estate has experienced a significant shift in composition over the medium term. This section provides a discussion of major drivers affecting change in the NSW marine estate over the last five years, organised into four key trends.

01

Impact of COVID-19

COVID-19 and resulting social distancing restrictions led to a significant decline in tourism activity, reducing income generated by the NSW marine estate as well as triggering broader supply chain and labour shortages. International travel bans and social distancing restricted tourism in a number of coastal regions. The closure of marine tourism and recreational businesses during COVID-19 led to subsequent job losses and by August 2020, tourism-related businesses faced the lowest employment rates since 2013.[54]

COVID-19 also led to supply chain issues including for Ship and Boatbuilders, due to limits on the movement and availability of materials and parts. In 2022 builders faced a 30% decline in sales and production, largely due to supply chain bottlenecks driving a backlog of orders (e.g. for boat engines).[55] Another industry highly impacted by COVID-19 was Water transport, as passenger levels were reduced by social distancing restrictions. While Ports and water terminal operations, Other water transport support services and Stevedoring faced difficulties in the beginning stages of the pandemic, particularly due to closure of major export hubs, the subsequent high demand for imported goods as these hubs reopened supported considerable economic activity in these industries.

02

Economic conditions and inflation

Global economic conditions have affected the NSW marine estate, including a slow recovery from the pandemic and supply chain disruptions that were exacerbated following Russia's invasion of Ukraine. Real incomes in Australia declined as the cost of living has escalated,[56] which was initially caused by an inability for supply chains to accommodate the shift in demand towards goods during the pandemic.

The Russia-Ukraine war worsened supply-chain issues following a range of sanctions, which most notably lead to inflated global energy prices following reduced Russian spot sales of gas.[57] These factors contributed to higher inflation in Australia, which reduced discretionary spending on industries such as Recreational activities other than fishing and Recreational fishing. This has also impacted marine related businesses who rely on tourism and visitation spending, such as Marinas and boating infrastructure.

In terms of business costs, inflated energy prices raised the price of inputs for all marine industries. Still, some industries were able to benefit amid these challenges. Water transport, as a fuel-efficient transport alternative to air, received significant revenue during the period. Lastly, the disruption to energy markets led to an acceleration in Australia's energy transformation efforts, driving investment into new renewable generation sources such as offshore wind. Because of its long coastline and stable continental shelf, NSW has immense potential for offshore wind power generation. Although there are no current plans to develop offshore wind projects in NSW, this could change in the future with projects currently conducting feasibility studies in this space.[58]

03 Demographic shifts

The population and demographic makeup of NSW has altered due to increased internal migration and reduced overseas migration following COVID-19, affecting NSW marine industries in terms of employment and income. In 2020-21, new interstate migration saw 16,676 more people leave NSW for other states and territories than arrived.[59] Sudden changes in state population and demography can have significant impacts on labour force composition and NSW marine industries which rely on residents' commerce. The 2022 Workforce Skills Survey by Business NSW reports 93% of businesses were experiencing skills shortages in 2022.[60] While skill shortages have impacted a range of marine industries, labour shortages were strongly felt in Tourism which was one of the most reliant sectors on migrant workers prior to the pandemic.[61]

International border closures during COVID-19 triggered a sharp decline in overseas migration. This has led to changing age profiles including a decline in the number of young adults. In 2021 there were 55,742 fewer 18 to 30-year-olds living in NSW compared to 2020, which is unprecedented in recent history.[62] This has augmented Australia's challenge to address its ageing population — a major contributor to skills shortages in Port and water transport terminal operations.[63]

04 Extreme weather events and climate change

The NSW marine estate has faced challenges due to increasing frequency and severity of extreme weather events including floods, drought, bushfires, and broader global warming impacts. Severe flooding in March 2021 impacted habitats along 450 km of the NSW coast. This caused extensive damage in a number of regions, including the Port Stephens embayment where over 50% of kelp beds and other marine species were affected.[64] Marine habitats were also destroyed during the 2019/20 bushfires, including the Wonboyn Lake area that lost 71% of its saltmarsh and 32% of its mangroves.[65] Bushfires can also affect water quality and impact the oyster industry.[66] These severe weather events have had a significant toll on Tourism through cancellations, business damages and by reducing the pristine image of Australia.[67]

The ocean is warming significantly, having absorbed around 90% of the heat generated by rising emissions.[68] Ocean warming can have a number of destabilising effects on the marine environment. NSW's Mid North Coast has recently witnessed these effects on its kelp and offshore reefs.[69] Habitat destruction has implications for Commercial fisheries and Tourism, which have been estimated to generate around $10 billion per year from activities related to the Great Southern Reef.[70]

Changing the distribution of marine species and degradation of habitats has had wide-ranging effects on ecosystem structure, impacting Recreational fishing and Commercial fishing through lower commercially and culturally valuable fish stocks. For example, warmer waters have permitted the spread of unwanted pest species such as tilapia in NSW waters,[71] while also threatening the survival of valuable produce like abalone. This can impact Recreational and Commercial fishing, as well as Tourism.

Concerns surrounding climate change have driven significant interest in technologies that could reduce the rate of global warming, including Offshore renewables and habitat restoration, and industries that offer sustainable alternatives to existing goods and services, including Aquaculture. While many of these are small and/or emerging industries, the impacts of extreme weather events and climate change in the last five years have prompted further interest in these areas – stimulating research, policy planning and investment to differing degrees.

04 | Future challenges and opportunities

Photo by Tommy Wainwright

The NSW marine estate's future is one of challenge and opportunity. Some of the key trends that will affect the health and economic contribution of the NSW marine estate include climate change, future regulations, research and development, emerging technologies, energy transition, changing consumer preferences, First Nations knowledge, food security, demographic shifts, and global linkages.


Global linkages
Future regulatory landscape
Climate change
Demographic shifts
Research and development
Future opportunities and challenges
Food security, quality and sustainability
Energy transition
First Nations knowledge and practices
Emerging technologies
Changing consumer preferences

This chapter provides a high-level distillation of research and discussion on global, national, and state factors that will impact the future health and economic contribution of the NSW marine estate. These drivers have been identified as the most significant, based on desktop research and consultations with marine industry experts. Sources suggest there is an overall opportunity for growth in marine economies. The OECD's pre-pandemic projections estimated a doubling of the global blue economy's size between 2010 and 2030 under 'business-as-usual' scenarios. The Australian blue economy is growing at three times the rate than the rest of Australia's GDP.[72]

The following trends are likely to affect the NSW marine estate's future. These are external factors that are also likely to impact the economy at an international, national, and state level:

Climate change	Long-term impacts to marine ecosystems resulting from climate change such as sea level rise and increased extreme weather events will affect industries such as Tourism, Fishing and Aquaculture that depend on a healthy marine estate.
Future regulatory landscape	Streamlining of regulatory processes aligned to nature positive outcomes will benefit industries dependent on a healthy marine estate while compelling others to adapt to changing regulations.
Research and development	Growing community, public and private sector interest in sustainability will spur R&D while stimulating new industries and innovative approaches to marine estate management.
Emerging technologies	New technologies can increase productivity, create new industries, and improve environmental management. However, some technologies will also challenge some businesses and activities, or be harmful as they accelerate impacts to natural assets such as through marine extractive activities.
Energy transition	The transition from fossil fuels to renewable energy poses risks to existing industries and business costs, contributing towards a long-term shift in the marine estate's industry composition and competition for marine space.
Changing consumer preferences	The rise of 'green' consumerism and better methods of environmental accounting will drive demand for sustainable products and business models.

Incorporating First Nations knowledge and practices	A key factor that is likely to have an influence on the NSW marine estate, is an increased understanding of traditional ecological knowledge and collaborative management with First Nations people.
Food security, quality and sustainability	Aquaculture and fisheries will be impacted by climate change, pests, and diseases, changing consumer preferences for high quality sustainable food options, and export competition affecting access and stock levels in NSW.
Demographic shifts	Population growth, urbanisation, higher incomes, and coastal development will place more stress on marine resources, with waste, congestion and other outcomes requiring sustained management.
Global linkages	Globalisation, in conjunction with climate change, will influence demand for marine industries. However, imports and tourism can bring new biosecurity threats that may impact marine industries.

All of the 21 marine-dependent industries quantified in this report will likely be directly impacted by at least one of the ten trends listed above. Those industries likely to be the most the affected by changes include Aquaculture, Commercial and Recreational fishing, Tourism, Recreational activities other than fishing, Offshore renewables, Water transport, and Defence. By definition, industries that are dependent on a healthy marine estate are more likely to be affected by trends that influence the health of the marine estate.

A further 71 sub-industries will be indirectly impacted by the trends. This means that changes in the marine estate will not only impact marine industries but could have profound knock-on impacts across NSW. This means that ensuring marine estate management is well coordinated and focused on the most significant threats is important, not only to support marine industries, but also, to positively influence the wider community and the natural assets upon which they rely.

This chapter is not intended to provide a forecast for how industries may grow or shrink over time or rank which trends will be most important due to the uncertainty over how they are likely to unfold.

This chapter makes references to a number of government policy strategies and initiatives. At the time of writing these are live policy issues and there is insufficient information to discuss the likely impacts on the NSW marine estate. Chapter 5 discusses potential areas of further work.

4.1 Climate change

Long-term impacts to marine ecosystems resulting from climate change such as sea level rise and increased extreme weather events will affect industries such as Tourism, Fishing and Aquaculture that depend on a healthy marine estate.

The World Economic Forum's 2022 *Global Risks Report* listed biodiversity loss, climate change and extreme weather as the three most severe risks to economic and social stability in the next 10 years.[73] The NSW Marine Estate statewide Threat and Risk Assessment, noted that climate change over a 50-year horizon was the highest threat to social and economic benefits.[74] Acceleration in environmental degradation is also expected, including coastal erosion, loss of habitats, coral bleaching and algal blooms. This is likely to impact Commercial, Recreational and First Nations fishing industries in NSW as marine habitats and species are increasingly put at risk. Tourism and Recreational activities other than fishing, such as visiting the beach, are also likely to be impacted.

Ocean warming can destabilise the marine environment and marine-dependent industries through rising sea levels and increasing intensity of storms and related storm surge. Marine heatwaves (MHWs) are also becoming increasingly common with the sea surface off Tasmania's east coast predicted to warm at a rate of 2.3C per century – equating to four times the global average.[75] MHWs can contribute to the depletion of key habitat-forming organisms, such as seagrass and kelp, by facilitating the southward migration of herbivorous tropical marine species. The occurrence of more frequent severe weather events like heightened El Niño[76] and La Niña activity could see the risk of bushfires, floods and damaging storms increase significantly and produce cumulative and unpredictable environmental impacts. This will increase pressure on emergency response agencies including NSW Search and rescue industries and catchment impacts on the marine estate.

These and other climatic factors can significantly impact marine ecosystems, delivering cascading economic impacts to various industries and flow on effects to communities. For example, the potential for continued ocean warming and an increase in MHW events across eastern Australia by 2040 would contribute to lower commercially and culturally valuable fish stocks, with a decline in primary production by up to 10%.[77] Projected reductions in fish stocks would have significant implications for Commercial and Recreational fishing industries, and associated trade.

In the Tourism industry, a 2018 Climate Council survey revealed that 17 to 23% of tourists would switch destinations if NSW beaches were further damaged by climate change.[78]

4.2 Future regulatory landscape

Greater protections and streamlining of regulatory processes aligned to nature positive outcomes will benefit industries dependent on a healthy marine estate, while compelling others to adapt to changing regulations.

Australia has committed to developing the Sustainable Ocean Plan, which supports economic growth underpinned by ocean health. It is also a member of the High-Level Panel for a Sustainable Ocean Economy.[79] and has committed to the Ocean Conservation Pledge,[80] and the Kunming-Montreal Global Biodiversity Framework, which aims to protect 30% of land, coast and marine areas and ensure they are effectively conserved and managed by 2030 (referred to as 30x30). Australian habitats are protected through national environmental legislation such as the Environment Protection and Biodiversity Conservation Act (EPBC Act).[81]

Climate change mitigation and adaption will also continue to change the regulatory landscape in NSW, especially as the ocean becomes an increasing area of interest for both industry and conservation. Policies such as the *Blue Carbon Strategy 2022-2027,*[82] which aims to restore ecosystems to support carbon sequestration, and the *NSW Climate change Adaptation Strategy* (2022),[83] which aims to embed adaption into all decision making in the NSW government, are examples of the increasing policy developments. Further developments may see marine specific policy and regulation in areas such as spatial planning,[84] habitat restoration[85] and offsetting.[86]

It should be noted that at the time of writing there is insufficient information to discuss the impacts of these specific strategies on the NSW marine estate. More broadly, policy decisions have the potential to impact the NSW marine estate and its management.

Regulatory change may result in greater challenges for some marine-dependent industries (such as fishing), while providing opportunities for others (such as tourism). The recent rezoning of the Commonwealth Macquarie Island led to a tripling in size of its protected marine park area, which will close 93% of the park to Commercial fishing, as well as mining and other extractive activities.[87]

Industries like Recreational activities other than fishing, including boating, surfing, and visiting the beach, however, are likely to benefit from regulations that improve the marine environment's quality and value. NSW marine parks manage a range of activities through zoning and other measures that reduce impacts to marine species and habitats,[88] allowing the marine estate to continue providing social wellbeing value that has been shown to contribute $1.9 billion in income to the NSW economy.

4.3 Research and development

Growing community, public and private sector interest in sustainability will spur R&D while stimulating new industries and innovative approaches to marine-estate management.

Demands are growing from industry and government for research and development (R&D) that can better inform decision-making in the marine estate, as well as drive broader scientific developments such as marine biotechnology for pharmaceuticals. This information is vital for emerging industries aiming to attract global capital.

Further investment in marine science is crucial to improve understanding on how marine systems work, and how they will respond to a range of threats including business impacts and climate change.

Emerging industries such as offshore wind farms, are heavily dependent on R&D related to environmental and industry impacts, including emerging technologies for their construction, operation, and decommissioning. Further research will be required to understand the implications of the infrastructure on marine habitats and species, as well as marine users.

Significant R&D efforts are underway to support NSW marine industries such as Dredging and Desalination, to meet Australia's growing water needs for irrigation, industry and domestic use in a more sustainable and efficient way. New technologies being explored may be less damaging to marine ecology and create 80% more desalinated water.[89]

4.4 Emerging technologies

New technologies can increase productivity, create new industries, and improve environmental management. However, some technologies will also challenge some businesses and activities, or be harmful as they accelerate impacts to natural assets such as through marine extractive activities.

As new marine acoustic technology helps to map large portions of uncharted Australian seabed, high-resolution seabed mapping and habitat classifications of the NSW marine estate will increasingly be made available through public portals such as AusSeabed and SeaMap Australia.[90] This information will improve business decision-making across several data-dependent maritime industries like offshore renewables which require the data to select locations, gain approvals and establish infrastructure. Seabed mapping is expected to generate new activities by providing previously unknown geographic information as well as helping move NSW into the Data industry, which contributed $51 million direct value to the Australian economy in 2018–19.[91]

Advancements in seabed mapping technologies can also have adverse impacts, such as Recreational and Commercial fishers using data to identify more productive areas and increase catches, putting further pressure on fish stocks. Fish finders, drop cameras, marine plotters, electric reels, and depth sounders are examples of technological advances that have already had an impact on how fishers access marine resources more readily. Technological advancements present challenges and opportunities for marine industries to keep pace with the skills and investment needed to compete. Retaining and attracting the labour necessary is one of the top three issues facing high-skilled marine industries including Scientific research and education, according to a survey of 700 marine engineers, scientists, and technologists.[92]

At the same time, technological change will enable better management of the marine estate by helping to understand the wider hydrosphere. For example, a CSIRO team recently used 20 years of satellite data to reveal how reduced water quality due to events like the 2022 floods reduces light availability for photosynthesis in important habitats.[93] Artificial intelligence is now being used to develop predictive future environmental scenarios, creating greater capacity for mitigation planning which will aid NSW marine estate management. Collaborative efforts are underway to improve sea surface temperature monitoring over the Australian and Southern Ocean regions using satellite technology.[94]

4.5 Energy transition

The transition from fossil fuels to renewable energy poses risks to existing industries and business costs, contributing towards a long-term shift in the marine estate's industry composition and competition for marine space.

Through the *Net Zero Plan*, NSW has committed to a 70% reduction in its 2005-level emissions by 2035, and net-zero emissions by 2050.[95] Offshore wind has the potential to contribute to this renewable energy transition. In August 2022, the Federal Minister for Climate Change and Energy announced six proposed regions for offshore renewable energy developments (such as offshore wind) around Australia. This included both the Hunter and Illawarra regions in NSW which are situated adjacent to deep water ports, existing grid infrastructure, supply chain and skill base. This emerging industry has the potential to fill a growing energy gap and provide security of supply.

In the future, if renewable energy sources are unable to meet NSW's growing demand, a rise in the cost of inputs could be experienced across NSW marine industries including Water transport and Other water transport support services, as well as Port and water transport terminal operations. This is particularly of concern given the closure of a number of coal-fired power stations in NSW.[96]

4.6 Changing consumer preferences

The rise of 'green' consumerism and better methods of environmental accounting will continue to create demand for sustainable products and business models.

Environmental, social and corporate governance (ESG) reporting will in future be important to attracting capital by demonstrating alignment with shifting consumer preferences, global regulations, and the ability to withstand exposure to degrading natural capital. Eighty-five percent of US investors already incorporate ESG criteria into their investment strategies,[97] an investment trend that will drive economic support for sustainable blue industries.

Studies have indicated products with ESG claims exceeded the cumulative growth of products without ESG claims by 8% in the five years to 2022.[98] Climate-related financial risk disclosure requirements, currently under development by the Australian Treasury, will encourage the direction of capital to businesses with nature-positive and ocean-sustainable outcomes.[99] This provides opportunities for NSW industries able to show sustainable practices, while challenging those with unsustainable models.

Estimates by the Taskforce on Scaling Voluntary Carbon Markets suggest that carbon credit demand could increase by a factor of up to 15 by 2030, creating a market worth more than $50 billion.[100] While the role of 'green' or land-based environments in storing carbon and mitigating climate change is already well established, 'blue' or water-based environments such as wetlands, estuaries and the seabed,[101] which can sequester carbon in vegetation and soils, also present an opportunity especially in carbon credit markets. The *NSW Blue Carbon Strategy 2022-2027* is a first step towards developing this potential.

Conservation funding initiatives are emerging globally which could present new ways of funding NSW marine estate restoration efforts. The Sustainable Blue Economy Finance Initiative is a United Nations convened global community focussed on the intersection between private finance and ocean health, which provides frameworks to ensure investment activity is aligned to United Nations sustainability goals.[102] The Nature Positive Initiative was launched in September 2023 including 27 of the world's largest nature conservation organisations, to promote the restoration of natural ecosystems.[103] There is growing international support for innovative blue financing instruments such as sustainability linked bonds or debt swaps to bridge an imagined funding gap to save marine biodiversity.[104]

4.7 Incorporating First Nations knowledge and practices into marine estate management

A key factor that is likely to have an influence on the NSW marine estate, is an increased understanding of traditional ecological knowledge and collaborative management with First Nations people.

A growing amount of public land and waters in Australia are being jointly managed or owned by First Nations people, restoring the use of cultural knowledge and practices into land and Sea Country management, and involving First Nations people in management decisions. Many initiatives are underway in NSW with First Nations people, traditional owners, and the NSW Government, to embed First Nations knowledge in Sea Country management.

The Sea Country Ranger Program, cultural site protection projects and cultural tourism work are a few examples of the initiatives underway. The Sea Country rangers project under Initiative 4 of the MEMS increases the participation of First Nations people in the management and care of Sea Country. The involvement of First Nations people in effective land and Sea Country management assists in protecting First Nations cultural values. The project respects First Nations traditional knowledge, connection to Country and aligns with scientific conservation methods to create a win-win for the environment, and the wellbeing of First Nations communities and the general public. These project activities include marine debris removal, rehabilitation and regeneration of coastal and marine habitats, and monitoring and responding to sea bird and other marine wildlife events, such as whale and dolphin strandings.

4.8 Seafood security, quality and sustainability

Aquaculture and fisheries will be impacted by climate change, pests, and diseases, changing consumer preferences for high quality sustainable food options, and export competition affecting access and stock levels in NSW.

Marine fisheries and Aquaculture industries are critical to global food consumption, representing 17% of total animal protein intake.[105] Aquaculture produce is becoming a popular source of high-quality protein, with more sustainable outputs than traditional livestock farming.[106]

In NSW, Aquaculture industries can provide a number of resource-efficient high-quality proteins, including expansion into alternative protein production like seaweed.[107] However, Commercial fisheries will potentially see declines in revenue of 35% by 2050,[108] with the Fisheries Research and Development Corporation (FRDC) estimating that 70% of valuable species in Australia will be impacted by climate change by 2050.[109]

Both industries will be integral to support growing demand for food. Global seafood consumption is projected to increase 80% between 2015 and 2050,[110] and a recent study predicts that mariculture (a subset of aquaculture restricted to marine and estuarine waters) has the largest potential to increase production in future high emissions scenarios.[111]

Growth in demand for NSW's higher-quality aquaculture produce is expected from key Asian markets.[112] As emerging economies become richer, demand for seafood is expected to increase due to better supply chain infrastructure and growing middle-class consumers.[113] Export competition is likely to intensify in emerging markets. Aquaculture industries may be more competitive due to strong perceptions of Australian quality standards and high demand for key species.[114]

The NSW Stevedoring industry is critical to ensuring continued security and supply of food produce to NSW vendors and residents. Congestion and delays in the global container freight supply chain experienced during COVID-19 demonstrate the continued need for strong logistics solutions.[115]

4.9 Demographic shifts

Population growth, urbanisation, higher incomes, and coastal development will place more stress on marine resources, with waste, congestion and other outcomes requiring sustained management.

The NSW population is expected to grow from 8.1 million in 2021 to 9.9 million by 2041 and 11.5 million by 2061 across the state. Based on recent trends, regional NSW's population will increase by 570,000 to 3.7 million in 2041. Greater Sydney's population will grow to approximately 6.1 million, over a million more people than currently live in the region.[116] Incomes are also expected to grow (in real terms) from a median $86,000 in 2019 to $139,000 in 2060-61.[117] Increased disposable income will encourage a higher concentration of individuals in coastal regions, which will likely experience a 22% population growth against 12.9% for non-coastal regions.[118] Influxes to coastal regions and increases in disposable income are likely to generate benefits for NSW marine industries including Marine equipment retailing, Boatbuilding and Recreational activities other than fishing.

Against this backdrop, demand for consumer goods, services and key resources will grow, requiring expansion in maritime trade services including Stevedoring, Water transport, Port and water transport terminal operations and Boatbuilding industries. NSW's freight task, encompassing road, rail, and coastal shipping operators,[119] is set to grow 34% between 2021 and 2061.[120] Port Kembla will become the state's second container port as Port Botany reaches capacity, supplying growth areas in western and south-western Sydney.[121] Newcastle's planned multi-use deep-water terminal could facilitate growth in regional NSW by improving its agricultural supply chain and costs of trade for business.[122]

Population growth may increase pressure on NSW Sewerage and drainage industries and water supply and production. Urban stormwater discharge was listed as the highest priority threat to social, cultural, and economic benefits of the marine estate in NSW in the NSW Marine Estate statewide Threat and Risk Assessment.[123] This will exacerbate issues faced by the industry during COVID-19 and 2022 flooding events.

Coastal and urban development will also increase the strain on marine ecosystems. Most of the 1.7 million new homes needed in NSW by 2060-61[124] will be located in coastal areas, with accompanying impacts of coastal erosion,[125] increased marine pollution, and congestion. This may also reduce the quality of marine locations, affecting the communities that use them recreationally.

4.10 Global linkages

Globalisation and the distribution of global economic growth will influence demand for marine industries. However, imports and tourism can bring new biosecurity threats that may impact marine industries.

The Asia and Pacific region is projected to contribute around 70% of global growth in 2023,[126] with Asia's emerging middle class projected to drive 40% of global consumption by 2040.[127] Asia will require more resources to fuel this expansion, with an expanding middle-class demanding more consumer goods and services.

NSW's marine industries are well positioned to capitalise on this growth if they quickly and adequately plan for pending demand, including within the Tourism industry. Before the pandemic, India was the fastest growing tourist market for NSW,[128] which created opportunities for businesses to cater to that market's unique preferences and tastes. International tourism to Australia has been recovering, and NSW continues to benefit from a prosperous cruise market, with calls for a third cruise terminal that could generate up to $2 billion for the NSW economy each year, benefitting NSW tourism.[129]

A consequence of intensified linkages through greater trade and tourism is emerging biosecurity threats and climate change drivers.[130] Invasive species cost Australia around $25 billion per year,[131] threatening marine ecosystems and food security. This is of particular concern to NSW as a net importer of seafood from a range of countries, some of which may have different food safety standards.[132] To mitigate risks, global non-tariff measures (NTMs) within ocean-based sectors have been growing.[133] Commercial fisheries face the highest average NTMs per traded product within ocean-based sectors, yet trade is slowed through the creation of unnecessary inefficiencies.[134] The development of disease-resistant breeding programs may also improve resilience as biosecurity threats intensify, representing an opportunity for NSW Aquaculture.[135]

In the Shipbuilding and Defence industries, the AUKUS pact will generate up to US$368 billion of investment into naval infrastructure, workforce training and Australia-UK co-designed submarines and boats over the next 30 years.[136] However, geopolitical fragmentation risks sparking further trade wars with China, whose restrictions on exports contributed to a 19% average annual decrease in the national Commercial fishing sector from 2016-17 to 2020–21.[137] To counter the risks of such events, Australia must embrace the global economy as a fully integrated participant.

05 | Conclusion

Photo by Tommy Wainwright

The NSW marine estate makes a substantial economic contribution, is highly diverse across industries, and important to regional communities. Two-thirds of income generated was dependent on a healthy marine estate. Marine industries have experienced volatility and change over time and will continue to do so in the future.

This chapter summarises the key findings and their implications for stakeholders and sets out potential areas of further work.

5.1 Importance of the findings of this work

This report and its key findings demonstrate the significant role of the NSW marine estate in economic terms. The NSW marine estate has strongly influenced the wellbeing and livelihood of NSW residents. It provided a diversity of direct and indirect benefits, such as sources of food, support for coastal businesses, and enhancements to health and education, while enabling the continuation of First Nations and other cultural practices. It is therefore essential that the NSW marine estate continues to receive investment, management, and protection in order to preserve these benefits for future generations.

An important outcome of this work is the establishment of methods to monitor economic benefits for the market components of the marine estate, particularly in relation to understanding loss/decline of marine industries and emerging industries into the future. This will be crucial to aiding and informing the development of marine estate management policies and frameworks. The urgency of sustainably managing the NSW marine estate and other natural ecosystems globally is highlighted by the World Economic Forum's *2022 Global Risks Report*, which listed biodiversity loss, climate change and extreme weather as the three most severe risks to economic and social stability.[138]

5.2 Summary of key findings

This report has assessed the economic contribution of the NSW marine estate over the five years from 2017–18 to 2021–22. Six key findings are identified, summarised below:

KEY FINDING 1

The economic contribution of the marine estate is substantial

The marine estate is important for the NSW economy. In 2021–22, income generated by marine estate industries was $20.6 billion. In nominal terms, income has remained relatively stable over the past five years. It peaked at $21.9 billion in 2018–19. It increased in size by 1.7% over the five years from 2017–18 to 2021–22. In value added terms, a measure that allows comparison to GSP, the NSW marine estate contributed an estimated $16.2 billion in 2021–22. 103,801 jobs in FTE terms were supported by the marine estate industries directly and indirectly, equal to 2.4% of total NSW employment. In relative terms, marine estate industries accounted for 2.5% of NSW's economy. This was a decline from 3.0% of GSP in 2017–18.

Its true value extends far beyond that quantified in this report through the considerable environmental, social, community and cultural benefits it provides.

KEY FINDING 2

NSW marine estate industries are highly diverse

The NSW marine estate contributes to the economy through a wide range of activities. Twenty-seven industries are identified as being dependent on the NSW marine estate. The economic contribution of 21 of these industries are quantified, due to data availability. In 2021–22, these 21 marine-dependent industries received $20.6 billion in income. While noting that tourism is the largest industry (27%) and that the top five industries account for almost three-quarters of the marine estate, we describe it as diverse for two reasons. First, another ten industries generate income over $100 million in income per year. Secondly, there is significant variety in the nature of the 27 industries. The marine estate includes consumer activities like Tourism and Recreation, industrial activities like Shipbuilding and Stevedoring, and government-funded activities like Naval defence and Scientific research.

KEY FINDING 3

Industries within the marine estate have experienced a period of significant change

There were considerable changes in the economic performance of marine dependent industries in NSW. Some of these changes could be attributed to external factors such as COVID-19 lockdowns, global economic conditions, demographic changes, and extreme weather events. The biggest change occurred in the Tourism industry, which experienced a significant decrease in income of $2.8 billion (or 32%) between 2017–18 and 2021–22. Other industries that declined included Other water transport support services (down 22%).

The analysis demonstrates that some marine estate income levels (and hence employment) can be greatly impacted by short-term events and external factors, while others can weather these factors and grow moderately over time. These findings may have implications for policy makers – to recognise both the magnified impacts of industry change at the regional level, and how other industry changes can provide opportunities for regional communities.

KEY FINDING 4

The marine estate is valuable to regional economies

The marine estate is found to be highly valuable to regions across NSW, spanning coastal as well as inland communities through upstream activities generating supply chain benefits and employment opportunities. Of the income generated from the NSW marine estate in 2021–22, just under half (47%) was generated in Sydney, while the rest (53%) was generated in the 14 other NSW coastal regions. Central Coast and Lake Macquarie, Newcastle and Shoalhaven are the regions with the largest income from marine industries outside of Sydney. Tourism, Port and water transport terminal operations, Recreational fishing, and Recreational activities other than fishing are the key economic drivers in these coastal regions. Inland regions also benefit from the marine estate through upstream activities induced by marine industries.

KEY FINDING 5

Around two-thirds of income generated by the marine estate depends on the health of the marine estate

Some industries are not just dependent on the marine estate, but also dependent on a healthy marine estate, defined as exhibiting clean water and biologically diverse marine life. For example, fishing industries depend on the quality of marine habitats and ecosystems. Recreational activities, including surfing, boating and beach visits, depend on water quality and coastal management. There are a range of views on which industries depend upon a healthy marine estate. An initial assessment indicates this includes 16 industries (14 of which are quantified in this analysis, while the other two had insufficient data). The top two industries dependent on a healthy marine estate in 2021–22 were Tourism and Port and water transport terminal operations, which generated $6.1 billion and $2.3 billion in income, respectively. Overall, almost two-thirds, or 63% of income, was dependent on a healthy marine estate.

KEY FINDING 6

A range of external factors are likely to have an impact on the economic performance of marine dependent industries

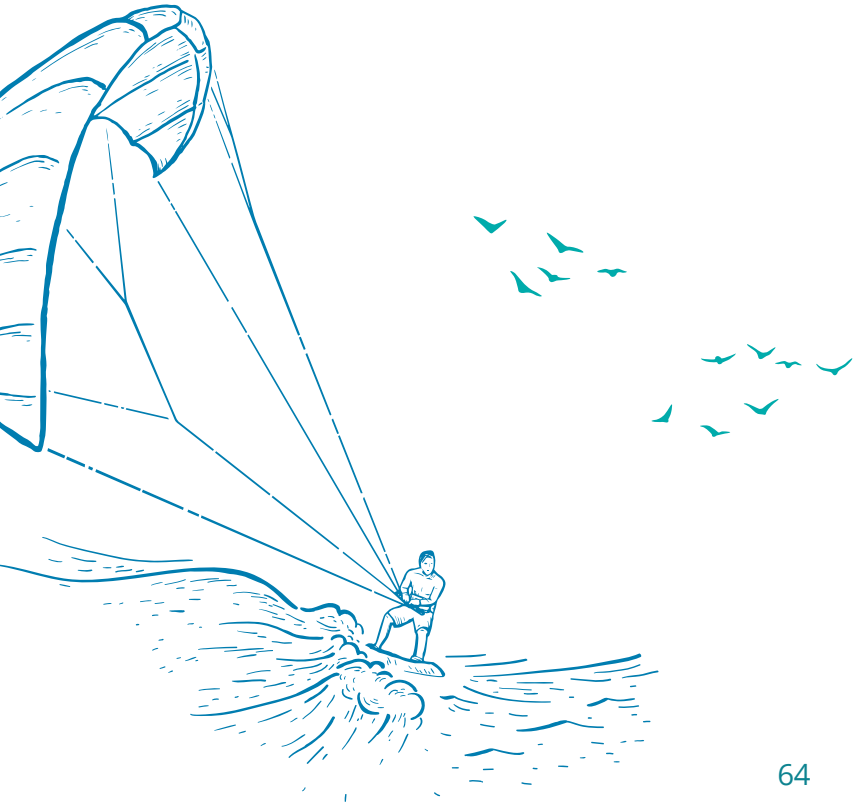
The NSW marine estate's future is one of both challenge and opportunity. Some of the key external drivers that are likely to affect the health of the marine estate and the economic performance of industries dependent on it include: climate change, future regulatory changes, research and development, emerging technologies, energy transition, changing consumer preferences, incorporating First Nations knowledge and practices into marine estate management, food security, quality and sustainability, demographic shifts and global linkages. Each of the 21 marine-dependent industries quantified in this report are likely to be directly impacted by at least one of the trends, while a further 71 sub-industries will be indirectly impacted.

5.3 The future of the NSW marine estate

This report highlights the vital importance of the NSW marine estate to NSW communities. It provides a high-level distillation of research on the factors that will impact the NSW marine estate's future health. The planning framework and specific strategies considered herein are critical to managing ongoing threats and risks to the economic, social, and cultural dimensions of the marine estate. They also provide guidance for industries to maximise the opportunities offered by the marine estate in a sustainable manner.

The findings of this report will help inform the management of the NSW marine estate in terms of protecting both the future health of marine assets and its economic activities. This includes contributing to government frameworks which aim to monitor and protect NSW marine habitats, biodiversity, and associated community benefits such as future Statewide Threat and Risk Assessments (TARA)[139] and the Marine Integrated Monitoring Program (MIMP).[140]

In providing a benchmark for the economic contribution of marine industries from 2017–18 to 2021–22, this report enables changes in the NSW marine estate industry composition to be clearly tracked across a range of metrics as industries evolve.



5.4 Limitations of the study and future considerations

This research could help inform industry, policymakers, and community stakeholders on trends in the NSW marine estate. If replicated in the future, it could be used to track further changes in marine industries and examine how market trends and external factors have influenced industries.

There are limitations with using an economic contribution approach to estimating the value of the NSW marine estate, and this should not be considered to encompass the full value of the natural assets or industries. Future research could be undertaken to build upon this report in the following ways:

Cultural

There is an opportunity to better understand the values of the marine estate beyond those captured in market terms in this report. Phases 2 and 3 of this work will extend beyond the economic contribution of the NSW marine estate to assess both the relationships between the economy and the environment through natural capital accounting, and the social and cultural value provided by the NSW marine estate.

Marine-dependent industries explored in this market insights report, such as tourism and commercial fishing/aquaculture include many First Nations owned and operated businesses. These businesses not only contribute to the NSW economy but have direct benefits to First Nations communities and reinforce traditional cultural practice and involve traditional knowledge that can offer further benefits to the economic sustainability and health of the marine estate. These businesses were not specifically identified and assessed as part of this report and could be considered as part of a future dedicated study.

Economic

This report quantifies the income, value added and employment generated by the NSW marine estate. This analysis could be expanded to examine the wages earned by employees working for businesses and organisations in marine estates and to consider the 'induced' economic effects – i.e. the additional value added and jobs supported through the spending of wages of employees in the industries directly or indirectly part of the marine estate.

Future research could include a quantified estimate of the economic contribution of several industries that were not quantified in this report. These include Offshore renewables, Marine biotechnology, Sand dune mining, Seabed mining, Salt production and Undersea cables. There are opportunities for further analysis on specific subsectors of interest such as education, recreational activities other than fishing and habitat restoration.

Environmental

The research could be enhanced to examine more precisely the extent to which industries are dependent on the health of the marine estate. This could be used for scenario analysis to forecast the economic benefits or costs if marine environments improved or deteriorated. The impacts on income and employment for upstream industries that experience demand from economic activity of marine industries could be further explored to enhance understanding of the wider impacts and effects of external drivers. Also, further analysis could be carried out on mapping the geographic spread of industry regions and their influence over regional economies, as well as considering the resilience of industries and regions in how quickly they recover from external shocks.

This report provides a strong foundation for a broad spectrum of further work which will aid understanding and conservation of the NSW marine estate for future generations. By setting out its considerable economic contribution and the diverse range of benefits provided to NSW communities, this report makes the case for continued investment, management and protection of the NSW marine estate. The ability to track changes across industries and regions based on the methods set out in this report will be a powerful tool in supporting these objectives as the NSW marine estate continues to evolve. Understanding the current composition and contribution of industries and regions through the data provided in this report is the first step in informing its sustainable management.

Appendices

APPENDIX A

Methodology

A.1. Overview of modelling

The following steps were undertaken to estimate the economic contribution of the NSW marine estate:

1. **Identify the relevant geographic regions:**
   Regions were analysed at the Functional Economic Region (FER) level, focussing on regions along the NSW coastline.

2. **Identify the relevant industries:**
   Industries that were dependent on marine resources were identified based on analysis of various reports and discussions with DPI.

3. **Collect data for the relevant industries in those geographies:**
   Comprehensive desktop research was then conducted for a range of industry reports to collect the required data, including income, expenditure, and Earnings Before Taxation, Interest, Depreciation and Employment.

4. **Estimate the direct and indirect economic contribution:**
   The economic contribution of each industry, in employment and value-added terms, were generated using the data collected. Deloitte's Regional Input-Output (IO) model, which is based on the Australian Bureau of Statistics Input-Output (IO) tables, provided outputs for the indirect and direct contribution of each industry. This data was disaggregated into state and regional figures if available.

STEP 1

Identify the relevant geographic regions

The economic contribution of the NSW marine estate is estimated in this study at the state level, and income contributions are analysed at the more granular FER level. FERs are comprised of at least one Local Government Area (LGA) which operates alone or with other LGAs within its FER as a smaller but strongly connected economy.[141] For the economic contribution study of the NSW marine estate, the relevant FERs, due to their locations along the coastline, are:

Tweed	**Hastings Macleay**	**Shellharbour**
Northern Rivers	**Mid Coast**	**Kiama**
Clarence Valley	**Hunter**	**Shoalhaven**
Coffs Coast	**Central Coast and Lake Macquarie**	**Far South Coast**
Nambucca		

Sydney and Newcastle are not FERs but are included in the analysis of this study.

Appendix B provides more detail around the FERs, including outlining the specific LGAs that sit within each FER.

STEP 2

Identify the relevant industries

In this analysis, industries are identified using frameworks from the United Nations, World Bank, and OECD. The United Nations and World Bank have produced a framework for categorising the ocean economy by the way industries use marine resources, as listed below:[142]

- Harvesting of living marine resources, involving the extraction of organisms for consumption or biotechnology products.
- Harvesting of non-living marine resources, including minerals, oil, and gas to meet production and energy demands.
- Use of renewable natural forces like offshore renewable energy (e.g. wind, wave, tide, ocean thermal energy).
- Commerce and trade in and around oceans, covering trade, tourism, and related services.
- Environmental protection, regulation, and research, supporting the marine environment's protection and sustainable use.[143]

The OECD's *The Ocean Economy in 2030* report and the United Nations' *The Second World Ocean Assessment* report identify the following relevant industries for estimating the ocean economy: shipping, shipbuilding and marine equipment, capture fisheries and fish processing, maritime and coastal tourism, recreation, conventional offshore oil and gas exploration and production, dredging, desalinisation, salt production, research, offshore renewable energy generation, seabed mining, aquaculture, marine biotechnology, ocean surveillance and monitoring, and port facilities and handling.

While these taxonomies provide a starting point for identifying the relevant industries, the following criteria were also used to identify the relevant industries:

- Industries must be considered directly dependent upon the ocean and thus upon the NSW marine estate. This extended to industries beyond a 3 nautical miles radius of the coastline as these industries were deemed to rely on the NSW marine estate, even where their main operations occurred beyond those boundaries.
- Industries selected for analysis ought to be comparable with other studies in Australia and internationally, and this was managed through a review of Australian ocean economy analyses as well as the OECD, United Nations and World Bank perspectives on ocean economies.
- Data on industry contributions must be available at the state level with the potential to be linked to more granular data sources to establish contributions at a regional level.

We note that 'directly dependent upon the ocean' could have several interpretations. For the purposes of this project, coastal tourism and certain recreational activities are included; however, this does not include all recreational activities near the ocean (see Appendix C for more detail on inclusions). Similarly, while Desalination and Sewerage and drainage services are included, this does not include all aspects of water supply. While marine estate management is included, this does not include regulatory activities pertaining to the ocean.

If the above criteria were met, the industry was quantified in the analysis. However, if these criteria were not met, industries were only discussed qualitatively. The final list of 27 industries considered dependent on the marine estate is provided in Table A.1. The table indicates whether these industries were recognised across three comparable reports as either an established or emerging marine industry (noted by a tick). Those industries that were not quantified in this study due to data limitations or because the income generated was too small in the period of analysis are labelled 'qualitative,' recognising that the industry should be quantified in the future if this was to change.

Table A.1 - Industries that are directly dependent upon the ocean

Industry	The Ocean Economy in 2030 (OECD 2016)[144]	The Second World Ocean Assessment[145]	The AIMS Index of Marine Industry 2020 (DAE, 2020)[146]	This study
Marine estate management	✓			✓
Commercial fishing	✓	✓	✓	✓
Defence				✓
Dredging	✓			✓
Desalination		✓		✓
Sand dune mining			✓	Qualitative
Marinas and boating infrastructure	✓		✓	✓
Marine and seabed mining	✓	✓		Qualitative
Marine-based aquaculture	✓		✓	✓
Marine biotechnology	✓			Qualitative
Marine equipment retailing	✓		✓	✓
Offshore renewables	✓	✓		✓
Oil and gas exploration	✓		✓	Qualitative
Recreational activities other than fishing	✓			✓
Ports and water transport terminal operations	✓		✓	✓
Recreational fishing	✓		✓	✓
Salt production	✓	✓		Qualitative
Scientific research	✓	✓		✓
Search and rescue operations	✓			✓
Sewerage and drainage services				✓
Boatbuilding	✓		✓	✓
Tourism	✓	✓	✓	✓
Water transport	✓	✓	✓	✓
Shipbuilding	✓			✓
Undersea cables			✓	Qualitative
Stevedoring services			✓	✓
Other water transport services			✓	✓

In addition to these three reports, another six studies on the marine estate were also consulted to ensure a comprehensive list of marine industries was considered:

- *The economic contribution of South Australia's marine industries* (Deloitte Access Economics 2017)[147]
- *At what price? The economic, social, and icon value of the GBR* (Deloitte Access Economics 2017)[148]
- *The economic contribution of the Australian maritime industry* (PwC 2015)[149]
- *Assessing the Value of Coast to Victoria* (URS Australia 2007)[150]
- *The Economic Contribution of Australia's Marine Industries* (The Allen Consulting Group 2004)[151]
- *The value of Australian seabed mapping data to the blue economy* (Deloitte Access Economics forth-coming)[152]

Small existing and emerging industries

There are various industries that were not included in the analysis as there was insufficient data or insufficient economic activity in the measured years. However, these should be quantified if the data becomes available in the future. These include:

- Offshore renewables: The production of offshore renewable energy
- Marine biotechnology: The exploitation of marine biological resources to develop technologies and products
- Sand dune mining: The extraction of sand from sand dunes along the NSW marine estate coastline
- Seabed mining: Harvesting of minerals from the ocean floor
- Salt production: The process of evaporating seawater to produce salt
- Undersea cables: Manufacturing, construction, and maintenance of undersea cables used for telecommunications.

While these industries are expected to grow further into the future, congruent with global trends, emerging industries which are yet to operate at a commercial scale are likely to play a more significant role in the future as technology and investment progress.[176] Some of these have been discussed in Chapter 4, including offshore wind farms.

Some industries included in the report did not include certain activities that should be included should the data become available. These include:

- Recreational activities other than fishing: This report only considered visits to the beach, surfing, and boating activities. Recreational activities other than these could be considered if the level of participation and expenditure on these activities became available.
- Scientific research and education: Education activities, such as excursions and field studies supported by the NSW marine estate, could be considered.
- Marine estate management: Maintenance, amenity services, and stewardship costs of caring for beaches and marine estate.

Industries dependent on a healthy marine estate

While various examples have been identified by research, there is no general consensus on which industries are dependent on a healthy marine estate. For the purposes of this analysis 16 industries have been identified as being dependent on a healthy marine estate, based on a desktop review of OECD criteria[153] and subsequent discussions with DPI (see Table A.2). Fourteen of these industries were quantified in this study, representing 63% (or $14.5 billion) of income associated with the marine estate. If the health of the marine estate deteriorated due to exploitation, climate change or other circumstances, these would be the industries likely to be most affected.

Table A.2 Industries dependent on healthy-marine estate

Marine industries	Healthy marine estate-dependent
Harvesting of living marine resources	
Aquaculture	Yes
Boatbuilding	No
Commercial fishing	Yes
Marine biotechnology	Yes
Marine equipment retailing	Yes
Recreational fishing	Yes
Extraction and use of marine nonliving resources (non-renewable)	
Desalination	Yes
Dredging	No
Oil and gas	No
Sand dune mining	No
Salt production	No
Seabed mining	No
Use of renewable non-exhaustible natural forces	
Offshore renewables	Yes
Commerce and trade in and around oceans	
Other recreational activities	Yes
Other water transport support services	Yes
Port and water transport terminal operations	Yes
Shipbuilding	No
Search and rescue	Yes
Water transport	Yes
Stevedoring services	No
Tourism	Yes
Undersea cables	No
Marinas and boating infrastructure	Yes
Environmental protection, regulation, and research	
Defence	No
Marine estate management	Yes
Scientific research and education	Yes
Sewerage and drainage	No

Source: Deloitte Access Economics

Many marine-dependent industries are also inherently exposed to the impacts of water quality and extreme weather events.[154] For example, the bushfires and floods which occurred in 2019–20 negatively impacted the tourism industries.[155] Poor water quality events, such as harmful algal blooms, can have impacts on aquaculture through the marketability of produce,[156] and can also have a significant impact on the participation of water-based activities.[157] Extreme weather events and poor water quality events are likely to have impacted marine industries.

STEP 3

Collect data for the relevant industries in those geographic regions

While the industries identified in step 2 constitute the relevant industries for the economic contribution, the study relies on the ability to collect relevant data for those industries. The required data for the analysis includes income, expenditure, earnings before taxation, interest, depreciation and amortisation and employment.

Comprehensive desktop research was conducted to identify and collect the relevant data. The data needed to be available at the state level with the potential to be linked to more granular data sources to establish contributions at a regional level.

As a result of the significant data requirements to estimate the economic contribution, available data was supplemented with secondary research or literature that was used to impute required values.

Data was also required for the relevant time periods. This study estimates the economic contribution of the NSW marine estate in 2017–18, 2018–19, 2019–20, 2020–21 and 2021–22. Where more recent data was unavailable, estimates were projected out based on historic trends.

Based on the identification of relevant industries and collection of relevant data or secondary research and literature, 21 industries were estimated for the economic contribution of the NSW marine estate. Where insufficient data or secondary research prevented quantitative estimates, relevant industries were discussed qualitatively.

The specific data sources and secondary literature used for each industry, along with the methodology for calculating income attributable to the industry, is further discussed in Appendix C.

STEP 4

Measuring the economic contribution

There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution.

Value added measures the value of outputs (goods and services) generated by the entity's factors of production (labour and capital) and is measured as the income to those factors of production. The sum of value added and net taxes on products across all entities in the economy equals GSP.

Value added is equivalent to the sum of:

- Gross operating surplus – represents the value of income generated by the entity's direct capital inputs, measured as earnings before interest, tax, depreciation and amortisation (EBITDA).
- Labour income – this is a sub-component of value added. It represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour.
- Tax on production less subsidies provided for production such as company taxes and taxes on employment. Given the returns to capital before tax (EBITDA) are calculated, company tax is not included; otherwise, this would double count for that tax.

Value added was broken down into direct value added and indirect value added. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using ABS IO tables which report the inputs and outputs of specific sectors of the economy. For clarity on the process used to quantify economic contribution, refer to Appendix D.

In addition to value added, this report also provides the income generated by each industry in the marine estate. Income measures the total value of the goods and services supplied by the entity. This is a broader measure than value added because it is in addition to the value added of the entity. It also includes the value of intermediate inputs used by the entity that flow from value added generated by other entities.

Employment is a different measure of activity from those above. It measures the number of workers employed directly and indirectly by the entity, rather than the value of the workers' output or incomes. Employment is measured in economic contribution studies through FTE roles.

Table A.3 Examples of measures used to measure economic value

Estimate	Example within the NSW marine estate
Gross operating surplus (GOS)	The EBITDA of the commercial fishing industry.
Labour income	The wages paid by the commercial fishing industry.
Value added	The sum of GOS and labour income of the commercial fishing industry plus production taxes less subsidies.
Income	Income of the commercial fishing industry.
Employment	The total employment of the commercial fishing industry.

Source: Deloitte Access Economics

A.2 Data quality, replicability and limitations of the analysis

Given the nature of an economic contribution study, there are some limitations that must be considered when interpreting these results. There have been changes in methodology since Deloitte's previous work done for DPI, and differences in the approach taken in this report compared to separate economic studies on marine industries. For clarity, we have included a note on the quality of data used in this report and some considerations on the replicability of these findings.

Limitations of economic contribution studies

At a conceptual level, there are limitations with using an economic contribution approach to estimating the value of the NSW marine estate, including:

- Estimating the economic contribution of the NSW marine estate should not be considered to encompass the full value of the natural assets or the industries. According to the OECD, a full valuation would include the environmental resources used and non-market goods and services provided by the broader ecosystem.[158]

- Economic contribution captures all activities that generate economic values even when such activities result in negative environmental impacts (e.g. Sewerage and drainage services and Dredging).
- Unless there is significant unused capacity in the economy (such as unemployed labour) there is only a weak relationship between a firm's economic contribution as measured by value added (or other static aggregates) and the welfare or living standard of the community. Indeed, the use of labour and capital by demand created from the industry comes at an opportunity cost as it may reduce the amount of resources available to spend on other economic activities.

There are also practical limitations in applying the IO techniques to assess the economic contribution of the NSW marine estate, including:

- Identifying the economic activities that should be in scope.
- Assessing the feasibility of estimating the value of those economic activities, given data availability.
- Estimating the flow-on impacts of those economic activities to suppliers.

Data quality and replicability

The data sources used were of the highest quality that could be obtained publicly or through DPI, including information from primary sources for five industries as well as highly reputable secondary sources such as the ABS, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and IBIS World for remaining requirements.

Where required, data was updated to reflect the most recent publicly available information. For industries such Aquaculture, Boatbuilding, Marine equipment retailing, Port and water transport terminal operations, and Stevedoring, variations are attributed to the use of census data. The current model incorporated the newest 2021 census data,[159] whereas the previous work relied on the 2016 census. This shift in data sources naturally leads to variations in the results, as the economic landscape and demographics evolved over that time frame.

The methodology for Defence, Recreational activities other than fishing, and Recreational fishing has been updated to align with AIMS 2023.[160] This adjustment was driven by the robustness of the AIMS approach and the availability of more reliable data. However, it was expected to result in variation compared to the previous period.

In cases where specific data points were not available, the compound annual growth Rate (CAGR) from 2017–18 to 2020–21 was used to estimate values for 2021-2022. This formula is outlined below:

$$I_{22}=I_{21} \times \left(\frac{I_{21}}{I_{18}}\right)^{1/3}$$

Where I_{22} is industry income for 2021–22, I_{21} is industry income for 2020–21, I_{18} is industry income for 2017–18, and 1/3 is an exponent

Incorporating CAGR to estimate values for 2022 is a practical approach; however it should be noted that this method assumes a level of stability and linear growth that may not always align with the complexities of real-world economic dynamics. CAGR projections were applied to 8 of 21 industries, providing indicative results only for those industries in 2021–22. These industries included Boatbuilding, Commercial fishing, Recreational fishing, Recreational activities other than fishing, Other water transport support services, Port and water transport terminal operations, Shipbuilding, and Stevedoring services.

Three industries required appropriate statistical techniques to be used to calculate estimations. Recreational activities other than fishing are industries with no available market data, so an estimation based on participation and average cost per participant was employed. Further, as Marinas and boating infrastructure lacked data for each year, imputation methods were used to provide reliable estimates in between years where data was available.

Given the data sources and methodology listed above, the findings discussed in this report should be replicable. However, implementing new data updates - for example updated Census data - different data sources, and separate IO models may yield results separate from those presented. Deloitte's Regional IO Model may differ to those employed by other organisations. A separate approach to calculating economic contribution can result in significantly different figures with other public reports. For example, the BDO report, *Economic and Social Indicators for New South Wales Commercial Fisheries in 2019/20* includes associated downstream activities when estimating the value of the commercial fisheries in NSW.[161] Inclusion of downstream activities, which is not in the scope of our approach, would result in a larger estimate of economic contribution for a single industry.

APPENDIX B

Functional Economic Regions

The economic contribution of marine dependent industries in NSW was disaggregated where possible into Functional Economic Regions (FERs) which define small regional economies in NSW using Local Government Areas (LGAs).[162] Each FER includes connected LGAs except for Newcastle and Sydney which are also analysed separately. For FERs along the NSW border, only NSW LGAs are considered. The LGAs that are included in each region are outlined in Table B.1.

Due to data limitations, some industries are not segmented at the regional level. These industries were Oil and gas, Search and rescue, Marine estate management, Scientific research, Sewerage and drainage, Marinas and boating infrastructure and Defence. Approximately 67% of marine estate income is attributed to a specific region. This means that the report will understate regional income for FERs where one of these industries recorded income between 2017–18 and 2021–22.

Data is also provided for Newcastle and Sydney as well as for inland FERs. Income data is counted outside these FERs for Shipbuilding only as Shipbuilding in any region will be reliant on the marine estate. These inland regions include Albury-Wodonga, Eastern Riverina, Northern New England High Country, Upper North West, Lithgow and Wingecarribee.

Table B.1 – Coastal Functional Economic Regions and Local Government Areas

Functional Economic Region	Local Government Areas		
Tweed	Tweed		
Northern Rivers	Ballina Byron	Kyogle Lismore	Richmond Valley
Clarence Valley	Clarence Valley		
Coffs Coast	Bellingen	Coffs Harbour	
Nambucca	Nambucca Valley		
Hastings-Macleay	Kempsey	Port Macquarie-Hastings	
Mid Coast	Mid-Coast		

Functional Economic Region	Local Government Areas		
Hunter	Cessnock Dungog Maitland	Muswellbrook Port Stephens	Singleton Upper Hunter Shire
Newcastle	Newcastle		
Central Coast and Lake Macquarie	Central Coast (NSW)	Lake Macquarie	
Sydney	Bayside Blacktown Blue Mountains Burwood Camden Campbelltown Canada Bay Canterbury-Bankstown Cumberland Fairfield Georges River	Hawkesbury Hornsby Hunters Hill Inner West Kur-ring-gai Lane Cove Liverpool Mosman North Sydney Northern Beaches Parramatta	Penrith Randwick Ryde Strathfield Sutherland Shire Sydney The Hills Shire Waverly Willoughby Wollondilly Wollongong Woollahra
Shellharbour	Shellharbour		
Kiama	Kiama		
Shoalhaven	Shoalhaven		
Far South Coast	Bega Valley	Eurobodalla	

Source: NSW Government (2021); ABS (2016)

APPENDIX C

Industry data

This section outlines the specific data sources and methodology used to determine income for marine industries. The methodology differs between some industries due to data availability and the nature of the industries – for example Recreational activities other than fishing is not a standard industry category and therefore requires specific steps to be taken to estimate its income. Where data was not available at the regional level, ABS Census employment data for the industry within a specific FER is the proportion of income attributable to that FER.[163] This is possible as a subset of these industries align with the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006, which is used by the ABS to collect data on industries in Australia and New Zealand. In one specific case, this process is applied to disaggregate national Naval defence income to the state level. The choice of employment data as an indicator of economic activity is due to its direct correlation with income generation. Employment is a good indicator of local economic impact, can facilitate comparative analysis between industries, and aligns with government statistics and indicators. These factors make employment a comprehensive and reliable tool for assessing a region's economic performance.

Table C.1 outlines industry definitions for the 21 measured industries, along with the data sources and methodology used to calculate income from activities dependent on the marine estate.

Table C.1 – Glossary of industries

Harvesting of living marine resources, involving the extraction of organisms for consumption of biotechnology products

Aquaculture

The cultivation and harvesting of marine life through marine-based aquaculture farming operations. This excludes hatchery and land-based aquaculture.

Data

- Income at the state level updated from *Aquaculture Production Report 2021–22* by DPI.[164]
- Employment data from the *Census of Population and Housing* (2021) by the ABS was used to attribute income regionally.[165]

Methodology

1. The gross value of aquaculture production in NSW was sourced from DPI.[166]
2. Aquaculture that was land-based or produced in hatcheries was excluded from this gross value.
3. Gross value of marine-based Aquaculture was then attributed regionally based on the proportion of employment in marine-based aquaculture in coastal regions. The ABS Census data provides three categories for Aquaculture employment, with offshore longline and rack and offshore caged aquaculture being the only non-land-based aquaculture operations.[167]

Boatbuilding

From the ANZSIC code 2392, which includes workforce activities such as boatbuilding, boat repairing, yacht construction and manufacturing of canoes, dinghies, inflatable boats, jet boats, motorboats (inboard and outboard), powerboats and sailboats. This is different from shipbuilding as it includes manufacturing or repairing vessels of under 50 tonnes (whereas shipbuilding focusses on vessels over 50 tonnes). Income for this industry that was attributable to inland regions of NSW was excluded from the estimate.

Data

- Income at the national level from ABS data, *Australian Industry* (2022).[168]
- Employment data from the *Census of population and housing* (2021) by the ABS, used to attribute income regionally.[169]

Methodology

1. Boatbuilding income was obtained at the national level from the ABS where income data for manufacturing is available at the four-digit ANZSIC code.[170]
2. This income data was disaggregated regionally based on the proportion of employees in the industry who worked in NSW according to the Census.[171]
3. Income that was attributable to inland regions of NSW was excluded from the estimate based on the disaggregation in step 2. Boatbuilding involves the construction of smaller watercraft (e.g. recreational boats) and therefore construction in inland areas may not be directly linked to the marine sector's contribution. Therefore, including inland Boatbuilding income could overstate the marine sector's contribution.

Harvesting of living marine resources, involving the extraction of organisms for consumption of biotechnology products

Commercial fishing

Activities related to wild capture fisheries up to the first point of sale, which does not include retail and wholesale activity. Includes the contribution of fisheries in Commonwealth waters that are offloaded in NSW.

Data

- Income at the state level from ABARES publication, *Australian fisheries and aquaculture statistics 2021*.[172]
- Portion of fish harvested in Commonwealth waters and offloaded in NSW calculated from the *Australian fisheries and aquaculture statistics 2017*, by ABARES.[173]
- Employment data from the ABS *Census of Population and Housing* (2021) used to attribute income regionally.[174]

Methodology

1. Income data at the state level for Commercial fishing was taken from ABARES as the gross value of production.[175] It should be noted for this study that income is estimated at first point of sale only and does not include secondary sales for wholesale or retail industries.
2. To estimate the NSW proportion of activity, the Australian fisheries and aquaculture statistics 2017 was used.[176] The sum of the value of all production in NSW (including fish harvested in Commonwealth waters but offloaded in NSW) was subtracted from the value of production in NSW (excluding Commonwealth waters harvested fish). As a proportion of total Commonwealth harvested fish, 7.93% are offloaded in NSW. This was calculated as the proportion is not recoverable in later iterations of the ABARES publication.
3. The proportion of fish harvested in Commonwealth waters was multiplied by the total value of production by commercial fisheries in Commonwealth waters and added to the income retrieved in step 1 (NSW commercial fisheries).
4. This income data was disaggregated based on the proportion of employees in the industry who worked in NSW according to the Census.[177]

Marine equipment retailing

From the ANZSIC code 4245, which includes workforce activities such as marine accessory retailing, boat trailer retailing, outboard motor retailing, sailing or nautical accessory retailing, yacht retailing and boat retailing. Does not include economic activity attributable to inland regions in NSW.

Data

- Income at the national level retrieved from IBIS World publication, *Marine Equipment Retailing in Australia*.[178]
- Employment data from the ABS *Census of Population and Housing* (2021) used to attribute income regionally.[179]

Methodology

1. Income at the national level for Marine equipment retailing was obtained from IBIS World.[180]
2. Census data on employment for Marine equipment retailers was used to estimate the regional and NSW share using the ANZSIC code 4245.[181] Income for this industry that was attributable to inland regions of NSW was excluded from the estimate.

Harvesting of living marine resources, involving the extraction of organisms for consumption of biotechnology products

Recreational Fishing

The expenditure of recreational fishers in NSW on items such as bait and fees & licences (not including items spent on other marine industries like marine equipment retailing and tourism).

Data

- Average expenditure per person on Recreational fishing in NSW from *The 2000-01 National Recreational Fishing Survey Economic Report.*[182]
- Participation in recreational fishing at the state level from *Survey of Recreational Fishing in NSW 2019–20*[183]
- Proportion of Recreational fishing that is marine estate dependent calculated using participation rates and share of harvest of marine species from *The National Recreational and Indigenous Fishing Survey*[184]
- Tourism Research Australia data from the *National And International Visitor Survey* was used to remove tourist fishers.[185]

Methodology

1. To calculate the income generated by Recreational fishing, we calculated per person spending across various categories by NSW recreational fishers. The proportion of expenditures across various categories were as follows: fishing gear (45%), camping gear (29%), bait (10%), fees & licences (7%), clothing (5%), and other expenses (3%). These per person expenditures were adjusted for inflation.
2. Per person expenditure was then multiplied by the participation rates for recreational fishers for each respective period. This expenditure is sourced from *The 2000-01 National Recreational Fishing Survey Economic Report*[186] and most recent participation rate was sourced from the Survey of Recreational Fishing in NSW 2019–20.[187]
3. This figure was then adjusted to consider exclusively marine fishing activities, excluding river and lakes/dams fishing. According to *The National Recreational and Indigenous Fishing Survey*, marine fishing represented 82% of the total value of harvest.[188]
4. The expenditure was further reduced to exclude the portion of fishers who were tourists using data from TRA (Tourism Research Australia). This indicated that in the 2019–20 period, 30% of fishers were tourists, while this figure rose to 43% in 2020–21.[189]

   Formula:

   Total expenditure = Expenditure per person * share of marine fishing activities * (1 minus percentage of fishers that were tourists)
5. The Recreational fishing expenditure is disaggregated to the regional level using the number of visitors who participate in recreational fishing activities by LGAs. This data is provided by TRA.[190]

Harvesting of non-living marine resources, including minerals, oil, and gas to meet production and energy demands

Desalination

The removal of salt and impurities from seawater to produce fresh water for drinking or irrigation.

Data

- Income at the state level retrieved from IBIS World *Sydney Desalination Plant Pty Limited* report.[191]

Methodology

1. Income for Desalination was provided at the state level from IBIS World.[192] There is one desalination facility that operates in NSW – the Sydney desalination plant, located in Kurnell. Therefore, regional disaggregation was not required. The operation of this facility is dependent on the level of water in Sydney's dams – in wet years it may not be required to operate.

Dredging

The removal of silt and other material from the bottom of bodies of water in coastal FERs in NSW.

Data

- Income was provided by DPI at the FER level.

Methodology

1. Dredging income data was provided directly by DPI at the FER level. This was collected in order to estimate the proportion of Dredging which occurred along coastal FERs with the use of the NSW marine estate.

Oil and gas

Oil and gas exploration that occurs in offshore environments in NSW.

Data

- Income was retrieved from ABS, *Australian Industry.*[193]

Methodology

1. Total Oil and gas exploration data is available at a state level while the offshore and onshore Oil and gas exploration and production data is only provided at a national level. Both were retrieved from the ABS.[194]
2. To estimate the offshore component for NSW, the proportion of oil and gas exploration and production which occurs offshore in Australia was multiplied by share of income from Oil and gas generated by NSW. This provided an estimate of statewide offshore Oil and gas exploration and production. This approach covers both petroleum and relevant minerals. This estimation could be improved with access to exploration expenditure data from PEP 11 – the exploration licence owned by Advent Energy Ltd and Bounty Oil and Gas NL. Advent has demonstrated considerable gas generation and migration within PEP11, with the mapped prospects and leads highly prospective for the discovery of gas. This data, however, is not available.

Commerce and trade in and around oceans, covering trade, tourism, and related services

Recreational activities other than fishing

Includes visits to the beach (and beach related activities), surfing visits, and boating activities excluding recreational fishing. These recreational activities were quantified to estimate the expenditure by coastal residents who undertake these activities.

Data

- *National Coastal Safety Report 2021* by Surf Life Saving Australia for number of coastal visitors and visitors per month. The report also provided the number of frequent boaters and occasional boaters. Data also included proportion of frequent surfers and average hours spent surfing.[195]
- Tourism Research Australia *National and International Visitor Survey* used to remove tourists from beach visitation estimates.[196]
- ABS data used to scale expenditure to regional populations.[197]
- A study by Mike Raybould and Neil Lazarow, *Economic and social values of beach recreation on the Gold Coast* (2007) used for cost of beach visits[198]
- Transport for NSW report, *Recreational boating participation* (2018), was used to estimate the proportion of day boating trips.[199]
- Transport for NSW open data hub, *NSW Boat Registrations and Licences* (2022) for count of recreational boat licences.[200]
- NSW Planning population data used to determine number of vessels in coastal areas.[201]
- *Recreational boating in the Murray-Darling Basin* (2018) study by Marsden Jacob used for expenditure on boating trips.[202]
- Boating licence fees sourced from WatercraftZone website with collation of state authority licence costs.[203]
- *A socio-economic study of recreational surfing on the Gold Coast, Queensland* (2008) used for expenditure on surfing.[204]

Methodology

Beach visits

1. Each state's total visits to the beach per year were calculated by multiplying the number of coastal visitors in each year by the average number of visits/months, both sourced from the National Coastal Safety Report.[205] The total visits to the beach for all of Australia was calculated as the sum of each state's number of visits per year. This was adjusted using TRA data to remove international and domestic tourists that engaged in surfing and visiting the beach (to avoid double counting).[206]
2. The cost per visit was sourced from a 2007 study titled *Economic and Social Values of Beach Recreation on the Gold Coast*[207] adjusted for inflation.
3. The national total expenditure on beach visits was calculated by multiplying the adjusted cost per visit by the adjusted total visits to the beach.
4. The percentage of the total population that NSW represents was multiplied by the national total expenditure on beach visits to calculate the NSW total expenditure on beach visits.[208]

Commerce and trade in and around oceans, covering trade, tourism, and related services

Boating

1. First, the number of vessels was sourced from the Transport for NSW open data hub, which has historical counts of NSW boat licences and registrations.[209] The number of vessels in coastal areas was calculated by adjusting the number of vessels by the proportion of people living in FERs along the coast of NSW.[210]
2. The number of trips per year for the average boating participant was then estimated to understand the frequency of boating participation. First, using the National Coastal Safety Report 2021, the number of frequent boaters in NSW was multiplied by the average number of yearly trips for frequent boaters, and the same was done for occasional boaters.[211] This number was divided by the total number of coastal vessels in NSW to get the average number of trips per year for a recreational boating participant.
3. Taking step 1 and step 2 together, the average number of trips per year for a boating participant multiplied by the number of coastal vessels provided the total number of trips per year in NSW.
4. To get the total expenditure, we needed an estimate of the expenditure of recreational boating participations on average. We analysed the separate expenditure on day and night trips. The cost of day trips and night trips was sourced from the *Recreational boating in the Murray-Darling Basin* study by Marsden Jacob in 2018.[212] This was adjusted for inflation. The proportion of trips that were day trips was sourced from the Transport for NSW *Recreational Boating Participation Survey*, showed that 90% of trips on NSW waterways were single-day events.[213] From this, we calculated that approximately 10% of trips are night trips.
5. The total expenditure on boating trips in NSW was then calculated by a weighted sum of day and night trips. The total number of boating trips in NSW was multiplied by the proportion of day trips and the average cost of day trips, and then added to the product of the total number of boating trips, proportion of night trips and the average cost of night trips.

Boating Licence Costs

1. Boating licence costs were not included in the above estimates. These were calculated separately by multiplying the average yearly cost of a boating licence – estimated as the cost of a 3 year boat licence in 2021 divided by 3.[214]
2. The average yearly cost of a licence was multiplied by the number of coastal vessels in NSW.

Surfing

1. The National Coastal Safety Report provides the proportion of coastal activity participants that surfed,[215] which was multiplied by NSW population data to get the total number of surfing participants.[216] This was further adjusted by the number of surfers who were frequent surfers from the same National Coastal Safety Report to consider only coastal participants.
2. The number of frequent surfers was then multiplied by the average number of trips per year to get the total trips for frequent surfers in NSW. The number of trips per year was calculated by dividing the average hours per year (as reported in the National Coastal Safety Report by 2 (assuming an average surf trip takes 2 hours).[217]
3. To get the cost per trip, the average expenditure per year for a surfing participant on surfing equipment, food and fuel per year was sourced from the *Socioeconomic Study of Recreational Surfing on the Gold Coast Queensland*.[218] This was adjusted for inflation.
4. The product of the cost per trip and total trips for frequent surfers per year provided the total expenditure related to surfing for frequent surfers each year.

Regional attribution

1. Expenditure was totalled for each activity, and was then scaled to regional populations in each year.[219]

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Other water transport support services

From the ANZSIC code 5219, which includes workforce activities such as lighterage service, navigation service, pilotage service, salvage service (marine), ship registration and agency service, towboat and tugboat operation and water vessel towing service.

Data

- Income at the national level retrieved from IBIS World, *Navigation, Towage and Services to Water Transport in Australia*.[220]
- Employment data from the ABS *Census of Population and Housing* (2021) used to attribute income regionally.[221]

Methodology

1. Income was retrieved at the national level from IBIS World.[222]
2. Since Other water transport support services aligns with ANZSIC at the four-digit level, this was able to be disaggregated to the NSW level by using the proportion of Other water transport support services employees who worked in each region according to the 2021 Census.[223]

Port and water transport terminal operations

From the ANZSIC code 5212, which includes workforce activities such as coal loader operation, container terminal operation, grain loader operation, port operation, ship mooring service, water freight terminal operation, water passenger terminal operation and wharf operation.

Data

- Income retrieved at the national level from IBIS World, *Port and Water Transport Terminal Operations in Australia*.[224]
- Employment data from the ABS *Census of Population and Housing'* (2021) used to attribute income regionally.[225]

Methodology

1. Port and water transport terminal operations data was acquired from IBIS World at the national level.[226]
2. Since port and water transport terminal operations align with ANZSIC at the four-digit level, this was able to be estimated for NSW level by using the numbers of Port and water transport terminal operations employees who worked in each region according to the 2021 Census.[227]

Shipbuilding

From the ANZSIC code 2391, which includes workforce activities involving manufacturing or repairing vessels of 50 tonnes and over displacement (whereas Boatbuilding is under 50 tonnes), as well as submarines or major components for ships and submarines not elsewhere classified. Primary activities include drydock operation, hull cleaning, ship repairing, ship wrecking, shipbuilding and submarine constructing. Income estimated to be attributable to inland regions of NSW was included in the estimate as Shipbuilding in any region is reliant on the marine estate.

Data

- Income at the national level from ABS, *Australian Industry* (2022).[228]
- Employment data from the ABS *Census of Population and Housing* (2021) used to attribute income regionally.[229]

Methodology

1. Shipbuilding income data was obtained at the national level from the ABS where income data for manufacturing is available at the four-digit ANZSIC code, 1292.[230]
2. This income data was attributed regionally by multiplying by the proportion of employees in the industry who worked in each region according to the 2021 census.[231]
3. Income estimated to be attributable to inland regions of NSW was included in the estimate. Shipbuilding, even in inland areas, can have a more direct connection to the marine sector than Boatbuilding. Large vessels produced inland may still play a significant role in maritime transportation, defence, or other marine-related activities. Thus, excluding shipbuilding from inland areas might result in an incomplete representation of the marine sector's economic impact, as these activities are relevant to its functioning and supply chain.

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Search and rescue

Includes the revenue generated from Surf Life Saving NSW, Marine Rescue NSW and Southern Region SLSA Helicopter Rescue Service Pty Ltd (Westpac Helicopter).

Data

- Income for Surf Life Saving NSW at the state level, *113th Annual Report 2019/20*.[232]
- Income for Marine Rescue NSW at the state level, *Annual Report 2019–2020*.[233]
- Income for Southern Region SLSA Helicopter Rescue Service Pty Ltd at the state level, *Annual Report* (2021).[234]

Methodology

1. Search and rescue income data was obtained from Surf Life Saving NSW, NSW Marine Rescue and Southern Region SLSA Helicopter Rescue Service Pty Ltd (Westpac Helicopter).[235,236,237] These sources provided estimates of income, which were added together, as well as expenses for the industry. It should be noted that this is likely an underestimate as it does not include water police and other government activity, which may occur along the marine estate, and it does not include income from individual surf life saving clubs due to a lack of data availability.

Water transport

From the ANZSIC code 48, which includes workforce activities related to freight and passenger transport. Water freight transport includes coastal sea freight transport service between domestic ports, freight ferry service, harbour freight transport service, international sea freight transport service between domestic and international ports, river freight transport service, ship freight management service and water freight transport service. Water passenger transport includes boat or ship charter (lease of rental) with crew for passenger transport, ferry operation (including vehicular), passenger ferry service, passenger ship management service, water passenger transport service and water taxi service. Cruises are not included and instead are captured in the tourism industry.

Data

- Income at the national level from ABS, *Australian Industry* (2022).[238]
- Employment data from ABS, *Census of Population and Housing* (2021), used to attribute income regionally.[239]

Methodology

1. Water transport data was obtained at the national level from the ABS where income data is available at the two-digit ANZSIC code.[240]
2. This income data was disaggregated to the regional level by multiplying the figures for relevant years by the number of employees in the industry who worked in each region according to the 2021 Census.[241]

Stevedoring services

From the ANZSIC code 5211, which includes workforce activities such as ship loading or unloading service and stevedoring service.

Data

- Income retrieved at the national level from IBIS World, *Stevedoring Services in Australia* (2022).[242]
- Employment data retrieved from Australian Bureau of Statistics (ABS), *Census of Population and Housing* (2021), to disaggregate data at regional level.[243]

Methodology

1. Stevedoring services income data was obtained from IBIS World at the national level.[244]
2. Since Stevedoring services aligns with ANZSIC at the four-digit level, this was able to be disaggregated to the regional level by using the number of Stevedoring services employees who worked in each region according to the 2021 Census.[245]

Commerce and trade in and around oceans, covering trade, tourism, and related services

Tourism

The value of domestic and international marine-based Tourism is estimated as the total expenditure of trips that involve marine-based activities – such as going to the beach, whale watching and scuba diving.

Data

- Income data at the regional level retrieved from Tourism Research Australia, *National and International Visitor Survey* (2022).[246]

Methodology

1. The number of visitors and length of stay for domestic overnight and international visitors was retrieved from Tourism Research Australia.[247] These were filtered by holiday as a sub-holiday reason.
2. Dividing the visitor nights by the number of visitors for each category of tourist provided the average length of stay for marine tourists. The first two steps were skipped for domestic day trip visitors as their average length of stay is 1 day.
3. We then retrieved the number of visitors to each FER each year by using filters that included visits related to marine activities only. Marine activities included going to the beach, whale or dolphin watching, fishing, scuba diving, snorkelling, water activities/sports, surfing, charter boat/cruise/ferry and visiting or staying on an island. To avoid double counting activities such as surfing that are also counted within Recreational activities other than fishing, the income captured within Recreational activities other than fishing is only counted for coastal residents participating in those activities, whereas Tourism focusses on domestic and international tourists undertaking these activities.
4. Multiplying the average length of stay for each tourist category with the total numbers of marine visitors in each FER provided the total nights/days tourists spent in NSW related to the marine estate. For domestic day trips, we used the number of marine visitors in each FER as the total days.
5. By dividing total expenditure by nights/days for each category of tourist, we were able to retrieve the average expenditure per day/night on a yearly basis.[248]
6. We then multiplied the average spend per night by the total number of nights/days that tourists spent doing marine-related activities in coastal FERs (step 4) to get the total spend.

Marinas and boating infrastructure

Activities relating to marina operations.

Data

- Income at the state level for 2016-17 from the Recreational Marine Research Centre (2017), *2016-17 Health of the Marina Industry Survey.*[249]
- Income at state level for 2020–21 retrieved from Recreational Marine Research Centre, *2021 Health of the Marina Industry Survey* (2022)[250]

Methodology

1. The NSW gross revenue for the year 2017–18 was determined by taking the gross revenue figure for NSW from the 2016-17 marinas survey (as reported) and then adjusting it for inflation.[251]
2. The gross state revenue for the year 2020–21 was obtained directly from the 2020–21 marinas survey.[252]
3. 2018–19, 2019–20 and 2021–22, which were not directly available. The NSW proportion of the gross revenue of the marinas industry in 2018–19 takes the 2020–21 NSW contribution, divides it by the national contribution in 2020–21, and then multiplies the result by the national contribution in 2018–19. This provides a scaled estimate of the NSW contribution to the marinas industry for 2018–19, taking into account the broader national context.
4. The figures for the years 2019–20 and 2021–22 were estimated based on historical data of the NSW gross revenue from earlier years. For instance, the data for 2019 was calculated using values from 2018 and 2020, and a similar method was used for estimating the figures for 2022. This approach was employed to account for any changes or variations in the data from one year to the next when making projections for future years.

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Defence

Naval defence industry activities in NSW.

Data

- Income was retrieved for Naval defence revenue and outputs at the national level from the Australian Government Defence, Annual Report (2020)[253]
- Employment data retrieved from ABS, *Census of Population and Housing* (2021), to disaggregate data at state level.[254]

Methodology

1. The primary data source for Defence activity was the annual report, using Naval defence outputs and revenue from other sources to determine national income.[255]
2. To estimate the NSW proportion of activity, the NSW share of Naval defence workforce employment was applied to the national figures (including both reserves and permanent workers). This was contained in the same annual report. Due to limited data availability, regional economic contribution for Defence was not able to be calculated.
3. Part of the direct value added of the Shipbuilding industry is income generated by the indirect value added of Defence – its expenditure on Shipbuilding. So, to avoid double counting, we remove the share of Defence's intermediate expenditure that goes to Shipbuilding in the Deloitte Access Economics IO model.

Marine estate management

Funding for the Marine Estate Management Strategy. This includes a range of activities funded by the strategy such as habitat restoration, spatial management, initiatives to improve water quality and planning for climate change.

Data

- Income provided at the state level by DPI.

Methodology

- Income for marine estate management was provided by DPI. It should be noted that additional spending on the NSW marine estate was not reflected in the economic contribution results, with 204 coastal and estuary grants awarded to local governments from 2016–2020 through the Coastal and Estuary Grants Program. These funds have not been included in this analysis due to the challenges associated with attributing grants.

Sewerage and drainage

Portion of wastewater attributable to the sewerage and drainage industry within NSW.

Data

- Income retrieved at the national level from IBIS World, *Sewerage and Drainage Services in Australia* (2022).[256]
- ABS, *Water Account, Australia* (2022) used to adjust the portion of wastewater attributable to the industry.[257]
- Employment data retrieved from Australian Bureau of Statistics (ABS), *Census of Population and Housing* (2021), to disaggregate data at state level.[258]

Methodology

1. The Sewerage and drainage national data was initially sourced from IBIS World at the national level.[259]
2. Subsequently, the national data was further refined using census employment data from the ABS to attribute income at the state level, considering employment along coastal FERs only.[260] The premise here is that employment data serves as an indicative measure of the presence of the sewerage and drainage industry within NSW.
3. However, it's important to acknowledge that this approach, while valuable, is an estimation of economic activity and carries inherent limitations. It may not fully capture all the intricacies of economic contribution and regional variations within the industry. The results were also adjusted to attribute revenue only attributable to marine activities. This adjustment was based on facility location and treatment levels at each facility, with an assumption from the ABS 'Water Account' that 87% of these activities were coastal, considering discharge volume limits (ML/day).[261] The outfall volume directly correlates with the volume of wastewater discharged, providing insights into the industry's operational scale. This measure can offer a reasonable indication of the environmental impact and utilisation; however it's important to note that outfall volume may not accurately reflect the full scope of economic activity or its impact on coastal regions.

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Scientific research

Research conducted by a NSW research institution or with NSW origin under the ARC's and FRDC's grants related to the NSW marine estate.

Data

- Income retrieved at the state level from the Australian Research Council, ARC Data portal: Grants Search (2023).[262]

Methodology

1. Scientific research income was estimated using data provided by the Australian Research Council (ARC) and Fisheries Research and Development Corporation (FRDC) grant.[263] Only research conducted by an NSW research institution or with NSW origin is included in this analysis to capture contributions to the NSW economy. Search terms, such as 'marine', 'estuary' and 'coast', were used to identify projects that are likely facilitated by the NSW marine estate. For projects that span over multiple years, grant funding was evenly distributed across each year it was active. The NSW marine estate supports education activities through enabling marine discovery centres, school excursions, and field courses.
2. Due to data unavailability, income from education has not been captured in this analysis.

Source: Deloitte Access Economics

APPENDIX D

Economic contribution methodology

D.1 Value added

Value added is one measure used to quantify the economic contribution of marine industries in this report. This section outlines in further detail how value added is calculated.

Value added measures the value of outputs (goods and services) generated by the entity's factors of production (labour and capital) and is measured as the income to those factors of production. The sum of value added and net taxes on products across all entities in the economy equals GSP.

For further clarity, the accounting framework used to evaluate economic activity, along with the components that make up gross output, is shown in Figure D.1.

Figure D.1 Economic activity accounting framework

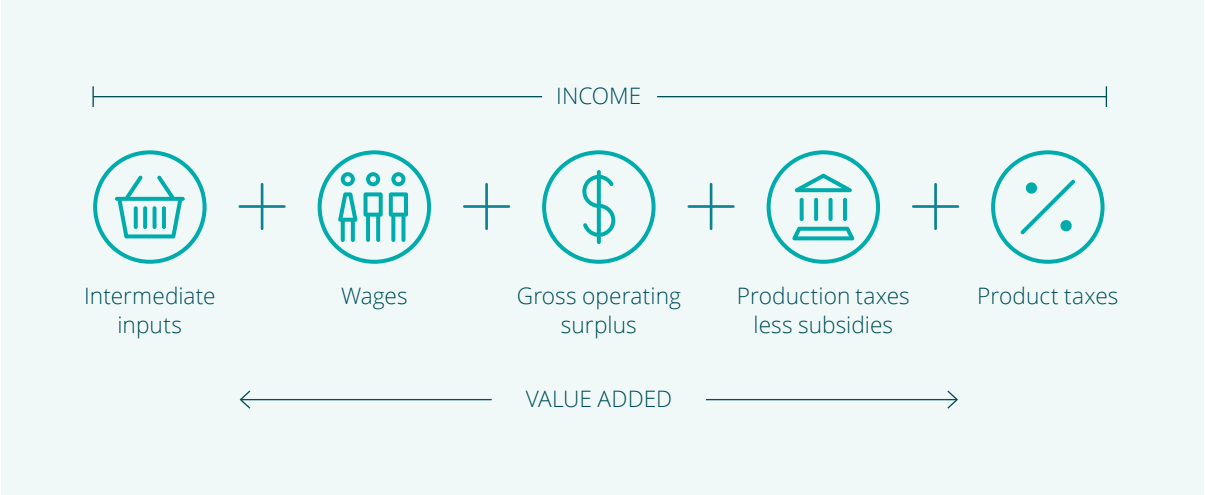

Figure D.1 shows the accounting framework used to evaluate economic activity, along with the components that make up gross output. Gross output is the sum of value added and the value of intermediate inputs. Value added can be calculated directly by adding the payments to the primary factors of production, labour (i.e. salaries) and capital (i.e. GOS, or profit), as well as production taxes less subsidies. The value of intermediate inputs can also be calculated directly by adding up expenses related to non-primary factor inputs. For example, the value of intermediate inputs for the Commercial fishing industry includes all costs of goods and services paid to suppliers, such as suppliers of fishing equipment and baits.

D.2 Estimating the direct and indirect economic contribution

The value added contributed by the NSW marine estate is broken down to two elements – direct value added, and indirect value added.

- The direct economic contribution is a representation of the flow from labour and capital in the company. This is the portion of industry value add which is directly attributable to demand for an industry. Direct value added is the value of the economic activities of marine industries – for example, the value of the Shipbuilding industry. The total direct value added of all of the NSW marine industries can be used to compare the economic significance of the NSW marine estate to the state's economy and other industries, such as agriculture.
- The indirect contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by the direct economic activity of an industry. This is the portion of industry value add which is generated as a consequence of demand for other industries. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using ABS IO tables which report the inputs and outputs of specific sectors of the economy (ABS 2021).[264] Indirect value added is the value of upstream economic activities that are induced by marine industries – for instance, the production of fishing equipment and bait are upstream activities of the Commercial fishing industry.

In this analysis, estimation of the indirect contribution has been adjusted to ensure there is no double counting when totalling economic contribution results across industries. For instance, a portion of the income of the Shipbuilding industry comes from Defence – to avoid double counting when adding the Defence and Shipbuilding contribution result, the indirect contribution of Defence to Shipbuilding is removed from calculation in the IO model.

The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

D.3 Input-output analysis

Input-output (IO) tables are required to analyse intermediate flows between sectors and calculate the relationship between total and direct activity generated by a sector. These tables measure the direct economic activity of every sector in the economy at the national level. Importantly, these tables allow intermediate inputs to be further broken down by source. For example, these tables show how much the Commercial fishing industry purchases from upstream suppliers such as bait production and fishing net production. These detailed intermediate flows can be used to derive the total change in economic activity associated with a direct change in activity for a given sector.

The IO matrix used for Australia is published at the national level in the ABS IO tables (2021).[265] The industry classification used for IO tables is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC), with 114 sectors in the modelling framework. This matrix is employed in the Deloitte Access Economics Regional Input Output Model (DAE-RIOM) to estimate contribution at the sub-national level, which requires in-house IO table decomposition toolsets. To adjust the national IO tables into state level IO tables, we assume that businesses across all regions in Australia have Leontief production functions – each firm consumes inputs in fixed proportions within an industry. Therefore, a gravity model of trade between regions can be used to estimate regional economic production by combining IO production functions for each industry with ABS Census place of work data. While the production profile remains constant, the total versus direct effect differential will vary across regions as it is dependent on the level of supply industry activity in that region.

References

Executive summary

1. Sweeney Research. (2014). Marine Estate Community Survey Final Report; DPI and Ipsos (2022). NSW marine estate community wellbeing survey report. Visitors to Coastal NSW (Wave 1); DPI and Ipsos (2022). NSW marine estate community wellbeing survey report. Coastal residents of NSW (Wave 1); DPI and Ipsos (2022). NSW marine estate community wellbeing survey report. Coastal Youth of NSW (Wave 1); DPI and Ipsos ATSIRU (2022). NSW marine estate community wellbeing report. Connections to Sea Country – Aboriginal people of coastal NSW (Wave 1).
2. NSW Government. (2023). Marine Integrated Monitoring Program.
3. NSW Government. (2017). NSW Marine Estate Threat and Risk Assessment.
4. NSW Government. (2018). NSW Marine Estate Management Strategy 2018-2028.
5. Deloitte Access Economics. (2016). Economic and social value of improved water quality at Sydney's coastal beaches.

Introduction

6. NSW Government. (2014). Marine Estate Management Act 2014 No 72
7. Department of Infrastructure, Transport, Regional Development, Communications and the Arts. (2021). Imports and Exports.
8. DPI and Ipsos (2022). NSW marine estate community wellbeing survey report. Visitors to Coastal NSW (Wave 1); DPI and Ipsos (2022). NSW marine estate community wellbeing survey report. Coastal residents of NSW (Wave 1); DPI and Ipsos (2022). NSW marine estate community wellbeing survey report. Coastal Youth of NSW (Wave 1); DPI and Ipsos ATSIRU (2022). NSW marine estate community wellbeing report. Connections to Sea Country – Aboriginal people of coastal NSW (Wave 1).
9. NSW Government. (2018). The NSW Marine Estate Management Strategy.
10. Organisation for Economic Co-operation and Development. (2016). The Ocean Economy in 2030.
11. United Nations. (2021). The Second World Ocean Assessment.
12. Australian Government. (2020). The AIMS Index of Marine Industry.
13. World Bank Group and United Nations. (2018). The Potential of the Blue Economy Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries.
14. NSW Government. (2018). NSW Marine Estate Management Strategy 2018-2028.
15. Deloitte Access Economics. (2016). Economic and social value of improved water quality at Sydney's coastal beaches.
16. Australian Conservation Foundation. (2022) The nature-based economy – How Australia's prosperity depends on nature.

Chapter 2

17. Destination NSW. (2020). Economic Contribution of Tourism to NSW 2019–20
18. Australian Bureau of Statistics. (2021). Australian National Accounts: Input-Output Tables

19. The Australian Institute of Marine Science. (2023). The AIMS Index of Marine Industry.
20. ABS. (2021).
21. Centre of Economic and Regional Development. (2018). Northern Rivers Regional Economic Development Strategy. NSW Government.
22. Centre of Economic and Regional Development. (2018). Clarence Valley Regional Economic Development Strategy. NSW Government.
23. Centre of Economic and Regional Development. (2018). Coffs Coast Regional Economic Development Strategy. NSW Government.
24. Centre of Economic and Regional Development. (2018). Hastings-Macleay Regional Economic Development Strategy. NSW Government.
25. Centre of Economic and Regional Development. (2018). Mid Coast Regional Economic Development Strategy. NSW Government.
26. Centre of Economic and Regional Development. (2018). Hunter Regional Economic Development Strategy. NSW Government.
27. Centre of Economic and Regional Development. (2018). Central Coast and Lake Macquarie Regional Economic Development Strategy. NSW Government.
28. Centre of Economic and Regional Development. (2018). Shoalhaven Regional Economic Development Strategy. NSW Government.
29. Centre of Economic and Regional Development. (2018). Far South Coast Regional Economic Development Strategy. NSW Government

Chapter 3

30. ABC News. (2020). South Coast NSW tourism industry recovering from devastating bushfire blow.
31. ABS. (2021). One year of COVID-19: Aussie jobs, business and the economy.
32. ABS. (2023). Government Finance Statistics, Australia.
33. Department of Defence. (2018). Naval Shipbuilding Plan.
34. NSW Planning. (2022). Population and Dwelling Projections.
35. Commonwealth of Australia. (2021). Australia State of the Environment: Marine.
36. Sydney Water. (2022). Annual Report 2021–22.
37. IBISWorld. (2021). Port and Water Transport Terminal Operations in Australia.
38. Wotton, Keatney. (2023). Russian sanctions - the implications for marine insurers.
39. Port of Newcastle (2023). Clean Energy Precinct.

Port of Newcastle case study

40. Port of Newcastle. (2021). History & Heritage,
41. Port of Newcastle. (2023). About the Port.
42. Port of Newcastle. (2023). Careers.
43. Port of Newcastle. (2019). Port Master Plan 2040.
44. Port of Newcastle (2023). Clean Energy Precinct.
45. Port of Newcastle. (2021). University and Port to strengthen region's future.
46. Port of Newcastle. (2023). Port of Newcastle commits to global hydrogen partnership.

Chapter 3 (continued)

47. IBISWorld. (2023). Shipbuilding and Repair Services in Australia.
48. IBISWorld. (2023). Marine Equipment Retailing in Australia.
49. IBISWorld. (2023). Retirement and Retirement Intentions, Australia.
50. IBISWorld. (2023). Navigation, Towage and Services to Water Transport in Australia.
51. Anthony Segaert. (2022). Cruise ships back in Sydney Harbour after two-year COVID ban lifted. SMH.
52. Destination NSW. (2021). Domestic travel to NSW Visitor Profile. Year ended June 2021.
53. Byron Shire Council. (2020). Tourism Resilience Discussion Paper.
54. Marina Industries Association. (2021). 2021 Health of the Australian Marina Industry Survey.
55. Marine Business News 2022, Supply chain challenges continue severely affecting builders.
56. Australian Institute. (2023). Real Wages Fell 4.5% in 2022; Largest Fall on Record as Rate Rises Risk Recession
57. KPMG International. (2022). Top risks facing the oil and gas industry in 2022.
58. NSW Government. (2022). Wind energy.
59. NSW Government. (2023). Population insights.
60. Business NSW. (2022). Workforce Skills Survey.
61. Sydney Morning Herald. (2022). Why Sydney's hospitality industry still struggles for staff.
62. NSW Government. (2023).
63. Ports Australia. (2019). The Effectiveness of the Current Temporary Skilled Visa System in Targeting Genuine Skills Shortages.
64. Davis, T. R. (2022). Extreme flooding and reduced salinity causes mass mortality of nearshore kelp forests.
65. NSW Environment Protection Authority. (2021). NSW State of the Environment 2021.
66. The Conversation. (2020). Ah shucks, how bushfires can harm and even kill our delicious oysters.
67. Sydney Morning Herald. (2020). 'People aren't stupid': bushfire crisis scorches Australia's image
68. United Nations Framework Convention on Climate Change. (2021). Ocean and climate change dialogue to consider how to strengthen adaptation and mitigation action
69. NSW Environment Protection Authority. (2021).
70. Scott Bennet et al. (2015). The 'Great Southern Reef': social, ecological and economic value of Australia's neglected kelp forests.
71. Department of Primary Industries. (2023). Tilapia.

Chapter 4

72. Organisation for Economic Co-operation and Development. (2016). The Ocean Economy in 2030; Commonwealth of Australia. (2021). Australia State of the Environment: Marine.
73. World Economic Forum (2023). Global Risks Report 2023.
74. NSW Marine Estate Management Authority. (2017). NSW Marine Estate Statewide Threat and Risk Assessment.
75. ABC News. (2020). These waters off Tasmania's east coast are warming up to four times faster than global average.
76. Department of Climate Change, Energy, the Environment and Water. (2021)
77. National Marine Science Committee. (2015)
78. Climate Council (2018). Icons at risk: Climate change threatening Australian tourism.
79. Department of Climate Change, Energy, the Environment and Water (2023), Sustainable Ocean Plan.
80. Department of Climate Change, Energy, the Environment and Water. (2022). Australia Endorses International Ocean Conservation Pledge.

81. Australian Government. (1999). Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
82. NSW Government. (2022). NSW Blue Carbon Strategy 2022-2027.
83. NSW Government. (2022). NSW Climate Change Adaption Strategy.
84. NSW Government. (2023). Blue economy.
85. NSW Government. (2023). Oyster reef restoration.
86. NSW Government. (2022). Aquatic biodiversity offsets.
87. MacDonald, Lucy. (2023). Macquarie Island marine park set to almost triple in size. ABC
88. NSW Department of Primary Industries. (2023). Zones.
89. University of Technology. (2023). Unlocking riches through sustainable desalination.
90. Deloitte and Geoscience Australia. (2021). The value of Australian seabed mapping data to the blue economy.
91. Ibid.
92. Institute of Marine Engineering, Science & Technology. (2022). Challenges in the Marine Industry: 2023 and beyond.
93. CSIRO. (2022). Using satellite data to unlock water quality knowledge.
94. IMOS. (2022). Sea Surface Temperature Products.
95. Prime Minister, Minister for Climate Chane and Energy. (2022). Australia Legislates Emissions Reduction Targets
96. Leading Edge Energy. (2022). The timeline for coal exit in Australia's power generation fleet
97. McKinsey & NielsenIQ. (2023). Consumers care about sustainability – and back it up with their wallets
98. Boston Consulting Group. (2021). Food for Thought.
99. Treasury. (2023). Climate-related financial disclosure. Consultation paper.
100. McKinsey. (2021). A blueprint for scaling voluntary carbon markets to meet the climate challenge
101. Scottish Parliament. (2021). Out of the blue: Is blue carbon the next frontier for climate change migration in Scotland?
102. UN Environment Program. (2023). Sustainable Blue Finance
103. Nature Positive. (2023). A Global Goal for Nature.
104. TNI. (2023). Blue Finance: How much debt can the ocean sustain?
105. Food and Agriculture Organization of the United Nations. (2022). The State of World Fisheries and Aquaculture
106. Bilal Ahmad et al. (2023). Efficacy of acidified phytase supplemented cottonseed meal based diets on growth performance and proximate composition of Labeo rohita fingerlings. 83 Brazilian Journal of Biology 1
107. FRDC. (2023). Seaweed Aquaculture in Australia.
108. Vicky Lam et al. (2016) Projected change in global fisheries revenues under climate change. 6 Scientific Reports 1
109. FRDC. (2018). Models are providing researchers with predictive capability into the effect of climate change on Australia's fisheries with implications for fisheries management
110. Rosamond Naylor et al. (2021). Blue food demand across geographic and temporal scales. 12 Nature Communications 5413.
111. Christopher Free et al. (2022). Expanding ocean food production under climate change. 605 Nature 490
112. Food and Agriculture Organization of the United Nations (n 105)
113. Ibid.
114. Department of Agriculture, Fisheries and Forestry. (2012). Aquaculture industry in Australia
115. Australian Compeitition and Consumer Commission. (2021). Container stevedoring monitoring report 2021–22
116. NSW Planning. (2022). Population and Dwelling Projections.
117. The Treasury. (2021). Intergenerational report: Australia over the next 40 years.
118. NSW Planning. (2022). Population and Dwelling Projections.

119. IBIS World. (2023). Domestic Freight Task – Australia.
120. Transport for NSW. (2022). Future Transport Strategy.
121. NSW Ports. (2019). 2019–2023 Port Development Plan.
122. Ibid.
123. NSW Marine Estate Management Authority. (2017). NSW Marine Estate Statewide Threat and Risk Assessment
124. The Treasury. (2021). Intergenerational report: Australia over the next 40 years.
125. Geoscience Australia. (2023). Coastal Erosion.
126. International Monetary Fund. (2023). Recovery Unabated Amid Certainty.
127. McKinsey. (2019). Asia's future is now.
128. Destination NSW. (2023). Destination NSW appoints new Country Manager for India.
129. Travel Weekly. (2023). Calls for a third cruise terminal as experts estimate '23 season could generate $2bn for NSW economy.
130. CSIRO. (2023). Catalysing Australia's Biosecurity
131. Bradshaw, Corey. (2021). Detailed assessment of the reported economic costs of invasive species in Australia. 67 NeoBiota 511.
132. S&P Global Market Intelligence. (2022). IHS Global Market Trade Atlas (GTA).
133. UNCTAD. (2021). Advancing the potential of sustainable ocean-based economies: trade trends, market drivers and market access
134. Department of Agriculture, Fisheries and Forestry. (2019). Non-tariff measures affecting Australian agriculture.
135. Department of Primary Industries. (2023). Breeding disease-resistant Sydney rock oysters
136. United States Studies Centre. (2023). USSC Insights: AUKUS Will Be One of the Most Ambitious Defence Pacts in History
137. The Australian Institute of Marine Science. (2023). The AIMS Index of Marine Industry.

Conclusion

138. World Economic Forum (2023). Global Risks Report 2023.
139. NSW Government (2023) Threat and risk assessment.
140. NSW Government (2023) Marine integrated monitoring program.

Appendices

141. NSW Government. (2021). Regional Economic Development Strategies.
142. World Bank Group and United Nations (2018). (n 13)
143. Ibid.
144. OECD (2016) (n 10)
145. United Nations. (2021). The Second World Ocean Assessment
146. Deloitte Access Economics. (2021). The AIMs Index of Marine Industry 2020. Australian Institute of Marine Science.
147. Deloitte Access Economics (2017). The economic contribution of South Australia's marine industries. Department of Primary Industries and Regions South Australia.
148. Deloitte Access Economics. (2017). At what price? The economic, social and icon value of the Great Barrier Reef. The Great Barrier Reef Foundation.
149. PwC. (2015). The economic contribution of the Australian maritime industry. Australian Shipowners Association.

150. URS Australia. (2007). Assessing the value of coast to Victoria. Department of Sustainability and Environment.
151. The Allen Consulting Group. (2004). The economic contribution of Australia's marine industries. The National Oceans Office.
152. Deloitte Access Economics. (2021) (n 90)
153. OECD (2016) (n 10)
154. Intergovernmental Panel on Climate Change. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press
155. Australian Tourism Export Council. (2020). Bushfire Impact ATEC Member Survey
156. Alan Campbell et al. (2013). Review of the 2012 paralytic shellfish toxin event in Tasmania associated with the dinoflagellate alga, Alexandrium tamarense. Fisheries Research and Development Corporation.
157. Deloitte Access Economics. (2016). Economic and social value of improved water quality at Sydney's coastal beaches
158. OECD (2016) (n 10)
159. Australian Bureau of Statistics (ABS). (2021). Census of Population and Housing.
160. The Australian Institute of Marine Science (2023) (n 19)
161. BDO. (2022). Economic and Social Indicators for New South Wales Commercial Fisheries in 2019/20.
162. NSW Government (2021) (n 141)
163. ABS (2021) (n 159)
164. Department of Primary Industries. (2022). Aquaculture Production Report 2021–22.
165. ABS (2021) (n 159)
166. Department of Primary Industries. (2022. (n 164).
167. ABS (2021) (n 159)
168. Australian Bureau of Statistics (ABS). (2023). Australian Industry
169. ABS (2021) (n 159)
170. ABS (2023) (n 168)
171. ABS (2021) (n 159)
172. Australian Bureau of Agricultural and Resource Economics. (2022). Australian Fisheries and Aquaculture Statistics 2021
173. Department of Agriculture and Water Resources. (2018). Australian fisheries and aquaculture statistics
174. ABS (2021) (n 159)
175. ABARES (2022) (n 172)
176. Department of Agriculture and Water Resources (2018) (n 173)
177. ABS (2021) (n 159)
178. IBIS World. (2022). Marine Equipment Retailing in Australia
179. ABS (2021) (n 159)
180. IBIS World (2022) (n 178)
181. ABS (2021) (n 159)
182. Department of Agriculture, Fisheries and Forestry (2001). The 2000-01 National Recreational Fishing Survey Economic Report.
183. Department of Primary Industries. (2020). NSW Recreational Fisheries Monitoring Program Survey of recreational fishing 2019–20.
184. Department of Agriculture, Fisheries and Forestry. (2003). The National Recreational and Indigenous Fishing Survey (NRIFS).
185. Tourism Research Australia. (2021). National and International Visitor Survey.

186. Department of Agriculture, Fisheries and Forestry (2001). (n 182)
187. Department of Agriculture, Fisheries and Forestry. (2003) (n 183)
188. Department of Agriculture, Fisheries and Forestry. (2003) (n 184).
189. Tourism Research Australia. (2021) (n 185)
190. Ibid.
191. IBIS World. (2022). Sydney Desalination Plant Pty Limited.
192. Ibid.
193. ABS (2023) (n 168)
194. Ibid.
195. Surf Life Saving Australia. (2021). National Coastal Safety Report 2021
196. Tourism Research Australia. (2021) (n 185)
197. ABS (2021) (n 159)
198. Mike Raybould and Neil lazarow. (2007). Economic and social values of beach recreation on the Gold Coast'
199. Transport for NSW. (2018). Recreational boating participation survey.
200. Transport for NSW. (2022). NSW Boat Registrations and Licences. Transport Open data Hub and Developer Portal.
201. NSW Planning. (2022). (n 34)
202. Marsden Jacob. (2018). Recreational boating in the Murray-Darling Basin
203. Watercraftzone. (2021). Jet Ski and PWC licence fees in Australia, how every state compares.
204. Gold Coast City Council. (2008). A socio-economic study of recreational surfing on the Gold Coast, Queensland.
205. Surf Life Saving Australia. (2021). (n 195)
206. Tourism Research Australia. (2021) (n 185)
207. Mike Raybould and Neil lazarow. (2007). (n 198)
208. ABS (2021) (n 159)
209. Transport for NSW. (2022) (n 200)
210. NSW Planning. (2022). (n 34)
211. Surf Life Saving Australia. (2021). (n 195)
212. Marsden Jacob. (2018). (n 202)
213. Transport for NSW. (2018) (n 199)
214. Watercraftzone. (2021). (n 203)
215. Surf Life Saving Australia. (2021). (n 195)
216. ABS. (2021). (n 159)
217. Surf Life Saving Australia. (2021). (n 195)
218. Gold Coast City Council. (2008). (n 204)
219. ABS. (2021). (n 159)
220. IBIS World. (2022). Navigation, Towage and Services to Water Transport in Australia.
221. ABS. (2021). (n 159)
222. IBIS World. (2022). (n 220)
223. ABS. (2021). (n 159)
224. IBIS World. (2021). Port and Water Transport Terminal Operations in Australia.
225. ABS. (2021). (n 159)
226. IBIS World. (2021). (n 224)
227. ABS. (2021). (n 159)

228. ABS. (2023). (n 168)
229. ABS. (2021). (n 159)
230. ABS. (2023). (n 168)
231. ABS. (2021). (n 159)
232. Surf Life Saving New South Wales. (2022). 115th Annual Report 2021/2022
233. Marine Rescue New South Wales. (2022). Annual Report 2021–22
234. Southern Region SLSA Helicopter Rescue Service Pty Ltd. (2022). Annual Report
235. Surf Life Saving New South Wales. (2022). (n 232)
236. Marine Rescue New South Wales. (2022). (n 233)
237. Southern Region SLSA Helicopter Rescue Service Pty Ltd. (2022). (n 234)
238. ABS. (2023). (n 168)
239. ABS. (2021). (n 159)
240. ABS. (2023). (n 168)
241. ABS. (2021). (n 159)
242. IBIS World. (2022). Stevedoring Services in Australia.
243. ABS. (2021). (n 159)
244. IBIS World. (2022). (n 242)
245. ABS. (2021). (n 159)
246. Tourism Research Australia. (2021) (n 196)
247. Ibid.
248. Ibid.
249. Recreational Marine Research Centre (2017). 2016-17 Health of the Marina Industry Survey.
250. Marina's Industry Association. (2021). Health of the Marina Industry Survey
251. Recreational Marine Research Centre (2017). (n 249)
252. Marina's Industry Association. (2021). (n 250)
253. Australian Government Defence. (2020). Annual Report
254. ABS. (2021). (n 159)
255. Australian Government Defence. (2020). (n 253)
256. IBIS World. (2022). Sewerage and Drainage Services in Australia.
257. Australian Bureau of Statistics. (2022). Water Account, Australia.
258. ABS. (2021). (n 159)
259. IBIS World. (2022). (n 256)
260. ABS. (2021). (n 159)
261. ABS. (2022). (n 257)
262. Australian Research Council. (2023). ARC Data portal: Grants Search.
263. Ibid.
264. ABS (2021) (n 18).
265. Ibid.

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