New Zealand Cruise Impact Research

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Authors:	Lawrence McIlrath (Director)
	Mobile: 021 042 1957
	Email: lawrence@me.co.nz
	Tilly Erasmus
	Email: tilly@me.co.nz
	Hannah Ashby
	Email: hannah@me.co.nz

www.me.co.nz

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15/10/2024	Draft v1.0	
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Executive Summary

The global cruise industry is substantial, with approximately 32 million people cruising by 2023. The global sector is recovering well with passenger numbers continuing to rise past pre-Covid levels and the growth outlook is positive. The New Zealand cruise market is lagging the international recovery, and the outlook is not as positive. After a strong 2023/24 season, the New Zealand cruise market is showing signs of contracting with anticipated short-term port visits and passenger numbers down.

This study aims to build on existing knowledge of the New Zealand cruise sector to better understand its wider (net) value. The research applies various tools to look at the cruise sector's wider values, including the economic, environmental, social and cultural dimensions.

Context

The global cruise sector is highly concentrated, dominated by three companies[1]. These cruise lines hold substantial market shares and influence over global operations, and routes. The cruise sector operates with a fixed number of ships that service passengers usings pre-planned itineraries and capacity is difficulty to adjust over the short-term. Cruise lines use itineraries to optimise financial returns and to optimise yield levels across the fleet. Cruise lines may cancel itineraries or keep ships idle to avoid sailing with low occupancy, but this is costly. Cruise lines do have some flexibility in adjusting their itineraries to match consumer demand trends. Areas of high demand can see premium prices for certain itineraries, especially if there is a 'scarcity effect' (limited tickets due to limited deployments to those areas). Nevertheless, the cruise sector operates within the boundaries of supply constraints. The industry adapts by strategically adjusting prices, itineraries, and marketing efforts to maximise occupancy and match consumer interest to their relatively inflexible supply.

The top three global destinations are the Caribbean, Mediterranean, and Europe. These areas attract 70% of global cruisers. The Australia, New Zealand, and Pacific market is relatively small, accounting for 2% to 4% of the global market – around 1.3m to 1.4m passengers. Cruise lines use sophisticated tools to track demand patterns across locations (origin and destination), seasons, and business cycles to optimise vessel deployment. Itineraries are typically planned two years ahead, reflecting cruise lines' response to trends and market conditions.

As part of the global maritime sector, the cruise sector is regulated by both the International Maritime Organisation (IMO), as outlined in the International Convention for the Prevention of Pollution from Ships (MARPOL), and through legislation and regulations administered by maritime authorities in destination markets. In addition, cruise activity is also regulated by country-level statutes.

Like many industries, the cruise sector is facing intensifying pressure to evolve, particularly in addressing its environmental footprint and its social and cultural impacts on local communities. According to the sector[2], it is responding by committing to achieve carbon neutrality by 2050, implementing alternative fuels and adopting sustainable practices in its operations. Capacity constraints experienced at global destinations are giving rise to increased pressure from those communities. Notably, affected communities generally do not call for an end to cruise tourism; rather, they advocate for measures to manage visitor numbers to minimise disruptions and manage infrastructure pressures.

Cruise sector in New Zealand

New Zealand is often referred to as a 'bucket list' destination, with outstanding natural landscapes seen as a significant drawcard. However, the local cruise sector is a small part of the global industry, attracting less than 1% of passengers. During the 2023/24 season, 54 individual vessels visited New Zealand, making more than

[1] Carnival Corporation and plc, Royal Caribbean Group, and Norwegian Cruise Line Holdings.
[2] Information provided by Cruise Line Industry Association (CLIA).

1,000 port calls. Forecasts indicate a decline during the current (2024/25) season, with 46 vessels scheduled to make fewer than 900 port calls.

Despite a positive outlook for the global cruise sector, current patterns and projections suggest that the New Zealand cruise market is facing a decline in the short-term. Changing conditions and cruise ship deployments are driving the changes. According to cruise line representatives, New Zealand is becoming increasingly expensive and uncompetitive from an operational perspective. Ultimately, the decision to deploy a vessel (or vessels) to a region is based on the ability to generate a suitable yield. The challenges include changes in the regulatory landscape, particularly the speed of implementation, and perceived limited responsiveness during engagement processes.

2023/24 season economic benefits to New Zealand

Total cruise spending in New Zealand for the 2023/24 season was estimated at $648m (excl. GST and fuel), which includes spending by passengers, crew, and vessels. The economic analysis estimates the direct and indirect GDP at $572m, thereby supporting 8,790 jobs in the economy, including the wider linkages and flow-on impacts increases this to $800m, supporting 11,935 jobs.

Total GDP numbers from cruise tourism in New Zealand is a well-understood measure of cruise tourism's economic impact. Crucially, the sector's effects go beyond the 'GDP and employment' impacts, but these wider effects are positive and negative and not as well understood as the economic impacts.

We used a literature review as well as interviews to identify and explore the wider effects. Methods to estimate the maritime sector's air emissions are reasonably advanced with usable industry ratios published by the likes of the IMO. This is unfortunately not the case for the cruise sector (a sub-sector of the maritime sector). Using available information, we estimate the cruise sectors' total emissions[3] during the 2023/24 season as 904,780 tonnes of CO_2-equivalent (CO_2-e). Using the Shadow Price of Carbon (SP-C) values the 2023/24 season's emissions at between $64.5m and $129m.

The cruise sector also has a range of other environmental, social, and cultural effects that are location-specific and nuanced. A standard approach to quantify or monetise these effects is not available. Further, the direction of effects (positive or negative) is often subjective, based on how a person views the sector and the effects. We use a multi-criteria assessment (MCA) structure to generate insights into these effects. We use different weights to emphasise different perspectives (i.e., a perspective that favours the environmental considerations, or a perspective that assigns more importance to economic matters[4]). Essentially, the approach mimics alternative views (and value sets). The different weights are integrated into the assessment to show how the results would change if different value sets (more or less importance) were applied. For example, a more environmental perspective assigns more weight to the potential effects of environmental effects associated with emissions, seabed disturbance, potential for mammal-strike, impacts on the marine environment from wash water discharge[5], or biofouling events (incursion). The MCA approach is useful because it helps to provide insights into relative importance of matters that are difficult (or inappropriate) to express in qualitative or monetary terms.

[3] This includes emissions from domestic cruising, time spent in port, shore excursions, and a partial allocation of international voyage emissions.
[4] This process is described in Section 3.1.
[5] The discharge of water used in exhaust gas cleaning systems.

Values and outlook

The cruise sector is assessed using three growth scenarios and six pathways within an MCA framework[6]. The growth scenarios capture sectoral growth, whereas the pathways show different events or potential changes. The three growth scenarios are:

- Scenario 1: A low-growth scenario that reflects the downsizing from 2023/24 to 2024/25, followed by stabilisation at this level. The long-term trend presents continued rationalisation with a slow 0.5% annual decline, indicating a restrained growth outlook.
- Scenario 2: A moderate growth profile that includes a five-year recovery, exhibiting passenger numbers approaching those seen in 2023/24, and then annual growth of 1.5% per year over the medium- and long-terms.
- Scenario 3: A robust recovery over a three-year period followed by sustained growth of 2.2% annually. This scenario shows a higher growth scenario that is unrestrained relative to recent trends.

In addition, six pathways are considered.

These pathways are:

- a shift to green technology,
- uptake of shore power,
- a focus on boutique cruising,
- fleet changes towards megaships,
- a maritime disaster (e.g., sinking of a vessel), and
- a biosecurity incursion.

The growth scenarios are combined with the six pathways, to show the effects under different scenarios. The MCA reveals the tensions between economic elements and environmental elements. Additionally, it demonstrates a close relationship between the social and cultural elements and both the economic and environmental elements. However, the economy-environment tensions dominate the results.

The core tensions and observations are:

- Higher growth in the cruise sector brings economic benefits, but these are tempered by environmental and social concerns, especially when cruise activity is concentrated (for example, when there is a move towards megaships). The concerns cover infrastructure pressures, congestion, disruption and so forth.
- Transitioning to green technology and shore power can reduce emissions and improve the sector's environmental impact, though infrastructure investment and renewable energy sources are crucial for long-term benefits. Improving the environmental credentials also impacts social cohesion and cultural values.
- Growing the megaship segment has positive effects on the economy (GDP and jobs), but it also raises the risks of overcrowding, damage to the environment, and social unrest, which lowers this pathway's overall score and relative position. In addition, risks around maritime or biosecurity incidents are also elevated relative to baseline values.
- The results could be different depending on which value set (lens) is used and how much weight is given to a certain aspect (economic, environmental, social, or cultural).

In terms of the cruise sector's costs and benefits, data availability limits the ability to capture all these effects. A key challenge is that many of the cruise sectors' costs cannot be quantified. Available information suggests that the benefits (new money flowing to New Zealand) outweigh the costs (emissions, cost of resources used,

[6] The framework has 37 criteria, and the underlying weights are changed to deliberate bias toward certain viewpoints (economic, environmental, social or cultural).

labour costs) with the annual[7] net positive in the order of $90m to $185m. Crucially, these estimates do not reflect environmental or cultural risks. Further targeted research is needed to understand the size (and value) of these risks.

While the short- and medium-term growth outlook for the New Zealand cruise sector is uncertain, the economic value of the spending the sector facilitates can be estimated. Under the low growth scenario, the sector's direct and indirect GDP is estimated at $5.9bn (present value @5%, 30 years), increasing to $15.2bn under the medium growth scenario. The high-growth scenario sees the direct and indirect[8] GDP increase to $19.1bn (present value @5%, 30 years). In terms of supported employment, the low scenario supports 5,420 jobs, and the medium scenario sees 16,510 jobs supported across the economy (annual average across 30 years).

Opportunities/Risks

The cruise sector's interaction with the economy and community in New Zealand brings both opportunities and risks. The decline in cruise activity offers a chance to develop a shared understanding of the cruise sector's role in New Zealand's tourism landscape and how to respond to pressures. At a regional level, New Zealand recognises the cruise sector's economic importance in their local plans[9], with specific actions to mitigate congestion and concentration risks (infrastructure pressures, etc). The wider environmental considerations around climate change and extreme weather events can be expected to elevate discussions around decarbonising. There are also links between cultural opportunities and risks, but these are associated with the size of the cruise sector, and how interactions are managed.

Concluding remarks

New Zealand's cruise market is facing a period of decline even though New Zealand is seen as a 'bucket list' destination. Despite the challenges, the analysis shows that the economic values of the cruise sector are significant. However, the economic values should be seen in the wider context of the sector's externalities and risks. A key gap is that it is not addressed as part of this research relates to the value/size of the risk or to express the risks in dollar-terms. Further research is needed to address this gap. Looking past this gap and using available information, suggests that the benefits to New Zealand outweigh the direct costs (emissions, etc).

This analysis identified opportunities and risks, and these include important areas around cultural and social impacts of cruise tourism. New Zealand aligns with international experience where local views and sentiments about the environment, cultural and social impacts of the cruise sector are diverse and nuanced. Available preference studies show that New Zealanders tend to have a positive view about the cruise sector. However, they juxtapose issues around environmental effects against economic benefits.

[7] (Present value over 30 years at 5%)/30 years.
[8] The figure is even higher if the induced impacts are included (+25%).
[9] Such as Destination Management Plans, or similar strategic documents.

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Acknowledgements

We would like to extend our sincere gratitude to all the stakeholders who participated in this research project. Your valuable insights and perspectives have added to broadening the understanding of the New Zealand cruise sector and its impacts. The following entities participated in the process, provided invaluable data, and shared their views. A total of 43 individuals across 27 entities were interviewed.

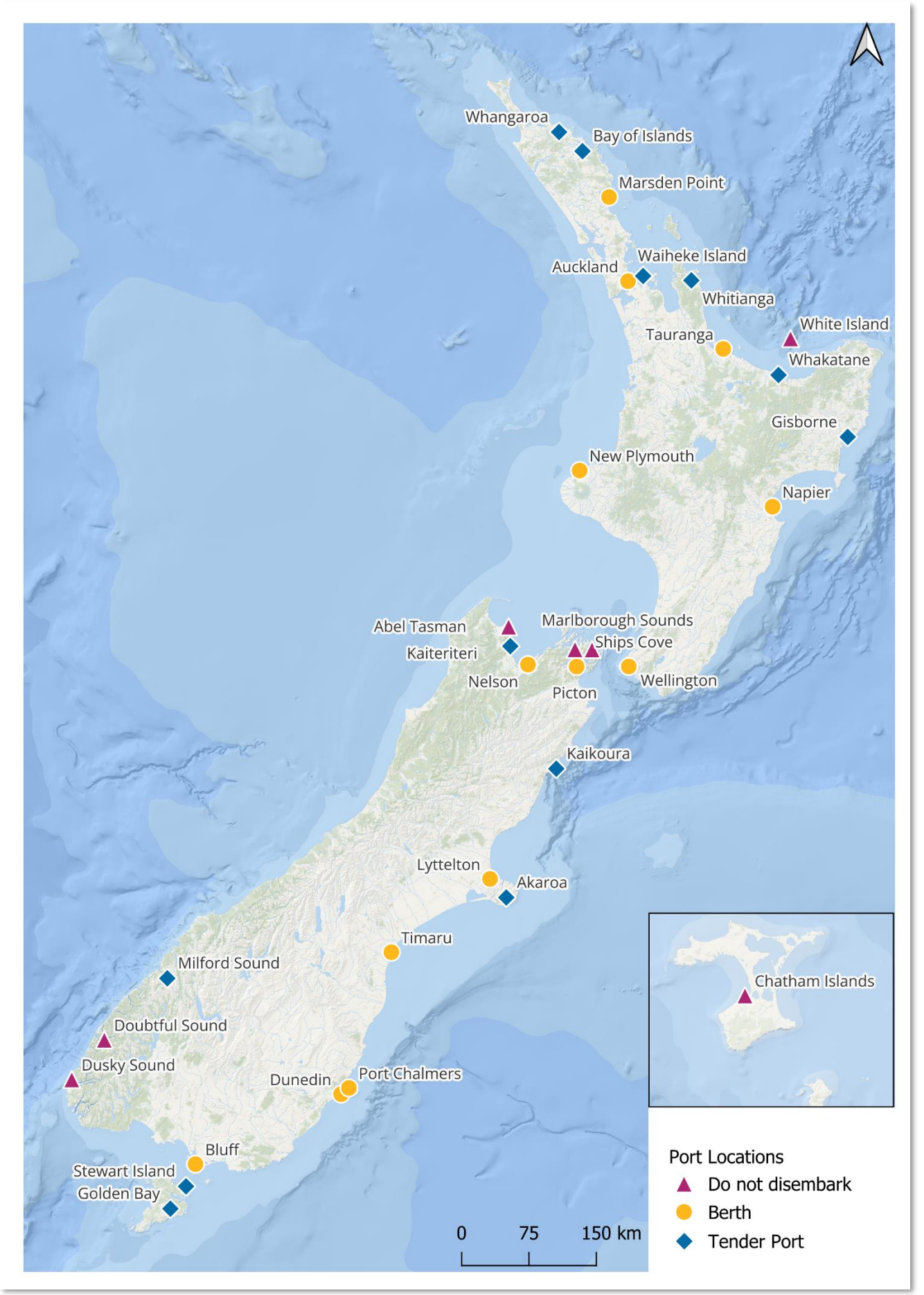
- Bush and Beach (1)
- Carnival Australia (6)
- Christchurch NZ (1)
- Cruise Lines International Association (1)
- Enterprise Dunedin (1)
- Environment Southland Harbourmaster (1)
- Extinction Rebellion (1)
- IDNZ Destination Management (1)
- ISS-McKay (1)
- Lyttelton Port Company (1)
- Maritime New Zealand (3)
- Ministry for Primary Industries (3)
- New Zealand Cruise Association (1)
- New Zealand Māori Tourism (2)
- Ngāti Whātua Ōrakei (1)
- Northport (2)
- Port of Auckland (2)
- Port of Tauranga (3)
- Port Otago (2)
- Regional Tourism New Zealand (1)
- Royal Caribbean Ltd – Australia (3)
- Tātaki Auckland Unlimited (1)
- Tourism Bay of Plenty (2)
- Tourism Hawke's Bay (1)
- Tourism Industry Aotearoa (1)
- Venture Taranaki (1)
- Venture Timaru (1)

Some of the stakeholders that we approached were unable to partake in the engagement; however, some did provide reports and/or data that helped in the process, or they introduced us to another party. They include:

- Auckland Transport Harbourmaster
- Bay Providors Ltd.
- Department of Conservation
- Environmental Defence Society
- Ministry for the Environment
- Ministry of Foreign Affairs and Trade
- Ministry of Transport
- New Zealand Customs Services
- Priority One.
- Professor Maree Thyne (University of Otago)

We appreciate your time, effort, and commitment to this project.

Ports and areas visited by cruise ships



1 Introduction

The global cruise sector is recovering from the COVID-19 pandemic and estimates suggest that globally, passenger numbers were 31.7m in 2023. The growth outlook is positive with passenger numbers projected to increase to 39.4m by 2027 – a compound annual growth rate of 5.6%[10]. The global cruise sector is dynamic and is a growing segment within the tourism sector. One reason for the growth is the diverse offer the cruise sector provides to the market. The offer encompasses a wide range of cruise experiences, including ocean and river cruises, diverse destinations as well as mainstream and niche options.

The global cruise market is estimated at $150 billion, with strong projected growth. The sector's growth is supported by:

- changing demographic patterns (age profiles),
- increasing disposable incomes,
- a growing middle class, and
- rising interest in experience-based travel.

Globally, the cruise sector is concentrated in a small group of players – Carnival Corporation, Royal Caribbean Cruises Ltd., and Norwegian Cruise Line Holdings Ltd. A variety of cruise brands sail under these companies. Geographically, the cruise sector covers all continents with the Caribbean, Mediterranean, Alaska, and Northern Europe as key destinations.

External market forces and internal, sector-specific responses shape the cruise sector, as they do all business sectors. The trends influencing the sector are:

- Increasing customer demands and regulatory requirements relating to environmental practices,
- Onboard technology requirements and demand for new, virtual reality, and AI-driven entertainment,
- Increased awareness and focus on health, safety, and passenger well-being,
- Increasing operating costs.

While the outlook is positive for the sector, like all industries, it is facing challenges such as geopolitical tensions and uncertainties as well as environmental concerns. In the global context, the New Zealand cruise sector is comparatively small. However, it is an important part of the New Zealand tourism landscape. There is limited information about the cruise sector's wider, non-economic effects or impact in New Zealand. From a New Zealand perspective, it appears that little or no current data and information is available that takes account of the specific scale, characteristics, and operating context of the cruise industry in New Zealand. This means that there is not much data or information about how it affects the environment, the economy, or the host communities.

1.1 Aim

The cruise sector's role in the New Zealand tourism offer is acknowledged. However, there are information gaps relating to the sector's non-economic values and contributions (both positive and negative).

This report expands the evidence base relating to the New Zealand cruise sector and improves the understanding of the sector's effect on New Zealand's economy, environment, and society. This evidence base can be used to inform future policy development which will reduce reliance on third-party analysis.

[10] (Cruise Market Watch, 2024)

This report provides a framework that:

- captures the cruise sector's wider effects on the economy, environment, and society; and
- highlights the interrelationships between the economic, environmental, and social effects of cruise; and
- identifies the interrelated risks and opportunities associated with the sector.

The framework draws on the principles associated with a multi-criteria analysis structure, and is combined with scenarios to identify:

- Economic risks and opportunities,
- Environmental risks and opportunities, and
- Social risks and opportunities.

The cruise sector's effects are spatially explicit, with regional footprints. These regional variations are captured as far as practical, but some data elements are only available at a national level.

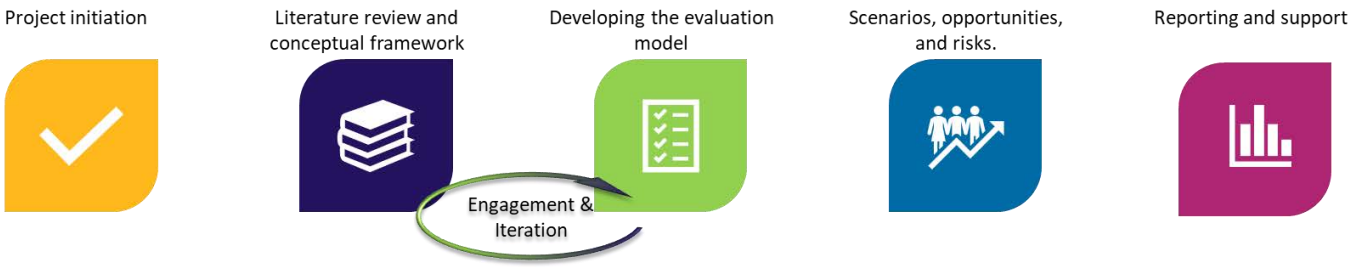
A scenario approach is used to illustrate the spread of potential future outcomes and how different effects could change. The scenarios are used to illustrate the linkages and implications across social, environmental, and economic aspects of society. The scenario approach considers interdependencies and assumptions to show how key relationships could change.

The project builds on and integrates existing research into the cruise sector, and how it operates across regional New Zealand. Some regional analysis and evaluations of the cruise sector were being undertaken at the same time as this project. Where possible and appropriate, we build on regional efforts, incorporating local nuances and regional elements.

1.2 Approach

The project was completed using a staged approach with multiple steps. Figure 1-1 shows the relationship between the steps. There were iterations between the steps and the process was not strictly linear.

Figure 1-1: Key steps



Step 1: Project initiation

The project started with an initial work session to finalise the explicit and tacit requirements. The step delivered a common understanding of the envisaged deliverables and reflected the finer nuances. The initial literature review and data collation commenced during this step.

Step 2: Literature Review and Conceptual Framework

During the second step, international and New Zealand literature were reviewed, and the insights were then used to create a conceptual framework that showed the sector's key parts, how they relate to each other, and what drives costs and benefits. A wide perspective guided the literature review and included different

perspectives such as: cultural, environmental, and social processes and how these are measured. As part of the literature review, we sought to identify the approaches and methods used elsewhere to value the cruise sector, its contribution, and the interconnected parts. In addition, insights gained during the engagement (discussed as a separate action) were integrated into the framework.

The insights were used to develop a conceptual framework. The framework is used to structure the New Zealand focused analysis and literature review. The framework is consistent with evaluation structures, New Zealand Treasury's Living Standards Framework, and the four capitals[11], as well as the principles underpinning valuation approaches. The interconnected parts of the cruise sector, how it links to the economy and other parts of the community as well as the current state of the sector are reflected.

The conceptual framework was prepared using an iterative process, with initial versions discussed with the Ministry[12] and refined. Working versions of the conceptual framework took the form of a logic map and included the flows between parts. The framework differentiated between:

- Social effects,
- Cultural effects,
- Environmental effects,
- Economic effects.

The analysis incorporates historic development patterns and shifts, which helps shape the framework. In parallel with the conceptual framework, we developed a model showing the linkages and the metrics. The selected metrics align with international literature, with adjustments for New Zealand experiences and data patterns.

Step 3: Developing the evaluation model

Using the conceptual framework as a structure, a scenario model was developed. The model integrates different values (costs, and benefits) and it has a temporal dimension showing the growth outlook. Three growth scenarios (low, medium, and high) are modelled. The growth rates used in the scenarios vary from slightly negative for the low scenario to a compound growth rate of over 2% per annum for the high scenario. The evaluation model then adds another dimension to deal with different potential events/transition pathways. These are considered for each scenario.

The data underpinning the model is a mix of official and private data (published and unpublished) data. The sources were identified and supplemented during the sector engagement work. Assumptions and proxy values are used to ensure that the model covers all the key elements.

All inputs and assumptions are expressed using a consistent set of baseline growth settings. The model is structured in a way that enables the trade-offs and flows between different parts of the system to be isolated and compared. However, the focus is not on developing a 'forecasting the future'-type tool. Instead, the baseline outlook will form the basis against which alternative growth scenarios can be compared and evaluated, and the cruise sector's value estimated. The model consists of both qualitative and quantitative measures and is structured as a Multi Criteria Analysis (MCA)-type structure. Where appropriate, future values are discounted and expressed in present value terms.

With reference to the quantitative measures, the economic metrics reflect direct spending by the cruise sector as well as the direct GDP and employment impacts of the spending. For emissions, we draw on international

[11] Human, social, natural, and financial/physical.
[12] Ministry for Business, Innovation and Employment

literature and information about the cruise fleet to estimate emissions that is translated into dollar terms using the shadow price of carbon.

Engagements

The project involved completing an array of sector engagements. These engagements were used to collect data and information about the sector, as well as views regarding the cruise sector. Insights about the key drivers and the anticipated growth patterns were also collected. A diverse group of parties were engaged, including:

- Industry associations,
- Port companies,
- Central and local government,
- Economic development agencies,
- Iwi,
- Sector providers, and
- Community groups.

The insights collected during the engagement process were used to guide the next steps. For example, the spatial reach of onshore excursions, the growth outlook as well as the type of criteria to capture in the MCA. The insights influenced further data collection and assessments.

A variety of different parties covering diverse views were invited to participate. For example, we engaged with industry bodies as well as environmental groups to collect opposing views. This helped to ensure that dissimilar perspectives were captured.

Step 4: Scenarios, opportunities, and risks

The growth outlook for the sector together with the development pathway across key parts (e.g., vessel technologies) are framed in a way that enables different scenarios to be assessed. M.E worked with the Ministry (MBIE) and used insights from the sector engagements to establish the growth outlooks. The results of the modelling were evaluated to identify growth opportunities, areas of risk, and the key trade-offs. While identifying specific policy responses is beyond the scope of this study, the implications are highlighted. These are based on the trade-offs and underlying relationships.

The relative change across different dimensions/aspects (social, cultural, environmental, and economic) relative to the baseline situation is reported. These changes will provide signposts to both the opportunities and risks facing the sector, as well as how the cruise sector generates benefits (and costs) for New Zealand, and the different port cities/locations. The degree to which the results move towards a 'better' or 'worse' overall position are interpreted.

Step 5: Reporting and ongoing support

The final part of the project included preparing a draft report that was reviewed and refined, as well as presentations to external parties to share the results.

As expected, parts of the assessment are technical. To maintain readability, technical information is included in referenced appendices. The technical appendices are included in the report because it maintains readability of the report, but also retains an ability to repeat the analysis.

1.3 Limitations and caveats

The project covered the New Zealand cruise sector, and a broad view was taken. A range of different stakeholders were interviewed, and their views are reflected in the report. In addition, a range of different data sources was used to model elements of the sector. As with any assessment, limitations and caveats apply.

- With reference to the engagement process, the following limitations apply:
    - We conducted semi-structured interviews. Conflicting views were encountered for several discussion topics. These are reported, and we did not judge or attempt to find the 'correct' answer. We note that some views were directly conflicting (e.g., the sector makes important contributions vs the economic contributions are minor).
    - The engagement process used interviews, and we did not undertake a survey. While representative bodies were targeted, the views expressed by the interviewees might not be the views of their institutions or individual members.
    - We approached a further 12 stakeholders who did not respond to our invitations to engage. For context, 27 entities were interviewed.
- In terms of modelling and analysis, we used a wide range of datasets. We worked to triangulate different data sources, but data availability limited our ability to triangulate all aspects. Areas of uncertainty remain. We highlight these areas and their implications where necessary.
- The approach is to structure along the lines of a cost-benefit analysis, but the intent is not to undertake a 'full' cost-benefit analysis because many of the effects cannot be quantified or monetised without significant, New Zealand-wide primary research. Some of the potential effects are reported in qualitative terms, and commentary about the anticipated size and direction of the effects is provided. The process identified deficiencies in understanding the New Zealand-specific risk profiles around some events. Further work around these risks would be helpful in getting a fuller picture of the cruise sector's potential costs to New Zealand.
- Crown research entities have assessed some of the environmental effects of the cruise sector. These studies have their own caveats and limitations, with an obvious limitation being that they are 'initial assessments'. Despite the 'high level' nature of these studies and the accompanying limitations, and in the absence of other available information to draw on, we use these studies. However, the port environments vary, making it difficult to simply 'transfer' many of the potential effects to other locations.
- The report lists risks and opportunities. Providing specific policy advice, insights and recommendations is outside the scope of this project.
- The landscape is dynamic, and new consultations (e.g., some levies) commenced as the report was being finalised. The report does not incorporate the new information.
- No new surveys of passenger or crew spending were completed. Historic information collected in earlier economic assessments into the cruise sector was used to inform the assumptions and the sector structures.
- A range of assumptions and proxies are used in the modelling. These are listed in the report.

1.4 Report structure

The report is structured as follows:

- Following Section 1 (introduction), Section 2 summarises the findings relating to the New Zealand cruise industry. The section integrates the insights gained during the engagement, New Zealand-

focused literature as well as modelling. The international literature on the cruise sector is also integrated throughout to provide context to the New Zealand situation.

- Section 3 presents the values and outlook for the cruise sector. The section outlines the framework used to assess the cruise sector, the scenarios and growth pathways. The qualitative and quantitative metrics are used to describe the sector, and the qualitative process is used to identify risks and opportunities.

The project started with an international literature search. The report's body presents key points, while cross-referenced appendices provide additional insights about the international cruise sector.

2 Cruise Sector

Section highlights

- The global cruise sector is dominated by three large companies.
- Post-COVID, the global cruise sector has rebounded strongly with 2023 global passenger numbers reaching 31.7 million – surpassing 2019 volumes by 7%.
- Coming out of the Covid-disruptions, New Zealand cruise numbers grew and recovered. However, pressures mean that New Zealand's short-term outlook and anticipated growth is expected to lag the international recovery and passenger volumes.
- From a cruise line perspective, New Zealand is considered within a broader sub-regional context consisting of Australia, New Zealand, and the Pacific Islands.
- The cruise lines are consolidating global itineraries with some shifts away from New Zealand. Furthermore, changes in the New Zealand landscape are presenting new challenges.
- For the 2023/24 season, total spending attracted to New Zealand was $648m (excl. GST and fuel). This estimate includes spending by passengers, crew and cruise vessels. For context, this equals approximately 6% of total international visitor spending in New Zealand.
- The spending is distributed throughout New Zealand, but the larger locations (Auckland, Tauranga and Wellington) capture the largest shares.
- Total economic effect of the 2023/24 season is estimated at:
    - $800m in GDP,
    - supporting 11,935 jobs throughout the economy.
- Wider effects:
    - It is important to look beyond the economic impacts (GDP, employment) to also consider wider effects such as environment, social, and cultural.
    - We estimate the cruise sectors' direct emissions for the 2023/24 season is between $64.5m - $129.0m (range shows the low and high Shadow Price of Carbon).
    - Biofouling is a key discussion point with views about the way to manage biofouling on cruise ships divided. New Zealand's approach to biofouling was perceived as appropriate by some parties while other groups indicated current regulations presented a high level of uncertainty to the cruise sector.
    - The social and cultural impacts of the cruise sector on New Zealand communities are closely tied to the concentration of cruise; number of ship visits, ships per day and ship size.
    - Impacts include overcrowding and congestion, distributes the effects across regional NZ, volunteer benefits and opportunities/risks to culture. However, the 2023/24 season did not see the pressures observed immediately after COVID-19.
- Available perception surveys show that regions (where there are studies to draw on) have a favourable view of the sector.

The section starts with contextualised data detailing the global cruise operating environment, followed by general observations about the New Zealand cruise sector, which are drawn using the patterns observed for the 2023/24 season. Next, the New Zealand values, local insights and information associated with the economic, environmental, and social and cultural dimensions are reported. These values are identified by

existing datasets and New Zealand literature. The qualitative values about the sector are highlighted and background information about the quantitative values is presented. Local views about the sector are presented and integrated into the discussion where necessary. These views were obtained during the sector engagement.

Crucially, some of the insights identified during the engagement process point to wider policy issues and are beyond the scope of this work. Regardless, the points are communicated to provide a full account of the engagements. The discussion draws on insights from the engagements, are well as available literature and international cruise experiences. Appendices 1 to 12 contain additional literature about the cruise sector and international cruise experiences.

The section concludes with a synopsis of the key messages received during the engagement.

2.1 Global context

The cruise sector is a large global industry that continues to experience significant growth. With increasing demand for unique travel experiences and the expansion of cruise offerings to new destinations, the industry is broadening its reach. Advances in ship technology, enhanced onboard amenities, and the rise of niche markets have all contributed to the ongoing expansion of the cruise sector, making it an increasingly popular choice for travellers worldwide.

Like other tourism activities, the sector is increasingly facing scrutiny around its environmental effects and impacts on communities. Sustainable development and growth present a challenge for the cruise sector and port cities/towns, with the industry investing in improving its environmental footprint. Destinations often use the economic benefits from the cruise sector as a key motivation for continued support and social license.

Between 1990 and 2023, the cruise sector globally, has grown at a rate of 6% per annum[13], servicing 32m passengers and supporting 1.2m jobs globally, in 2023. The sector contributed an estimated $154bn to the global economy[14].

Internationally, the cruise industry is responding to the post-COVID landscape. After the disruptions caused by the pandemic, the sector rebounded strongly, recording a 7% increase in passenger numbers in 2023, relative to 2019. However, geopolitical tensions and economic uncertainty are undermining economic confidence and inhibiting cruise growth. Nevertheless, the outlook remains positive. Currently, the sector accounts for around 2% of the tourism and travel sector and the industry sees room for growth.

The cruise sector is both multinational and international by nature, as cruise lines operate across numerous countries and depend on international waters, various global ports, and diverse tourism markets. Additionally, while cruise companies may be incorporated in countries with favourable tax and regulatory conditions (such as Panama or Liberia), their shareholders and decision-makers often reside in other parts of the world, typically in major financial hubs like the United States or Western Europe. This separation between incorporation, operational areas, and decision-making is typical of industries that function on a global scale and seek to optimize their operations across different regulatory and financial landscapes.

Few major companies within the global cruise sector reflect an oligopolistic market structure in which a few large companies dominate the industry. Carnival Corporation and plc, Royal Caribbean Group, and Norwegian Cruise Lines hold substantial market shares and influence over global operations, pricing, and routes. The

[13] (Cruise Market Watch, 2024)
[14] (Cruise Lines International Association, 2023)

companies each operate several brands within their fleet. Table 2-1 provides the market share for each brand associated with the main companies (Appendix 1 provides a full breakdown including the minor brands).

Table 2-1: Market Share

Parent	Brand	Total Passengers	% Passengers	Revenue (US$m)	% Revenue
Carnival	Carnival	6,114,200	20.3%	6,263	9.5%
	P&O Cruises	1,502,300	5.0%	4,299	6.5%
	Princess	1,649,600	5.5%	3,527	5.3%
	AIDA	1,113,500	3.7%	3,186	4.8%
	Holland America	796,500	2.6%	2,655	4.0%
	Costa Cruises	1,409,100	4.7%	2,584	3.9%
	Cunard	250,400	0.8%	1,191	1.8%
	Seabourn	85,400	0.3%	975	1.5%
Carnival	*Subtotal*	*12,921,000*	*42.9%*	*24,680*	*37.3%*
RCI	Royal Caribbean	5,769,300	19.1%	8,587	13.0%
	Celebrity	1,781,000	5.9%	4,808	7.3%
	Silversea	190,600	0.6%	2,415	3.6%
RCI	*Subtotal*	7,740,900	25.7%	15,810	23.9%
Norwegian	Norwegian	2,514,100	8.3%	6,306	9.5%
	Regent Seven Seas	117,800	0.4%	1,633	2.5%
	Oceania Cruises	187,400	0.6%	1,381	2.1%
Norwegian	*Subtotal*	*2,819,300*	*9.4%*	*9,320*	*14.1%*
Other	*Subtotal*	*6,665,900*	*22.1%*	*16,357*	*24.7%*
	TOTAL	30,147,100	100%	66,167	100%

(Cruise Market Watch, 2024)

Carnival Corporation and plc, Royal Caribbean Group, and Norwegian Cruise Lines have market shares of:

- In terms of passengers:
  - Carnival Corp: 43%
  - Royal Caribbean Cruise 26%
  - Norwegian Cruise Lines 9%
- In terms of revenue
  - Carnival Corp: 37%
  - Royal Caribbean Cruise 24%
  - Norwegian Cruise Lines 14%

The balance of passenger movements (22%) and revenue (25%) are generated by 35 other brands, the most prominent being:

- MSC Cruises
- Disney
- TUI Cruises
- Adora
- Virgin Voyages.

As with most large corporate companies, cruise companies are often incorporated in jurisdictions that offer favourable tax and regulatory environments. For instance:

- Carnival Corporation is dual-listed and incorporated in Panama and the United Kingdom, benefiting from tax advantages in both.
- Royal Caribbean Group is incorporated in Liberia, another tax-friendly jurisdiction.
- Norwegian Cruise Line Holdings is incorporated in Bermuda, allowing it to minimise tax liabilities.

The tax profiles and corporate structures of cruise companies are a key part of their financial strategies, as they avoid paying high corporate taxes in the United States by being incorporated elsewhere. Ultimately, these companies are commercial operations, and their primary goal is to generate a return on investment.

The cruise industry has a global reach, operating worldwide with the main concentrations around the Caribbean, the Mediterranean as well as Europe. These top three markets account for 70% of global passengers, and in 2023 served more than 21 million passengers. The Australia, New Zealand, and Pacific markets (combined) accounted for around 2% to 4% of the global market (2023). Total passengers in the Australia, New Zealand and Pacific market are estimated in the 1.3 million – 1.4 million range.

The market is dynamic, characterised by shifts in demand patterns and the deployment of capacity. The cruise lines closely monitor market trends and demand patterns when planning vessel deployments. These deployments are scheduled two to three years in advance and reflect cruise lines' willingness to develop new markets and to enhance existing market penetration. Appendix 6 contains additional information on the cruise sector's global spatial patterns and demand-side factors influencing the industry.

2.2 New Zealand general observations

New Zealand is often referred to as a 'bucket list' destination because our outstanding natural landscapes are seen as a significant attraction for international travellers. Compared against the global market, the New Zealand market is relatively small with less than 1% of the global market (passengers). Despite this, the New Zealand cruise sector is a large part of the tourism landscape. StatsNZ collected official information about the sector, with the most recent records covering YE June 2020. The cruise sector has subsequently seen large disruptions and changes – notably the COVID period. New Zealand's international visitor numbers have recovered toward pre-COVID levels but are still behind 2019 levels.

The 2023/24 cruise season (October 2023-September 2024) saw approximately 257,380 passenger arrivals. Compared to the 2019 cruise season, the last full cruise season prior to the COVID pandemic, recorded passenger arrivals for the 2024 season demonstrated a strong recovery to 94% of 2019 levels. However, this comparison is based on different datasets with the 2023/24 data imputed from New Zealand Customs, New Zealand Cruise Associated and CLIA data.

The last StatsNZ data (published in 2020) about the cruise sector indicated that the sector generated total (new) spending in New Zealand of $547m, broken down as follows:

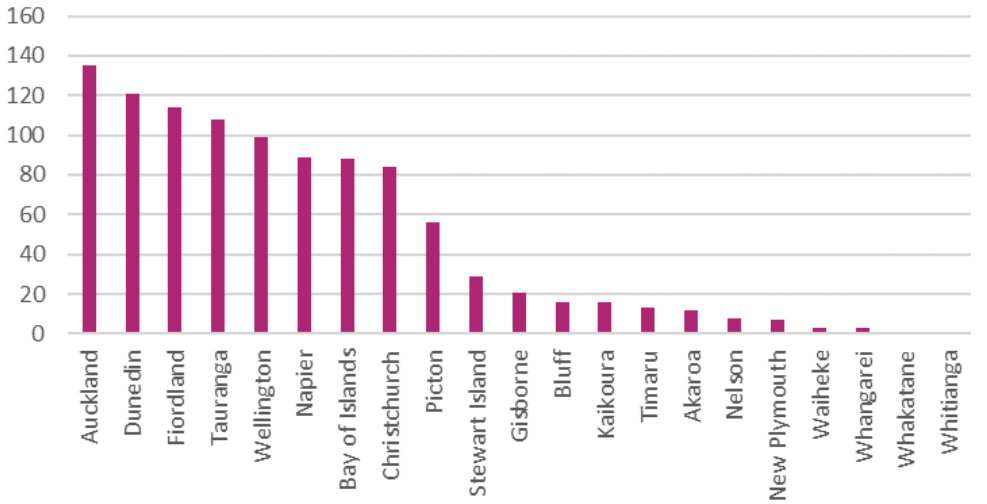
- Passengers and crew $356m
- Vessels $139m
- GST $52m.

However, these official statistics include the initial COVID-lockdown period that started in March 2020 , so the figures do not reflect the pre-COVID peak. In fact, YE-June 2019 saw total cruise spending in New Zealand of $565m. Post-COVID, global cruise passenger levels have recovered strongly, and similar upward trends were evident in 2022/23 and 2023/24.

The general features of the New Zealand cruise sector are presented drawing on the 2023/24 season. The spending and spatial patterns of the expenditure are presented in Section 2.3 which deals with the economic value of the sector.

During the last season, a total of 54 unique vessels visited New Zealand. The vessels visited New Zealand's key ports across the North Island and South Island. The North Island saw a larger share of visit days, capturing 54% of total visit days compared to the South Island's 46%. Figure 2-1 shows the vessel days per port as recorded for the 2023/24 season.

Figure 2-1: Vessel Visit Days



Cruise vessels visit the main ports around New Zealand, and the key locations are:

- More than 100 visit days per year
  - Auckland
  - Dunedin[15]
  - Fiordland
  - Tauranga
- 80 – 100 port visit days per year
  - Wellington
  - Napier
  - Bay of Islands
  - Christchurch/Lyttelton.

In addition to the ports listed above, several (13) other ports around New Zealand see cruise ships visiting them. Fiordland presents a unique situation in which almost all vessels coming to New Zealand pass through the sounds; therefore, there is a high number of port visit days, but very few passengers disembark, and consequently, passenger spending in Fiordland (Southland) is low.

In terms of the different cruise lines, the New Zealand market is serviced by the global cruise lines. In 2023/24, the large cruise lines accounted for 85% of the delivered port days. This highlights the concentration in the local market as well as the dominant position of the large players.

[15] Includes Port Chalmers and Dunedin.

A key point raised during engagements was that cruise itineraries are designed using the ports as a network. Auckland and Milford are seen as the two cornerstones of the network. The port network is expected to remain relatively stable over the short term. However, concerns were raised around the potential effect of losing access to Fiordland and how such a loss might impact demand patterns.

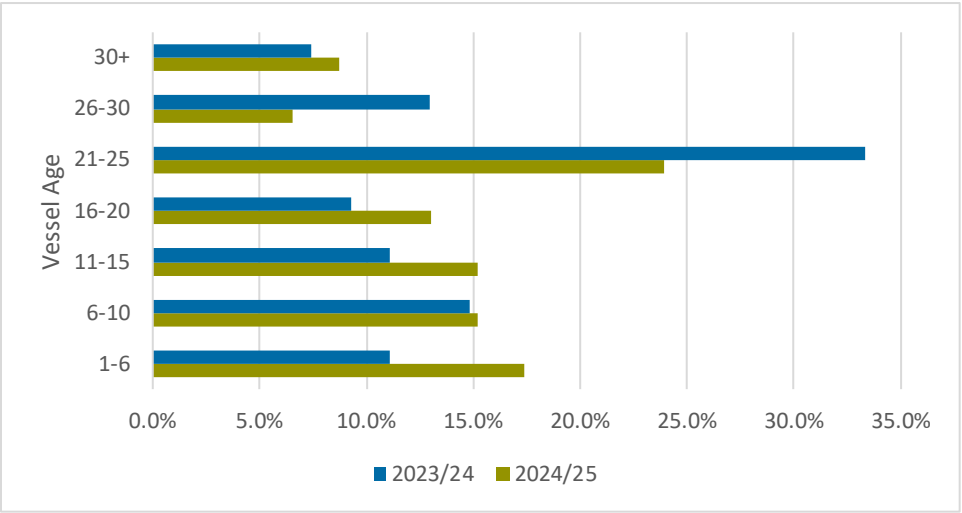
The price competitiveness and quality of infrastructure at key ports were also raised as emerging issues. Capacity constraints at the large ports were seen as an inhibiting factor constraining growth, and this is expected to be an issue over the medium term.

2.2.1 Ship age profile

The cruise sector is adapting to new technology and shifting demand patterns, and this is partially reflected in ongoing investment in new vessels. New vessels are not automatically deployed to New Zealand; however, over time the age profile of vessels will gradually change.

Cruise ships have long operational lifespans due to regular refurbishments and maintenance. The fleet visiting New Zealand includes a mix of both newer and older vessels (Figure 2-2). Most cruise ships visiting New Zealand are in the 11-30+ years cohort. Ships built in the 1990s and early 2000s still in operation undergo periodic refurbishments to stay modern and compliant with safety and environmental regulations.

Figure 2-2: Vessel Age distribution (2023/24 and 2024/25)



Source: ME calculations, international data and NZCA data

For the 2023/24 season, vessels older than 16 years account for 63% of cruise ships. This is expected to drop to 52% of ships for the 2024/25 season. The oldest cruise ship expected to visit New Zealand for the 2025 season is MV Artania built in 1984 (40 years old). Conversely, six ships less than 5 years old visited New Zealand during the 2023/24 season. This is expected to increase to 8 in 2024/25. New Zealand attracts some of the latest cruise ships, especially from premium and luxury lines like Celebrity Cruises, Viking Ocean Cruises, and Royal Caribbean. These ships, constructed within the last 5-10 years, feature state-of-the-art facilities,

environmental innovations, and are designed for high energy efficiency. For the 2024 season, newer vessels (10 years or younger) accounted for approximately a third (37%) of total vessels. Newer vessels visiting for the 2025 season are expected to increase to just under a half (48%) of total vessels.

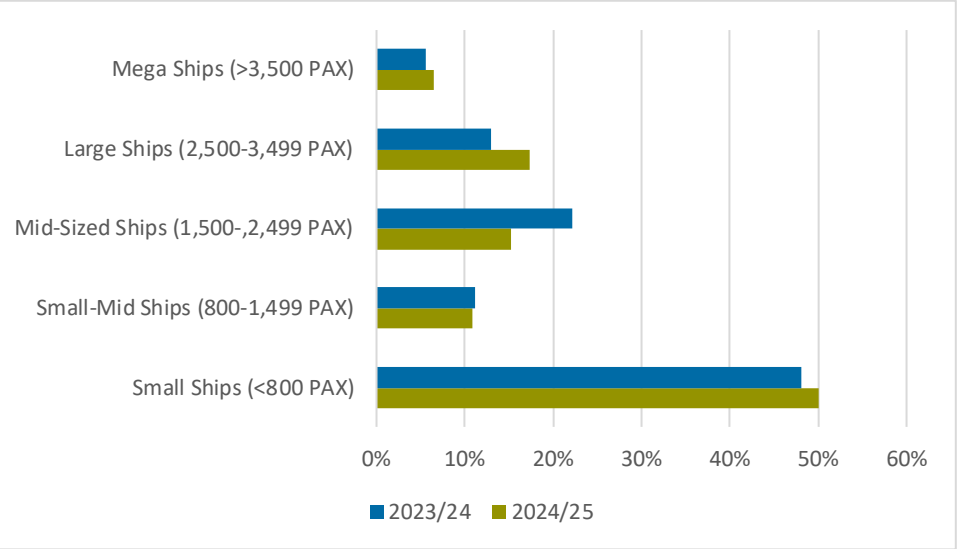
The weighted average age of cruise ships that operated in New Zealand waters during 2023/24 was 18 years, and for the 2024/25 season, the average age is estimated at 16 years.

> The age of a vessel influences its emissions profile because hull smoothness deteriorates with age, even if it is maintained.

2.2.2 Ship size profile

The size of a cruise ship can be expressed in terms of passenger capacity (PAX) or its length. Figure 2-3 presents the 2023/24 and 2024/25 season profiles in terms of passenger capacity.

Figure 2-3: Ship Type by Passenger Capacity (2023/24 and 2024/25)



Source: ME calculations, international data and NZCA data

Cruise ships are categorised into five cohorts based on passenger numbers (lower berths):

- Small Ships <800 PAX
- Small-Mid Ships 800-1,499 PAX
- Mid-Sized Ships 1,500-,2,499 PAX
- Large Ships 2,500-3,499 PAX
- Mega Ships >3,500 PAX

For the 2023/24 season, just under half (48%) of vessels that visited New Zealand were small ships (<800 PAX). Mid-sized ships (1,500 – 2,499 PAX) were the next largest share of (22%), followed by large ships (13%), small-mid ships (11%) and mega ships (6%). The outlook for the 2024/25 season in terms of expected shares of ship types by passenger capacity is broadly consistent with the patterns observed during the season just gone (2023/24). The key changes include a reduction in the share of mid-sized ships (-7%) and an accompanying small increase in large ships (+4%) visiting.

The increase in share of larger ships visiting New Zealand for the 2025 season align with observations about the cruise sector's trend towards large vessels and using economies of scale i.e., using large vessels to service demand. However, continued strength in numbers of smaller ships visiting our waters confirms a feature of the New Zealand market where luxury and adventure cruise form an important sub-sector. This sub-sector is associated with smaller, boutique ships that deliver a higher value product.

Despite more small ships visiting New Zealand, mid-sized ships account for the largest share (34%) of passenger visits. Large ships and megaships account for a combined 45% of passengers (occupied lower berths). Small and small to midsized ships account for a fifth (21%) of passengers. Smaller vessels are typically more expensive and offer luxury accommodation and experiences, whereas larger vessels can provide the most cost-competitive cruise rates and sell more tickets.

In terms of occupancy levels, smaller ships have lower occupancy compared to larger ships (as calculated based on 2023/24 data). This attribute is expected due to the different types of cruise experiences offered based on the ship size.

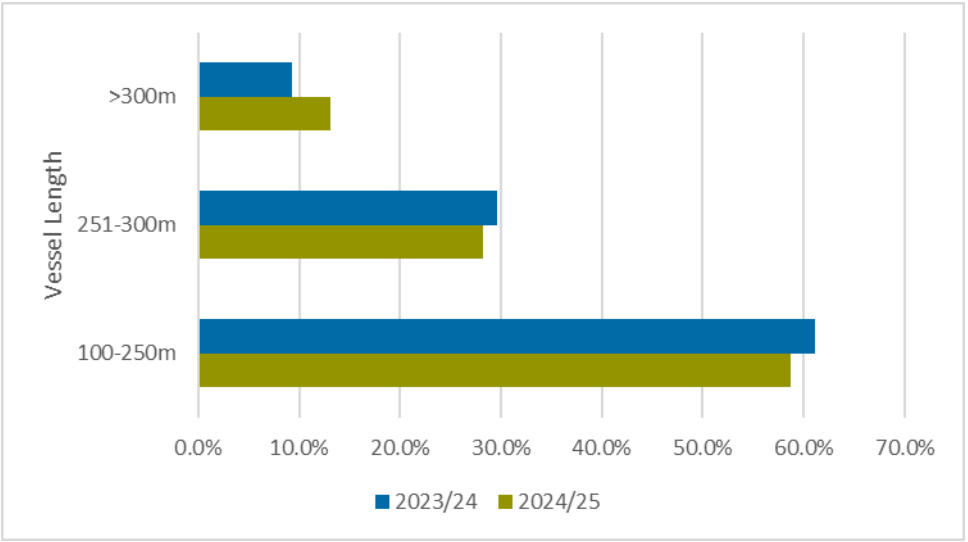
2.2.3 Vessel Length

The length of a cruise ship is dependent on the type and class of the vessel. Typical size breakdowns include:

- 100m to 250m small cruise ships (expedition and speciality cruise ships)
- 250m to 300m mid-sized cruise ships (often luxury or premium categories),
- 300m to >350m large and mega cruise ships (contemporary categories).

Figure 2-4 shows the relative distribution of ship by length

Figure 2-4: Vessel Length distribution (2023/24 and 2024/25)



Source: ME calculations, international data and NZCA data

Overall, small cruise ships make up the largest proportion of cruise ships that visit New Zealand, accounting for 59% and 61% of cruise vessels arriving in the 2023/24 and 2024/25 seasons, respectively. This is followed by mid-sized ships (251-300m) accounting for 30% in 2023/24 and decreasing slightly to 28% in 2024/25. The balance is large or megaships (>300m) which accounted for 9% in 2023/24 and expected to increase slightly to 13% for the upcoming 2024/25 season.

In terms of passenger volumes by ship length, small ships carry 23% of visitors. The mid-size category accounts for more than half of passengers, and the large category accounts for a quarter (25%). A large share of passengers is associated with large vessels. Using large vessels generates economies of scale, driving down per passenger costs. At the same time, the potential spending (on a per ship basis) is greater than that associated with smaller ships. Importantly, the size of these vessels also brings dis-economies of scale, such as congestion and overcrowding.

There is an increasing global trend towards larger ships, however, cruise ship lengths can impact the ports they visit, as larger ships require deeper waters and larger docking facilities. This is important for New Zealand itineraries which often include several smaller destination/ports which are not suitably equipped to deal with large cruise ships and passenger logistics.

2.2.4 Recent Deployment Decisions

Cruise line representatives noted that deployment decisions are made two to three years[16] in advance, and New Zealand is considered part of a broader region that includes Australia, New Zealand, and the Pacific Islands, rather than a standalone destination. Consequently, the region (Australia, New Zealand, and the Pacific) competes with other global destinations to attract ships. In addition, there is a degree of competition within the region (between Australia, New Zealand, and the Pacific for vessels). According to representatives, New Zealand is becoming increasingly expensive and less appealing from an operational perspective. Examples of international locations' efforts to attract cruise ships are widespread. For example:

- The peak season in San Juan, Puerto Rico, coincides with New Zealand's, running from December to April. San Juan has undertaken a multimillion-dollar upgrade of its cruise facilities, aiming to grow annual passenger movements from 2m to 5m over the next 30 years. This investment will help the port actively attract more cruise ships and highlights the fact that the cruise sector is targeted to support economic development.
- Japan's Tourism Nation Promotion Plan encourages rural ports to welcome international cruises, helping to curb over-tourism in major cities and distribute tourism spending more evenly across the country.
- European ports are reported to be offering incentives to attract more environmentally friendly ships. For example, Norway offers a discount on port dues based on cruise ships environmental footprint such as air emissions and handling of waste streams.[17] Port of Hamburg offers tax exemptions on electricity prices by lowering the surcharge by 20 percent or 1.2 cents per kilowatt-hour.[18]

These global efforts show the lengths that countries and locations go to in support of the cruise sector. It underlines the value that other jurisdictions place on retaining cruise to their local economies, and the value of optimising infrastructure use. Costs and fees are used in a strategic way to attract and incentivise the industry, and to attract green vessels.

[16] The range reflects the feedback received during the engagement process.
[17] (Alamoush, 2022)
[18] https://ptr.inc/wp-content/uploads/2023/10/shore-power-whitepaper-min.pdf

- In Singapore, port fees are regulated by the Maritime and Port Authority of Singapore (MPA). The authority regularly adjusts port fees to align with regional market rates and ensure they remain attractive and competitive. In addition, specific fee adjustments may be made to encourage types of trade or support green initiatives.

The global cruise sector is projected to grow significantly over the medium to long term. However, the Pacific market (Australia, New Zealand, and the Pacific islands) as a region is projected to be 'flat' or 'declining' over the short to medium term. While attractive in terms of landscapes and net promoter scores, regulatory costs and challenges in doing business in New Zealand are suppressing growth potential. Deployment decisions to allocate vessel capacity to New Zealand are difficult to motivate with uncertainties around regulations and wider issues (e.g., practicalities around biofouling) positing challenges.

Ultimately, the decision to deploy a vessel (or vessels) to a region is based on the ability to generate a suitable yield. Cruise lines decide these deployment arrangements as part of their long-term strategy. From a passenger demand perspective, New Zealand is a 'bucket list' destination and remains a desirable destination. However, cruise lines willingness to supply cruises into the market is declining due to increasing regulatory costs and uncertainty. A central theme about the regulatory landscape (as mentioned elsewhere) is that it is not necessarily the quantum of change that is the issue, but the speed with which it is implemented together with the limited (perceived) responsiveness during engagement processes that are the issue.

These matters combine to dilute the growth in deployments over the short term.

2.3 Economic elements

Cruise passenger visits to Australia and New Zealand (combined) accounted for 2.4% of global cruise visits in 2023 with a total of approximately 1.3m[19] passenger visits combined. Compared against the global market, the New Zealand market is relatively small with less than 1% of the global market (passengers).

Despite being relatively small in the global context, the cruise sector is sizable in the New Zealand context. Like international tourism in general, the cruise sector brings foreign exchange into New Zealand. Provisional estimates put total international tourist expenditure in New Zealand at $10.8bn[20], or 11% of New Zealand's exports (by value, 2023 and provisional estimates).

2.3.1 Spending

The engagements highlighted the general data gap in the sector. Several Regional Tourism Organisations (RTOs) commissioned reports over the past year to understand the value of cruise ships for their region. It appears that most of these studies are perception-based, and they seem to draw on historic StatsNZ reports. However, StatsNZ had stopped collecting (and publishing) cruise sector data (visitor numbers and spending) in 2020, suggesting the information being used is somewhat out of date. In some areas (such as emissions) there is simply no publicly available information. This opens the sector up to myths and misinformation (misconceptions). The cruise industry is frequently criticised for potentially overstating their economic impact and understating their environmental impact. The sector is therefore keen to better understand passenger behaviour, spending patterns, and the overall impact of the cruise sector, including the wider effects (e.g. social and cultural effects). There is also a desire from communities and tourism businesses to understand the net benefit of the cruise sector.

[19] (Cruise Lines International Association, 2024)
[20] (Stats NZ, 2024)

Official data about the spending of the cruise sector does not exist and consequently, the spending is estimated from different sources, including:

- Historic data from StatsNZ data about cruise spending,
- Customs NZ data about cruise movements and passengers around New Zealand,
- New Zealand Cruise Association data regarding cruise itineraries,
- Market Economics information collected in earlier economic assessments of the cruise sector (including 2017/18 season),
- Information provided by industry players (e.g. ground handlers and providers)[21].

The direct spending that is facilitated by the cruise sector includes the following categories:

- Passenger spending while they visit port cities and participate in visitor activities; this spending is broken down into key segments:
    - Hospitality
    - Retail
    - Transport
    - Tourist activities and services
    - Accommodation
    - Other
- Spending by crew while they visit port cities,
- Spending by cruise vessels, covering:
    - Operational spending
    - Port fees and levies
    - Water and food stores
    - Professional services
    - Vessel spending (e.g., maintenance and repairs)
- Spending by passengers before and after the actual cruise i.e., turnaround passengers' spending on non-cruise-related activities.

Information about the different items is not reported at a detailed, disaggregated level. Historical spending patterns (e.g., from StatsNZ and Market Economics' earlier work) are used to estimate spending levels for the 2023/24 season. In addition, work by CLIA relating to the economic impacts of the cruise sector in New Zealand also estimates total spending. Using the different sources, the total spending[22] is estimated as follows:

Total cruise spending in the 2023/24 season was $648m (excl. GST and fuel), approximately 6% of total international visitor spending in NZ. This spending attracted to New Zealand is a key benefit of the sector.

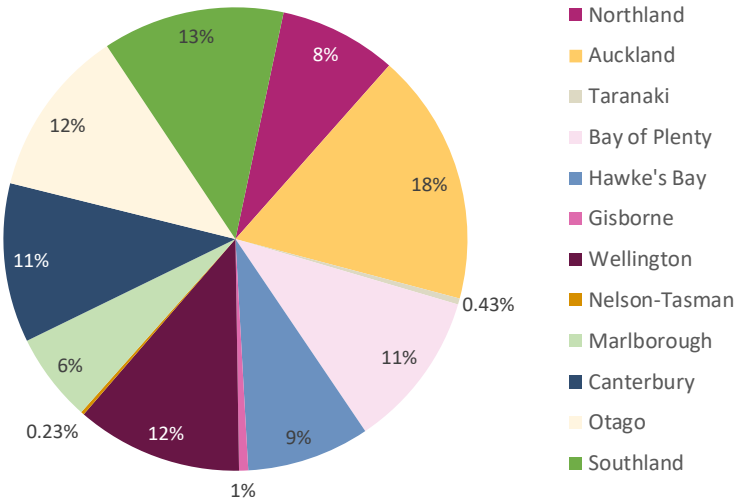
- Passenger and crew spending
    - Direct spending
        $449m (international only and excluding New Zealand passengers)
    - Facilitated excursions and commissions $40m (including shore excursions)
- Vessels
    - Operational $14m
    - Ports and levies $132m (+/- $25m)
    - Fuel $102m
    - Water, food and stores $6m (+/-$3m)
    - Professional services $8m.

[21] This information is confidential. To maintain the confidentiality only aggregated data is reported.
[22] Excluding GST (15%)

The estimates[23] suggest that total cruise spending in the 2023/24 season was $648m (excl. GST and fuel), approximately 6% of total international visitor spending in New Zealand.

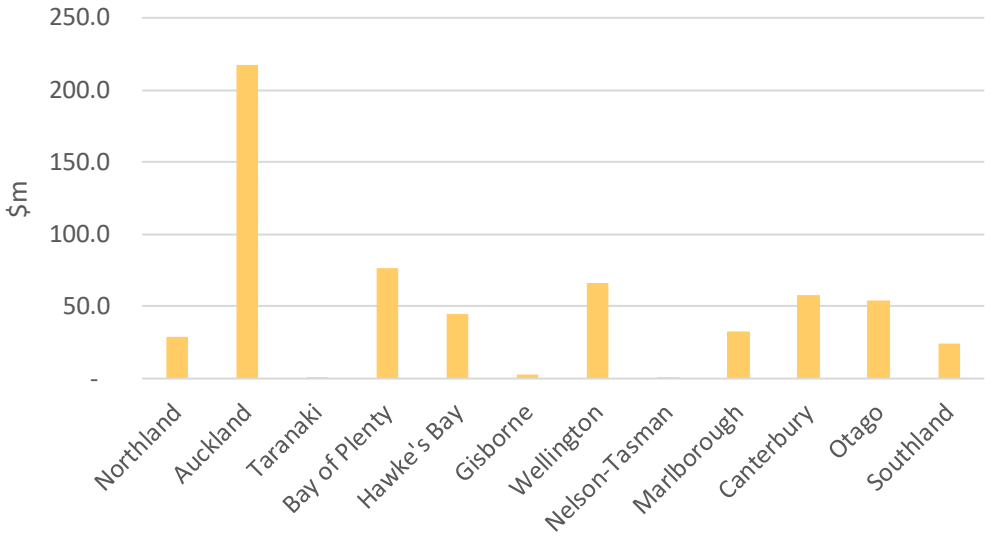
The estimate for passenger port days is 1.6m, while the crew contributes an additional 0.3m port days. The cruise itineraries include most of regional New Zealand (see Figure 2-5 and Figure 2-6).

Figure 2-5: Regional distribution of Visitor port days (2023/24)



Source: ME Calculations based on NZ Customs data and Stats NZ data.

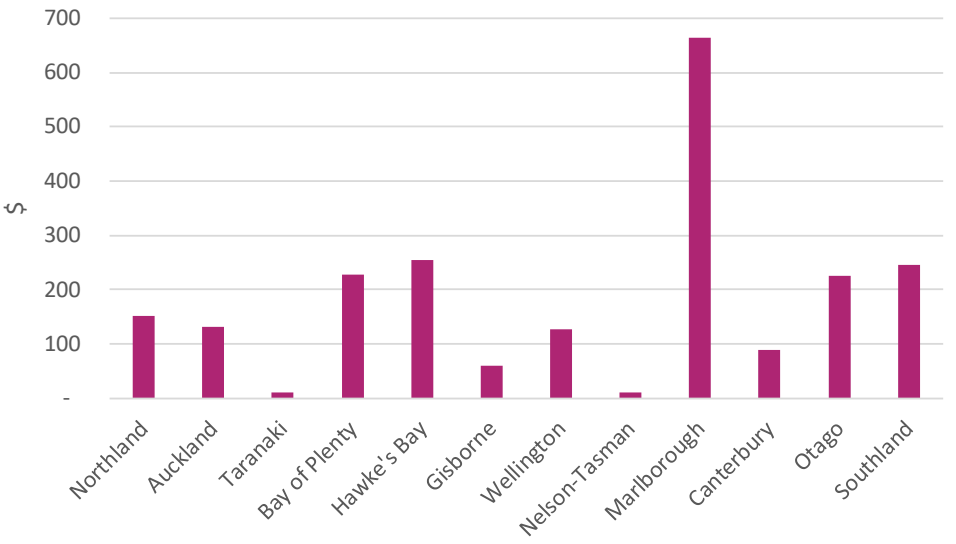
Figure 2-6: Regional spending by cruise sector



Source: ME Calculations based on NZ Customs data and Stats NZ data.

[23] Rounding results in the components not summing to the total.

Figure 2-7: Cruise Spending per capita (regional population)



Source: ME Calculations based on NZ Customs data and Stats NZ data

The regional patterns identified across the different data sources are broadly similar – the port days are concentrated in Auckland and are followed by:

- Southland,
- Canterbury,
- Otago,
- Wellington, and
- Bay of Plenty.

The other areas that also have noteworthy visit days are Northland, Hawke's Bay and Marlborough. Compared to other locations, Taranaki and Gisborne have a limited number of vessels visiting them.

The main points are:

- Auckland captures the largest share of cruise spending – this is because the city is a main port for servicing vessels and their spending and captures a significant portion of visitors that are inbound/outbound from other regions (domestic and international, i.e., turnaround passengers). Cruise ship spending such as operational and maintenance spending and procuring provisions, further increase spending. While not shown in the above figure, other items such as fuel, also increase Auckland's relative importance.
- The spending patterns across the regions underplay the importance of Fiordland as a destination. Customs data indicates that Fiordland, located within Southland, receives the second-most port calls, yet the region's expenditure does not reflect this. This is because passengers for the most part do not disembark and therefore spending is very low. The spending the region attracts includes the local levies. The role of the Fiordland in attracting cruise ships to New Zealand is essential, even if Southland does not see an immediate spending uplift. Other South Island regions benefit from Fiordland being included in itineraries.

The regional patterns illustrate the spread of activity – almost all regions are visited suggesting that the sector's effects are likely distributed across the regions.

- Other regions that see notable spending levels are those with larger ports - Bay of Plenty (Tauranga), Wellington, Canterbury[24] (Lyttelton), Hawke's Bay (Napier) as well as Otago (Dunedin and Port Chalmers) all received more than $50m annual spending (2023/24 season).
- When cruise spending is viewed relative to the size of the regional population (Figure 2-7), Marlborough stands out. Despite having a much smaller population compared to Northland (194,000 people), Marlborough (49,400 people) captures a similar share of visitor port days and cruise spending. This implies in a much higher spending per capita for the region. Additionally, when compared to Gisborne, which has a similar population (51,100), Marlborough captures significantly more visitor port days and spending. This highlights the region's relative success in attracting and benefiting from cruise tourism.

The total spending associated with the cruise sector is foreign exchange that flows to New Zealand. It is seen as the same as export revenue that generates a (gross) benefit.

There are costs associated with delivering the activities supporting cruise passengers and ships. There are also environmental effects to consider. The environmental effects are unpacked in section 2.4.

Fuel imports with little direct value to New Zealand account for a large portion of cruise vessel spending. The above ratios have been estimated after accounting for imports. The labour component should be treated with caution because only a portion of it is a 'net benefit' to New Zealanders because, in the absence of the cruise-supported employment, those employees could be employed in other parts of the economy. There are opportunity and displacement costs to consider (and to reflect as part of a 'net position calculation').

There are costs associated with delivering the activities supporting cruise passengers and ships. There are also environmental effects (externalities) to consider.

2.3.2 Government-related costs and levies

A portion of the cruise expenditure flows to government (local and central) and is used to recover other costs. Some of the levies are recovered from cruise lines, and others from passengers. The various levies, fees and charges imposed by government agencies (including regional councils) and port authorities add to the costs faced by the cruise sector. The main levies and fees incurred are:

1. International Visitor Conservation and Tourism Levy (IVL): Levy charged to most international visitors to New Zealand to mitigate tourism and conservation costs associated with international visitation. Australian citizens or permanent residents and many Pacific Island countries are exempt and data for 2019 suggest that 59% of international arrivals incur this levy; the balance (41%) of visitors are from Australia and Pacific islands, so do not pay this levy. From 1 October 2024, the IVL increased from $35 to $100 per eligible visitor. This levy is paid by all tourists (not just cruise passengers) as part of their visa application when coming to New Zealand.
2. Maritime Levy: Maritime New Zealand imposes two sets of charges; a marine safety levy and an oil pollution levy. For cruise ships (foreign vessels) the maritime safety levy is charged per port call and calculated based on passenger capacity, gross tonnage, and dead weight tonnage. The oil pollution levy is charged per gross tonne of the vessel per port call. Updated Levies came into effect 1 July 2024.
3. Petroleum and Engine Fuel Monitoring Levy: This levy applies to petroleum or engine fuel that is specified in the Excise and Excise-equivalent Duties Table as motor spirit, diesel, biodiesel and ethyl alcohol. It is calculated based on gross weight tonnage and paid by cruise lines when purchasing fuel in New Zealand. On the 1 July 2024 the levy decreased to 0.69 cents per litre from the existing rate of 0.72 cents per litre.

[24] Akaroa, Timaru and Kaikoura are also part of Canterbury, but host significantly fewer ship calls compared to Lyttelton

4. **Border Clearance Levy:** Managed by New Zealand Customs Service and Ministry for Primary Industries (MPI), this levy covers the cost of customs and immigration checks. The levy is imposed on each cruise ship and charged on a per passenger basis, which cruise lines incorporate into cruise ticket prices. The total cost per traveller arriving and departing on a cruise ship is $26.61 (until 30 November 2024). From 1 December 2024, this will increase to $34.43[25].
5. **Port Fees:** These fees are paid directly to individual port authorities and charges vary depending on the port. Specific port fees are not readily (publicly) available.
6. **Environment Southland Marine Fee:** This is unique to Southland and comprises a fee that each cruise ship operator, who is a signatory to the Deed of Agreement, must pay for each visit to the internal waters of Fiordland and Stewart Island. The fee is calculated based on the vessel gross tonnage.

Willing to pay, but need time to adjust to new cost structures

The broad consensus appears to be that cruise lines are entirely comfortable 'paying their fair share' towards the environmental policies and wider processes. Indications are cruise lines need a lead-time of approximately 18 months to adjust prices in response to new/altered levies and regulatory costs. In the absence of adequate consultation, transparency about how the costs were estimated, and an unclear relationship between the cost changes, inflation, and the change in level of service, there are perceptions that central government does not understand the true costs and business challenges.

A range of changes to the levies have been implemented over the past 6-12 months (see Appendix 4). The speed at which the changes have been rolled out was a recurring theme and a key point of frustration across many parts of the sector. The message is that the additional cost changes being imposed on the cruise sector within a short period means that the cruise lines must absorb these costs. Despite raising issues during the consultation period, the cruise lines asserted that the changes proceeded as planned.

Assessing the flow-on effects and implications of levy increase is beyond the scope of this assessment. However, it is still worthwhile to mention the anticipated effect of the levy increases from a cruise line perspective. In the interviews cruise lines stressed that most levy increases that came in effect from December 2024 have been implemented at short notice and outside of the normal levy cycle, providing cruise lines with circa six months' notice. Cruise lines stated that they sell tickets typically at least 12 months in advance, and therefore any fee increases imposed with little warning cannot be passed onto passengers through tickets. According to the interviews, the levy increase that cruise lines couldn't budget for, impacted their bottom line and their deployment decisions for New Zealand. Based on the estimated financial profile of a typical cruise and based on the global sector, the scale of the change is illustrated in Table 2-2.

Over a typical five-day cruise, the net profit is $330. A seven-day cruise would return a margin of $461.50. The announced changes in the different levies (Maritime Safety Levy, Oil Levy and Border Clearance Levy) would add a combined cost of $26.64 per passenger – leading to a 6% to 8% drop in margins through ticket prices should the operating model remain unchanged.

[25] These are amounts originally proposed by Customs during the consultation process of setting the levies for the next 3 years and were used in the modelling of economic effects for this report. Modelling and analysis was completed between September and October 2024, so due to timing, finalised amounts could not be incorporated in the economic assessment. For the sake of completeness, final figures are also presented in Appendix 4.

Table 2-2: Financial profile for a typical cruise

Profile	Cost (Global estimates expressed in 2024 $NZ terms)
Daily revenue per PAX	$426
Direct and indirect costs[26]	$360
Margin	$66

Note: The values are expressed in NZ-Dollar terms using an exchange rate of 0.60848, sourced from XE.com (09/10/2024).

Source: M.E calculations based on Cruise Market Watch data

The overall change (additional costs) accruing to cruise vessels is estimated at:

- Using a vessel with 3,000 PAX, and the Gross Weight Tonnage (GWT) of 110,000 visiting eight ports, the additional levy charge is estimated at $79,900.
- Indicatively, the annual increase is estimated $5.2m i.e., the additional cost falling to the cruise lines based on the 2023/24 season.

The limitations of this example and the considerable variation in real world impacts are acknowledged, but this business implication is clear.

The effect associated with cost increases and regulatory challenges, as well as global shifts in deployment patterns, may influence a more downbeat growth future as observed for the planned 2024/25 and 2025/26 New Zealand cruise season.

2.3.3 Economic impacts

CLIA's sector engagement includes reporting and producing the economic impact of the global cruise sector. CLIA uses a standard economic impact analysis approach applying Input-Output (IO) models (see Appendix 7 for additional details) to produce their economic impact reports. IO models are widely used around the world and in New Zealand to estimate the economic impacts of industries and economic development initiatives. IO models have limitations – a key assumption is that the structure of the economy will remain stable and will not change. Care is needed when applying IO models to highlight their limitations. A strength of IO models is that they are transparent, and fine spatial definitions can be developed (i.e., modelling the impacts of small areas, such as Local Boards and Territorial Authorities).

IO modelling provides valuable insights into the cruise sector by analysing the economic interactions between the cruise industry and various related sectors. Since the cruise sector has several supply chains and involves multiple industries—such as retail, stevedoring, energy, port services and government services — IO modelling helps illustrate the economic effects of how these relationships flow through the economy. When cruise passengers and crew go onshore in New Zealand, they engage directly with the New Zealand economy by spending foreign exchange locally. Similarly, cruise lines pay for goods and services, stimulating the New Zealand economy. The spending supports local businesses and jobs, and the demand created by this spending flows through the economy, supporting other businesses and creating further rounds of economic impacts. The impacts are predominantly felt in the region where the spending takes place, but a portion of them are felt in other regions because businesses' supply chains cross regional boundaries.

[26] See Appendix 6.

This section presents an overview of the estimated economic contribution of the spending in the economy by cruise passengers and crew, as well as the spending associated with the vessels when coming to New Zealand, as outlined in the section above.

Note: The economic impacts should not be equated with benefits. The GDP and employment impacts are economic measures. For example, GDP includes salaries and wages. These are costs to a business but a benefit to the employee. GDP does not reflect environmental costs and externalities.

The results show the economic impact of spending over the 2023/24 season and form the baseline against which different futures can be compared. The two metrics reported are Gross Domestic Product (GDP) and employment – the standard metrics used when assessing economic impacts.

Employment is measured by Modified Employment Count (MEC), which represents a headcount of workers supported by the economic activity generated. Put differently, it is a count of employees, modified to include working proprietors, supported by the additional Value Added (VA).

To estimate the economic impact, expenditure associated with the cruise sector as presented in section 2.3.1 is mapped across 109 economic sectors in Market Economics' proprietary multi-regional input-output (MRIO) model, which covers 16 regions[27]. The model is developed using StatsNZ data, specifically New Zealand-wide Input-Output Tables, and Supply and Use Tables. This model tracks the flow of transactions through the economy, enabling estimates of the associated VA and employment impacts from all economic activities. The direct and indirect as well as the total impacts (including induced impacts) were assessed. Care should be taken when interpreting the induced impacts because this part is often seen as somewhat controversial. The induced impacts relate to how salaries and wages are spent by households and then flow through the economy, creating additional rounds of economic impacts, and is often seen as large because potential economic responses. In addition, the potential for resources to shift/be reallocated between sectors, or price responses due to different demand levels, are not modelled in an IO. Instead, IO modelling assumes that the input structures remain stable and do not change. This is an important limitation of IO.

The economic impacts are associated with the supply chain effects, and they show the VA impacts as the initial cruise-related spending flows through the economy. These impacts can be defined as follows:

- Direct and indirect impacts' – when a visitor (or business) spends (new) money in the local economy, businesses respond by firstly increasing (or decreasing) activities associated with supplying the goods and services needed to address that initial demand. The direct effect captures the initial responses. Next, all firms supplying the businesses responding to the initial spending, adjust their outputs, stimulating further rounds of impacts. This continues throughout the supply chain, creating other rounds of impacts. The further (flow on) rounds of activity are needed to meet the extra demand, and the subsequent rounds are called the indirect impacts.

[27] The model reflects the sectoral attributes (and variations) across the different regions i.e., the economic structure associated with each region, and how regions interact with each other (buying from/selling to) are captured in the model.

- **The induced impacts**: As firms respond to the economic change (the direct and indirect impacts explained above), they employ additional workers or increase staffing hours. This leads to a lift in salary and wage payments to households, i.e., more salaries and wages paid to workers in return for their labour. Businesses also take additional profits as operating surpluses increase – this is partially returned to households through returns/dividends paid to business owners or investors. As households spend their returns or earnings, another round of effects is created (i.e., household spending). These are termed induced impacts.
- **The 'total impact'** reflects the sum of the direct, indirect and induced impacts.

Some critique of IO modelling suggests that total impacts are optimistic, and that IO modelling does not reflect structural shifts in an economy and relies on fixed relationships.

The direct impacts are not controversial and seen as the 'at least value'. Despite the critique, there is merit in considering the indirect and induced impacts because there are linkages and supply chain effects in the economy. It is also possible to reduce some of the wider, flow-on effects by being more conservative during the model closure process (when households are included in the model). Therefore, both the direct, indirect and total impacts can be used, but it is essential to understand the limitations.

CLIA AND NZCA ECONOMIC IMPACT ASSESSMENT

An economic impact assessment jointly commissioned by Cruise Lines International Association (CLIA) and the New Zealand Cruise Association (NZCA) was released in October 2024. It reports the economic activity generated by the cruise sector in New Zealand during the 2023/24 season. It is the first national economic impact assessment since COVID-19 disrupted operations in 2020 and StatsNZ ceased collecting information about cruise sector tourism.

The results presented in that study differ from the M.E estimates for several reasons (note, we comment on the information presented in the media release because it is publicly available).

- While the assessment uses a similar methodological approach to the M.E report, national multipliers were used. M.E uses a bespoke multi-regional IO model, with 16 regions. In addition, we use a different technique to estimate the impacts (not multiplies).
- We report a different metric. M.E report the economic impact using GDP while CLIA/NZCA reports 'economic output' or 'economic activity'. This is 'total output or gross output' (GO). In our view, GDP is the appropriate metric because it shows the value added in the NZ economy, after adjusting for matters such as using goods that have been imported in the local production process. GDP gives a clear picture of the economic value, showing the actual increase in wealth or income created by the activities being assessed (which in this case is the spending by passengers, crew and vessels).
- The CLIA/NZCA assessment includes the spending by domestic passengers, i.e., New Zealanders onboard cruise ships. In contrast, M.E adjusts the spending totals to account for transfers and displacement. It is our view that only 'new money' coming into the economy should be reported as an economic impact. This adjustment has a relatively minor impact on the results.

In terms of the estimated size of the cruise sector, and how much spending it facilitates, the M.E and CLIA/NZCA estimates are broadly aligned.

Using the spending estimates (section 2.3.1) about how the cruise sector interacts with the rest of the economy, we estimate the GDP impacts of the sector. Table 2-3 presents the distribution of impacts[28] for the 2023/24 season. Cruise tourism contributed $800m in GDP to the economy – the largest share (as expected) is felt in Auckland (32%). More than three quarters (76%) of the total impact (GDP) can be attributed to visitor (passengers and crew) spending. The remaining GDP is associated with the vessel-related spending. The results are presented in 2024 Dollar terms.

Table 2-3: Economic impacts of the 2023/24 cruise season

2023/24 season	GDP $m	Jobs (MEC)
Direct + Indirect impacts	$572	8,790
Induced impact	$228	3,145
Total impact	$800	11,930

Source: ME calculations

Employment supported by cruise tourism activity is approximately 11,930 jobs (MEC) during the 2023/24 season. Note, this does not imply that these are all new jobs, but rather that this is the level of employment being sustained by the economic activity (GDP) generated by the additional cruise-related spending. A regional breakdown of the economic impacts is included in Appendix 3. Apart from its economic contribution, cruise activity also causes disruption to commuter ferries in Auckland, leading to adverse economic impacts. The next section discusses the effect of cruise activity on ferries in Auckland but could not quantify the impact of disruption in dollar terms due to a lack of information about the frequency and size of disruptions (i.e., how many commuters are on the disrupted ferries).

2.3.4 Disruptions and curfew agreement

Cruise vessels, while contributing to tourism revenue, can also disrupt other port activities with flow-on implications for other users and communities. These disruptions arise from various factors, including congestion at ports, strain on local infrastructure and vessel movements outside of agreed curfews. It appears that Auckland is the main location where some of these disruptions are occurring. Other disruptions to aspects such as public transport due to an influx of cruise passengers can also occur (section 2.5.3 describes recent examples of such disruptions). This section explores the ways that cruise vessels can hinder economic productivity using Auckland as an example.

In Auckland, the arrival and departure of cruise ships at Princes Wharf have been blamed for causing disruptions to commuter ferry services. Local commuters have expressed frustration, believing that cruise ship tourists are taking precedence over their daily travel needs.

To mitigate the impact, a morning and evening stand-down period was agreed to. These exclusion windows during peak commuting hours stipulate that cruise ships larger than 500gt cannot operate their thrusters when alongside a berth in the Downtown Ferry Terminal Basin or move through the basin. In the 2023/24 season the no-movement period spanned:

- 6:30am to 9:05am and 4:30pm to 6:05pm on weekdays, and
- 8:30am to 12:00pm and 4:30pm to 6:05pm on weekends and public holidays.

[28] Adjusted for GST. The total impact exclusive of GST is estimated at $685m.

While the stand-down periods for cruise ships are stipulated by the Auckland Transport Harbourmaster, the port company has worked with cruise operators, industry groups, and Auckland Transport (AT) to agree to the hours.

An extension to the afternoon exclusion period took effect at the start of the 2024/25 season, on 1 October 2024. Going forward, cruise ships are prevented from manoeuvring or using their thrusters within the ferry basin between 4:30pm and 7:05pm on weekdays and between 4:30pm and 6:05pm on weekends.

Ferry commuters might still experience disruptions outside these times, since many ferry commuters travel outside the protected hours. The primary reason for these disruptions is said to be safety. Cruise ships use powerful engine thrusters that create strong underwater currents, making it hazardous for smaller ferries to navigate the ferry basin.

According to information provided by Port of Auckland (POAL), during the 2023/24 period, four cruise ships had to unexpectedly use their thrusters or moved within the ferry basin during the no-movement period due to emergency situations. POAL indicated that over the 2023/24 season, 51 ships berthed at Princes Wharf, which has the potential to impact scheduled ferry sailings.

The ferry schedules published by Auckland Transport show eight ferries operate before 6:30am across the Auckland network. There are 77 ferry services (trips) operating between 6pm and 10pm on weekdays. Of the 77 services, 26 are scheduled between 6pm and 7pm and 51 between 7pm and 10pm. This suggests that during the 2023/24 cruise season, on weekdays, up to 85 trips were 'at risk', i.e., could potentially be affected by cruise ships arriving and departing. Over the coming season, with the extended exclusion period, the total number of weekday services potentially affected falls to 59. Stakeholders are said to be liaising and communicating schedule changes well in advance to minimise the impact of cruise ships on commuters.

According to media reports[29] 98 ferry sailings were affected (either cancelled or delayed) in December 2023. The most affected route was the Devonport ferry, with 81 cancellations. By the start of February 2024, it was reported more than 260 ferry trips have been disrupted in Auckland by cruise ships.[30] We were unable to confirm these numbers with the Harbourmaster's office.

To get a sense of the level of potential impact of ferry operations from cruise ships, we combined several data sources and made assumptions, such as:

- all cruise ships arrive and leave on weekdays;
- all cruise ships arrive before 6am and leave between 6pm[31] and 10pm, i.e., maximising the potential number of ferries trips affected[32];
- the distribution of ships berthing at Princes Wharf over the season is similar to cruise ship calls to Auckland.

Based on these assumptions, there were 9 days in December 2023 when a cruise ship was berthed at Princes Wharf. This implies 765 ferry trips were at risk of being affected. The actual disruptions in December 2023 (98 trips), reported in the media, are therefore less than 13% of the potential number of trips that could have been disrupted by cruise ships. Another later report (February 2024) suggests 260 disrupted trips were delayed or cancelled by the first week of February 2024. Using a similar methodology and assumptions, suggest the actual disruptions (260 trips between October and January) make up less than 10% of 'at risk' ferry trips (2,550 trips over the same period on weekdays before 6:30am and between 6pm and 10pm).

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[29] https://www.newshub.co.nz/home/new-zealand/2024/01/auckland-residents-fed-up-with-frequent-ferry-cancellations-to-allow-cruise-ships-to-dock.html
Port Sees Nearly 100 Ferries Delayed or Cancelled by Cruise Ships (cruisehive.com)

[30] https://www.stuff.co.nz/nz-news/350167475/were-ones-get-penalised-ferry-user-laments-cruise-ship-disruptions

[31] This reflects the situation prior to the extension of the curfew (exclusion period).

[32] This could overstate the impact but is viewed as a conservative approach.

In the short term, the extended exclusion period and fewer cruise ships arriving over the 2024/25 season changes the risk profile, decreasing the number of 'at risk' services. If there had been an extended curfew last season, there would have been 3,927 ferry trips 'at risk' (versus 4,335). Combining the extended blackout period with fewer ships on Princes Wharf, more than halves the 'at risk' services for the season (2,002 versus 4,335). To minimise disruptions over the longer term, POAL has included a purpose-built cruise facility in its long-term planning. The Port is currently developing its Central Wharves Masterplan which includes proposal for a more suitable base for cruise ships and separating cruise from ferry activities, with the aim of eliminating the conflicts.

It is understood that the Harbourmaster's directive does not prohibit smaller vessels from operating in the ferry basin during cruise ship movements. The decision to halt operations was reportedly made by ferry operators due to health and safety concerns but the specific link (causality) to cruise ships is disputed. Conversely, a Fullers360 spokesperson stated that Auckland Transport's pre-agreed standard operating procedure prevents all ferry operators from operating in the basin while a cruise ship is arriving or departing, due to the significant wake and wash generated during these manoeuvres.[33]

This issue appears to be unique to Auckland. In Sydney, disruptions to ferry services caused by cruise ship movements are uncommon. Ferries there can continue operating while cruise ships are manoeuvring. It was highlighted, though, by one of the stakeholders that we interviewed that the basin in Sydney is somewhat wider than in Auckland.

One of the primary ways to measure the economic impact of disruption is by calculating the lost productivity due to delays. This involves estimating the number of hours commuters spend in traffic because their ferry was cancelled or waiting for transport because the ferry trip was delayed, and then multiplying it by the average wage rate. However, because we were unable to obtain information about the exact number of commuters who were affected by delays and cancellations or what their options were for getting to their destination (e.g., working from home, taking a bus to work, driving a private car to work, etc.), we were unable to quantify this. A more detailed survey would need to be completed to provide an estimate of the lost productivity.

2.3.5 Wider economic effects

The cruise sector delivers an array of other economic effects. Some of the dollar values associated with these effects are already included in the values reported above, but it is worth highlighting the wider effects. These effects include:

- Distribution of port profits: Commercial entities operate New Zealand's ports, with the expectation of returning a dividend to their owners. Councils have partial ownership of many ports with dividends returned to them. Cruise ships generate port revenue and the engagement process suggests that the share of total revenue generated by cruise ships is between 0.5% and 7%. However, estimating the direct impact on ports' bottom line and dividends is challenging, but cruise activity determines a portion of it. The dividends that are returned to councils supplement council revenues, enabling them to deliver a range of services to ratepayers without loading the costs onto households.
- Environment Southland Marine Fee (ESMF): The ESMF generates revenue that is used for environmental research projects and the management of the Southland coast. The ESMF supplements Environment Southland funds. These additional funds are leveraged and combined with wider funds, enabling Environment Southland to deliver a range of projects that would not be possible within the ESMF.

[33] https://www.stuff.co.nz/nz-news/350167475/were-ones-get-penalised-ferry-user-laments-cruise-ship-disruptions

- **Conferences**: The cruise sector has an industry body (New Zealand Cruise Association). The NZCA hosts annual conferences around New Zealand. The 2024 conference was held in Auckland and had over 240 attendees. The conference is held in different locations around New Zealand, distributing the economic effects across the regions (e.g., the conference of 2025 will be hosted in Napier).
- **Return visits**: According to CLIA research, more than 60% of cruise passengers indicated that they have returned to a destination that they have first visited via a cruise. This share could not be varied against other sources. Taking a conservative approach by reducing the relative share for first-time cruise passengers, optimism bias and New Zealanders on the cruises, and applying the average spending per visitor to the 2023/24 cruise passengers suggests that the return visits could add $133m of visitor spending. This figure is for illustrative purposes only and is highly uncertain[34] and the time over which the intent to return plays out is not known. Nevertheless, the potential contribution is material and for comparison, the spending is around 1% of total international visitor spending[35]
- **Leverage events:** Another potential benefit of the cruise sector relates to a facilitated effect associated with supporting New Zealand to host large, international events. For example, during the 2011 Rugby World Cup, three cruise ships were berthed in Auckland. These ships added additional accommodation capacity and an estimated 5,550 passengers were hosted in Auckland. These ships were in Auckland during the semi-final and final weeks. Providing additional accommodation capacity assisted Auckland to leverage additional economic impacts during the marque event.

2.4 Environmental

The cruise industry has effects on marine ecosystems, air quality, and local communities. These environmental effects influence the cruise sector's social license to operate, as communities and stakeholders increasingly demand improvements in sustainable practices. Regulatory entities are improving regulation and imposing stricter environmental standards to deal with emerging issues and risks. Despite the normal justification for such change and responsiveness, the changes escalate the costs of compliance.

Cruise lines are working to actively reduce their environmental footprints. Industry commitments towards goals such as being net zero carbon by 2050, aligning practices to the United Nations Sustainable Development Goals (SDGs) as well as measuring performance and progress towards meeting the stated commitments, signals positive progress and intentions. However, some (global) community segments have views around the environmental effects of cruise vessels and see the environmental effects as significantly adverse. Furthermore, some segments[36] see the trajectory associated with reducing the environmental effects as too slow.

While industry-led actions to reduce environmental footprints are valuable, international conventions and regulatory responses provide more certainty and a formalised structure to ensure compliance. The International Maritime Organisation (IMO) is a part of the United Nations and is responsible[37] for measures to:

- improve the safety and security of international shipping as outlined in the International Convention for the Safety of Life at Sea (SOLAS)[38],

[34] This comparison uses only a quarter of the CLIA rate.
[35] (Stats NZ, YE March 2023).
[36] This includes environmental groups.
[37] (International Maritime Organisation, 2024)
[38] https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx

- prevent pollution from ships as outlined in International Convention for the Prevention of Pollution from Ships (MARPOL). Crucially, all waste associated with ships is regulated via MARPOL.[39]

MARPOL includes regulations aimed at preventing and minimising pollution from ships and consists of six annexes. New Zealand has been a member of the IMO since 1960. Despite MARPOL and country-specific legislation, the cruise sector faces increasing public scrutiny to manage and reduce its environmental effects. Detailed descriptions of the MARPOL regulations are, however, beyond the scope of this assessment.

The cruise sector operates across the globe and often takes passengers to significant natural landscapes with pristine environments, and sensitive marine ecosystems. The cruise lines acknowledge the risks of pollution and environmental effects and work to mitigate and reduce them. Nevertheless, the environmental impacts of cruise ships can be significant and multifaceted, affecting the marine environment, air quality, and coastal communities. The concentration of cruise ship operations in specific coastal areas and port destinations contributes to the cumulative impact on local environments. There is a vast body of literature and analysis on the environmental risks and how to manage or mitigate against these risks.

International literature suggests that the cruise sector's main environmental effects are associated with:

- Emissions and air quality,
- Water quality and waste,
- The marine environment.

The environmental effects associated with the cruise sector in New Zealand are summarised using the following headings:

- Emissions and air quality,
- The marine environment,
- Environmental risks.

In terms of regulations governing emissions, waste and pollutants, New Zealand has acceded to all MARPOL Annexes except Annex IV: Sewerage. New Zealand has not signed up to Annex IV because there are more appropriate ways for New Zealand to meet the same objectives, specifically through the Resource Management (Marine Pollution) Regulations 1998, which control the discharge of sewage from maritime sources into the marine environment.

Understanding and addressing these environmental effects is essential to managing growth and minimising damage to the destinations and waters frequented by cruise ships.

2.4.1 Emissions and air quality

The maritime sector[40] contributes to global emissions. The IMO has a long track record in terms of assessing ship emissions and developing policies to reduce emissions. These policies are based on a mix of technical, operational, and market-based approaches[41].

A key challenge in estimating emissions is the availability of quality information about vessels, the diversity in elements covered, and wider factors that influence emissions. These wider factors include:

- Operating considerations for each vessel i.e., manoeuvring, at anchor, cruising, at berth,
- Design features, i.e., engines technology and fuel, draught,
- External factors, such as the weather, hull fouling, and
- Sailing conditions while underway and moving across oceans.

[39] MARPOL is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.
[40] That is, all maritime vessels, not just cruise ships.
[41] (Marintek, Econ, Carnegie Melton, DNV, 2000).

These factors have a large influence on overall emissions as emitted on a per vessel basis. For example, hull fouling can increase power demand by an individual ship[42] by about 7%. The size of this impact also varies based on a ships age and maintenance schedule with ranges of 2%–11% reported[43].Increasing energy use lifts the operational costs of a vessel and lowers the return to owners. Therefore, there is an incentive to maintain the hull to a high standard.

With reference to the operating conditions, emissions are a function of the energy used by a ship during different parts of the journey. A ship typically has a mix of the following types of engines:

- Main engine (ME),
- Auxiliary engine (AE), and
- Boiler power (BO).

The power demanded from these engines varies depending on the phase in which the ship is operating. Main engines are normally turned off at berth and at anchor. Auxiliary engines are typically always on, and boilers (if fitted) are normally turned on during low-load activities such as manoeuvring, berthing and anchorage.

Estimating global emissions associated with sea-going vessels also require a list of all vessels, their movements, engine data and operations. The most recent global emissions modelling and assessment was conducted in 2020 and estimates are reported in the fourth IMO greenhouse gas study[44].

Cruise ships account for a small portion of the global vessel numbers – 0.5% of the global fleet.[45] Globally, as share of total vessels, cruise ships account for 2.8% of emissions[46]. Cruise ships' average fuel consumption rates, and emissions, are comparatively high and consequently, overall emissions on a per ship basis are relatively elevated. A portion of cruise ships' total emissions are related to the movement between ports. In contrast to cargo and transport ships, cruise ships have high rates because a substantial portion of energy use relates to the accommodation and entertainment functions of cruise ships.

In terms of the trends in fuel use, the general direction is downward. The drop in fuel consumption is due to a combination of changes in design parameters (including average installed power), operational parameters (including average speeds and days at sea), and in average ship sizes over the years (economies of scale).

2.4.1.1 Estimating emissions

Total emissions can be estimated using different techniques and are a function of distance sailed, time in port as well as the speed of the voyage (i.e., how fast the ship is sailed). Appendix 8 provides an outline of the approach used to estimate emissions. The general approach is based on fuel/energy requirements and energy-based emission factors. The IMO work around global emissions reports total emissions across vessel types. We draw on IMO information as well as work by other institutions, such as the International Council on Clean Transport, to estimate emissions for the New Zealand cruise sector. Published emissions factors are combined with engine load factors and information about energy requirements by vessel phase (at berth, manoeuvring, sailing). Other factors such as hull fouling and vessel age are captured in the analysis. The total distance sailed between New Zealand ports is estimated using LINZ data (distance between ports). The emissions (e.g. tonnes of CO_2), are expressed in monetary terms by applying a cost factor such as the shadow price of carbon or another appropriate metrics.

[42] All ships, not only cruise ships.
[43] (Olmer, Comer, Roy, Moa, & Rutherford, 2017)
[44] (International Maritime Organisation, 2021)
[45] (International Maritime Organisation, 2021).
[46] (International Maritime Organisation, 2021) (based on data in Table 35).

Using the 2023/24 itinerary and ship details[47], the total emissions for the season are estimated. The carbon equivalents are derived using standard factors to show the greenhouse warming potential (GWP25) as per the Ministry for the Environment guidance[48]:

- Carbon Dioxide (CO_2) 1
- Methane (CH_4) 28
- Nitrous Oxide N_2O 265.

The vessel emissions are estimated at 904,780t $CO_{2\text{-e.}}$ This estimate includes:

- The domestic portion of the cruise activity (cruising between New Zealand ports),
- Manoeuvring (berthing and departing),
- Time in port (generating energy for internal use),
- Half of the emissions associated with the international cruise portion[49] (e.g., only half of the Auckland to Sydney leg's emissions is included in the estimates),
- Emissions associated with shore excursions.

The emissions associated with the auxiliary engines contribute almost half (46%) of the total emissions with the requirements associated with supplying energy to the accommodation and entertainment functions driving this requirement. The international segments account for marginally less than 9% of emissions.[50]

For context, the emissions ($CO_{2\text{-e}}$) for maritime emissions (excluding cruise ships and recreational boats) in the 2018/19 year was estimated at 993,760 tonnes ($CO_{2\text{-e}}$)[51]. More recent estimates were unavailable but considering the growth in economic activity and the associated transport load would suggest that the emissions from cruise ships in New Zealand is likely to be slightly less than the emissions of that of maritime transport.

Emissions can be expressed in dollar terms using a price. There are different 'prices' for emissions, including:

- The market price for carbon emissions. This price is determined by New Zealand's emissions trading scheme (ETS),
- The Social Cost of Carbon (SC-CO_2)– this is an estimate of the global damage from one additional tonne of carbon in the atmosphere.
- The Shadow Price of Carbon (SP-C) as presented by the likes of the New Zealand Transport Authority.

The market price for carbon is shown in the spot price[52] and the current price for New Zealand carbon units is $62.50. Estimating the SC-CO_2 is complex and highly dependent on assumptions, typically leading to varying estimates, each with a wide range of uncertainty. The price is estimated at US$185/tonne with a wide range (US$44 – US$413/tonne). The mid-value translates into NZ$304/tonne. In terms of the Shadow Price of Carbon, the values are estimated at between $71/tonne and 143/tonne and the midpoint value is reported as $107/tonne[53]. The values have been updated to 2024-Dollar terms using price inflators.

The different approaches have different price values. According to NZTA[54], shadow pricing can be based on an estimate of the damage caused by each additional tonne of $CO_{2\text{-e}}$ (social cost of carbon) or on the full marginal

[47] Published information about the cruise ships are used, this includes engine size, number of engines and so forth. Data about auxiliary engines are not readily available. The engine capacity of the main engines (e.g., kW) are used as proxy for size and energy requirements/loads of auxiliary engines.
[48] (Ministry for the Environment, 2024)
[49] This approach implies that the emissions associated with the international leg are shared between origin and destination. This approach is also used in other studies that attempt to allocate emissions between locations.
[50] The international legs account for 18% when the total voyage is counted (e.g., 100% of Auckland to Sydney).
[51] (Kushel, 2022)
[52] (ETP-EMS Tradepoint, 2024) as at October 2024
[53] (New Zealand Transport Authority, 2021)
[54] (New Zealand Transport Authority, 2021)

cost of achieving a given domestic or international emissions reduction target (target consistent shadow price). Most international jurisdictions use the latter approach because of its stronger empirical basis and link to defined targets. Shadow prices are different from market traded prices in the Emissions Trading Scheme (ETS), which do not currently reflect the marginal cost of achieving New Zealand's emission targets. Therefore, the SP-C is used to value the emissions[55]. Crucially, the shadow price is applied to each future year over a given period, creating a 'shadow price path' and the NZTA shadow price follows an upward trajectory – increasing to $189/tonne by 2050.

Based on the SP-C, the estimated 'value' of the $CO_{2\text{-}e}$ emissions associated with the 2023/24 season is estimated at:

- Low-price $64.5m,
- Mid-price $97.2m,
- High price $129.0m.

These values reflect the 2023/24 cruise season's emissions and the 2024 shadow price of carbon ($/t). Over the long term, the shadow price will trend upwards. By 2050, the shadow price of carbon is 76% higher than in 2024.

Importantly, the shadow price of carbon does not include the social costs associated with emissions, such as the health effects of emissions. To estimate these effects, the change in air quality directly caused by cruise ships and detailed information about the people in the airshed is required. Available information does not support efforts to estimate the health effects (and the costs) of cruise ships while in port. This is consistent with challenges faced in international locations where attributing health effects (from air quality) directly to cruise ships is complex and limited by issues around:

- Measuring air quality and linking air quality outcomes to cruise ship emissions. Weather variability can significantly impact measurement accuracy.
- Micro-conditions influence emissions dispersion and pollutant behaviour.
- Identifying cruise ship emissions while in port needs detailed information about fuel use, emissions control technologies, operating practices and so forth. This information is often unavailable.
- The influence of other land uses or emitters in proximity to a port is difficult to isolate.

2.4.1.2 Alternative fuels and shore power

The cruise industry is under increasing pressure to address sustainability and decarbonise. Managing fuel use and changing the fuel mix are often cited as key actions that the cruise lines can take to reduce emissions. Fuel used varies depending on the vessel phase (e.g., manoeuvring, at berth or sailing) and vessels can use different fuels for each phase. The type of fuel that is used is determined by the overall load and engine efficiency considerations. As mentioned, cruise ships have different energy requirements associated with the engines (main engine, auxiliary engine, and boilers).

Literature on cruise-sourced air pollution highlights the spatial distribution of emissions. At a global level, emissions are concentrated along busy cruise routes and locations such as the Caribbean and Mediterranean.[56] Cruise vessels can also contribute towards local emission concentrations while at port. However, measuring the specific concentration (or relative contribution) is difficult because local weather factors reduce the ability

[55] The Shadow Price of Carbon as used is consistent with NZTA guidance and recommendations to use consistent carbon pricing.
[56] (Norwegian Maritime Authority, 2017)

to collect accurate samples. For example, wind strength and direction, inversion layers and other activities can impact readings.

In a bid to reduce air pollution, cruise ship operators have been investing in fossil gas (LNG) as an alternative fuel.[57] However, although LNG does cause less air pollution, from a climate perspective, LNG is more damaging due to methane slip. Methane is a potent greenhouse gas, over 80 times more climate warming than CO_2. Over the next five years, an increasing number of ships will either use alternative fuels or be able to incorporate zero-carbon fuels once available at scale.[58]

Reducing emissions is an important priority for the cruise lines as well as New Zealanders. During the stakeholder engagements cruise lines and ports were asked about this and most are of the view that there are currently two options, i.e., Liquid Natural Gas (LNG) and shore-power:

- LNG is a cleaner alternative to traditional marine fuels. It can cut carbon dioxide ($CO_{2\text{-}e}$)[59] emissions by up to 40%. However, LNG may be more damaging due to methane slip – the release of unburned methane into the atmosphere during the storage, transportation, or use of methane. Methane is a greenhouse gas with global warming potential that is 30 times greater than CO_2.
- Connecting to shore-side electrical power while in port ('cold ironing') allows cruise ships to shut down their diesel engines. This reduces greenhouse gas emissions and air pollutants. See Appendix 9 for international experiences of investing in shore power projects.

Like their international counterparts, New Zealand's ports are exploring options around the required investment. Capital costs and the potential uptake rates across all vessels, not solely cruise ships, are undermining the ability to get the necessary investment proposals approved.

Available information and industry feedback suggest that capital costs and the potential uptake rates across all vessels, not solely cruise ships, are undermining New Zealand ports' ability to get the necessary investment proposals/due diligence approved for infrastructure associated with alternative fuels.

The following pertinent points were raised during the engagements:

- The capital cost associated with providing shore power was mentioned as a key barrier. Broad estimates by POAL estimate the level of investment in the order of $18.3m with a range between $12.8m and $23.8m in 2017-Dollar values[60]. Adjusting these values for price changes to 2024 suggests that the current range is between $18.7m and $34.7m with a mid-value of 26.7m. Other ports indicated that the required investment could be in the $40m-$50m range.
- The availability of electricity to supply ships.
- The capacity of the transmission grid to cope with additional load. Some suggested that the power required for a cruise ship could equal that of the communities where they dock.
- The nature of demand is 'peaky', suggesting that it adds uncertainty to the grid by making it difficult to manage load.
- Shore power has been seen as a potential investment option for the past 25 years, with many options explored but the 'financial returns' appearing elusive.

[57] (Transport & Environment, 2023; Cruise Lines International Association, 2023)
[58] (Cruise Lines International Association, 2024)
[59] Based on the 2023/24 cruise period, and assuming that all ships can switch to LNG and using emissions factors in Olmer, Comer, Roy, Moa, & Rutherford (2017).
[60] (Advisian (WorleyParsons Group), 2017)

- There is also a lot of uncertainty about what ships will choose. It was mentioned that the Port of Sydney is currently installing shore power, the first port in the region to do so.

With reference to operating cruise ships using alternative fuels, Liquefied Natural Gas (LNG) is a common alternative that is mentioned and explored. LNG is predominately methane (CH_4) with some mixture of ethane (C_2H_6). Some (<10%) of the cruise ships that visited New Zealand during the 2023/24 season are capable of operating on LNG but the degree to which these vessels operate on LNG is unknown.

New Zealand does not currently have a domestic source of LNG nor the port infrastructure to enable importation or export. Imported LNG would require upfront investment in this type of infrastructure. A report for MBIE on LNG importation options[61] identified four concepts that could be pursued. However, the infrastructure investment required to enable LNG importation is significant, and is put at:

- Marsden Point $250m – $338m
- Port Taranaki $140m to $210m
- South Taranaki Bight $328m to $511m
- Maui-A $426m to $624m

Therefore, bulk quantities of LNG to support cruise or the marine sectors are currently unavailable. Specific storage and bunkering (or barging) systems would also be needed[62] to enable large scale uptake of this opportunity.

It was suggested by cruise line representatives that New Zealand might end up with an older fleet coming here due to the lack of alternative fuels available in the region. Port representatives, however, have indicated that once LNG is well-signalled as the 'fuel of choice' infrastructure can be stood up, but there is great uncertainty at the moment about alternative fuels and the financial implications and practical considerations around rolling out the supporting infrastructure.

New Zealand might end up with an older fleet coming here due to the lack of alternative fuels available in the region. There is uncertainty in the industry about which fuel type will be dominant in future and this is slowing down decision-making and any momentum around investing in alternative fuels.

2.4.2 Marine environment

New Zealand's marine environment offers significant opportunities and holds considerable value. In the marine environment, cruise lines operate under regulations that outline permissible and prohibited interactions. New Zealand acceded to MARPOL and international regulations are enforced locally. In addition, New Zealand also enforces other regulations to mitigate risks associated with other adverse environmental effects, such as biofouling. Furthermore, cruise ships and maritime traffic can generate other environmental effects such as sediment plumes and potential impacts to marine life. Appendix 11 provides additional literature and analysis on the environmental risks to the marine environment as outlined in international and New Zealand literature. The New Zealand values associated with the marine environment are explored below.

[61] (Ministry of Business, Innovation and Employment, 2023), report prepared by Enerlytica, 2023: LNG import and options to increase indigenous gas market capacity and flexibility in New Zealand.
[62] (Advisian, 2017)

2.4.2.1 Biofouling

Vessel biofouling is way for non-indigenous species to enter the New Zealand marine ecosystems. Managing biofouling on hull and in niche areas is actively overseen by the Ministry for Primary Industries (MPI). Once established in New Zealand, foreign marine species can have severe economic and environmental impacts on the marine environment. The potential adverse effects can be significant and avoiding incursions is seen as a way to avoid the associated costs. The potential adverse effects are significant and widespread with cost across:

- initial incursion response,
- aquaculture,
- commercial fishing,
- coastal infrastructure,
- marine tourism and recreation,
- recreational fishing,
- recreational shellfish gathering,
- recreational use of beaches,
- human health, and
- indigenous biodiversity.

Biofouling presents a risk to New Zealand's marine environment which has environmental, economic, and cultural implications. Estimating the exact cost of an incursion is complex. The direct cost of the response might be small when compared to the wider impacts and lost production. Biofouling regulations aim to mitigate these risks, but compliance can be challenging for maritime operators due to costs, logistical issues, and regulatory uncertainties.

Estimating the specific costs is complex and there are limited examples to draw on. The cost-benefit analysis[63] that was completed as part of the process associated with adopting an import health standard for biofouling in 2012 provides clear indications of the scale of the risks. The direct response is an initial, but only a partial, cost consideration of an incursion.

Table 2-4: Response cost of historic marine incursions ($ expressed in 2024 terms)

Incursion	Total Cost (2012 estimates expressed in 2024 $'m terms)
Styela clava*	4.03
Didemnum vexillum*	0.01
Eudistoma elongatum	0.21
Sabella spallanzanii	2.05
Perna perna	0.67
Pyura praeputialis*	0.32**
Undaria pinnatifida	0.19**

* a sea squirt
** partial values

The average cost of responding to an incursion is estimated at $1.5m. These costs are spread over multiple years and relate to each incursion. The 2012 report demonstrates that multiple incursions could be dealt with per year and avoiding incursions would lower the annual costs. However, these direct costs are dwarfed by the wider impacts and lost production. The average value of these wider impacts is put at $71m per year. According to the MPI report, the largest potential impact is on aquaculture activities – 87% of the effect. Within aquaculture, the impacts are concentrated in Greenshell Mussels, and the distribution (% of impact) as follows:

[63] (Occam Economics, 2012)

- Greenshell Mussels $54.5m
- Pacific Oysters $3.6m
- King salmon $3.2m.

These values are based on historic modelling and there have been several developments that mean that forward-looking values could be higher, including:

- The role of seafood and aquaculture as part of New Zealand's economy and growth ambitions is well-published. Aquaculture can deliver protein in a carbon-efficient way when compared to other protein source. Export revenue derived from aquaculture is projected to increase from $528m in 2023 to $770m by 2028 – compound growth of 8%[64].
- The mussel industry is expanding with developments in the Bay of Plenty and Hauraki Gulf. Some of these developments are associated with Treaty settlement processes that add additional importance to avoiding risks. The potential economic impacts associated with the Bay of Plenty aquaculture opportunities are substantial – the wider economic impact of the mussel opportunity is estimated at $142m (Value Added over 30 years).
- Aquaculture and using marine space to drive exports are important priorities for economic development. These priorities include other species for which the risks and potential effects associated with biofouling are unknown. For instance, the Fast-Track list includes the Hananui Project in Southland.
- Biofouling could have a dampening effect on the growth ambitions.

Protecting against incursions and avoiding the adverse effects are important. During the engagement, different views about New Zealand's approach to biofouling were aired:

- Some parties perceived the approach as balanced, with an appropriate level of trade-offs between protecting against incursions and maintaining the ability to use ships.
- In contrast, other parties indicated that New Zealand's approach to biofouling regulations present a high level of uncertainty. The uncertainty was reaching a tipping point, and some parties were unwilling to wear the risks.

The stated uncertainty related to the risk of being turned away (prevented from entering New Zealand waters) because of the vessel's hull not being clean to the required standard. This situation is especially concerning for vessels that have spent the winter in the region where there are no suitable dry dock facilities. The lack of accessibility to suitable facilities to undertake the required work in Australasia was highlighted as a key factor. While the option of cleaning a hull at sea (beyond 12 nautical miles from the coast) was acknowledged, the operational challenges were pointed out. Other options such as perform in-water cleaning at some Pacific Island ports were suggested but again the operational challenges were noted, and it was also suggested that there are perceptions that New Zealand was exporting its problem to the Pacific Islands.

The practical implications of seeking to ensure compliance with biofouling requirements were pointed out. These include scheduling issues, access to suitable facilities as well as the consequences of non-compliance. Assessments of the costs and benefits of potential changes in biofouling (as part of the policy development process) should take these factors into account to provide a comprehensive assessment of the potential effects. Such an assessment would need to reflect the foregone economic effects (benefits) when cruise vessels cannot enter New Zealand waters due to biofouling.

This assessment does not reflect an analysis of the costs and benefits of biofouling regulations per se, but the findings highlight the need to avoid the adverse effects associated with an incursion as well as the practical challenges the cruise lines are facing when seeking to comply with the regulations.

[64] (Ministry for Primary Industries, June 2024)

2.4.2.2 Sediment plumes, seabed disturbance and protected mammals

As vessels, including cruise ships, manoeuvre in port, they can stir up the seabed and create sediment plumes. Most of these manoeuvres are in ports – areas that are already highly modified environments with existing consent conditions that manage and regulate the environmental effects associated with such movements.

However, some smaller locations, such as Akaroa can see disturbances from time to time. In the period immediately after the Christchurch earthquakes, Akaroa saw a significant increase in cruise vessel traffic. The Akaroa receiving (marine) environment has 'very high ecological values' based on values associated with:

- Hector's Dolphins
- Threatened seabirds,
- Banks Peninsula marine mammal sanctuary, as well as
- Significant natural landscapes.

Due to concerns relating to seabed and water quality degradation from cruise ship propeller wash and anchoring activities in Akaroa Harbour, Environment Canterbury (ECAN) requested that Cawthron Institute perform a brief preliminary ecological risk assessment (ERA) on several potential effects (as identified by ECAN) of the Akaroa Harbour marine environment.

The characteristics and habits of the cruise ships that frequent Akaroa Harbour were compiled using available literature and data collected over three cruise ship seasons by ECAN. During those periods Akaroa received an increasing number of cruise ships over time, with one to three vessels visiting per day. The potential effects resulting from cruise ship propeller wash and anchoring activities in Akaroa Harbour investigated in this assessment were:

- Seabed anchor chain sweep on seabed disturbance,
- Effects on the water column, i.e., sediment plumes,
- Impacts on marine mammals,
- Effects on seabirds.

Cawthron's assessment covered an overview of the vessels, the environment, as well as the potential effects. The report underscores the need for additional research to refine the findings and the suggested management approaches. In addition, the analysis was a desktop approach with a focus on examining existing data. In terms of the approach, the focus was on the potential risks as well as the likelihood of the effect occurring.

Overall results from available reports and risk assessments suggest that cruise ship anchoring and propulsion activities have potential for 'significant or unacceptable' adverse ecological effects to the 'very high' ecological values of Akaroa Harbour. However, when the 'likelihood' of an effect was considered, the ecological risk of the effects assessed here were typically 'medium or low' and at worst 'high,' which could be considered 'manageable using measures to avoid remedy or mitigate'.

The key findings relating to the effects are caveated around data quality issues that lower the overall confidence in the assessment. Nevertheless, the analysis shows that there are areas of high risk where the effects could be significant to unacceptable. This is specifically around mammal strikes, some effects associated with Hector's dolphins and bird strikes. The list of other effects ranges from minor to more than minor. Appendix 5 summarises the key points of the effects.

Results suggest that there is a 'medium to low' level of risk of 'significant' or 'unacceptable' adverse ecological effects from anchoring and propulsion activities of cruise ships. Based on the ERA, these effects could be

considered 'manageable using measures to avoid remedy or mitigate'. However, at present the level of confidence in the data available for this assessment is low, and the assessment relies heavily on expert judgement. Therefore, the provision of activity- and location-specific effect assessments is recommended to inform potential management approaches.

Overall results from this risk assessment suggest that cruise ship anchoring and propulsion activities have potential for 'significant or unacceptable' adverse ecological effects on the 'very high' ecological values of Akaroa Harbour. However, when the 'likelihood' of an effect was considered, the ecological risk of these effects was typically 'medium or low', and at worst it was 'high'. This meant that the risk could be 'manageable' by taking steps to avoid, remedy, or mitigate the effects.

However, when the 'likelihood' of an effect was considered, the ecological risk of the effects assessed here was typically 'medium or low' and at worst 'high,' which could be considered 'manageable' using measures to avoid remedy or mitigate.

2.4.2.3 Washwater from scrubbers

A concern that is often raised about using scrubbers relates to the washwater discharges and chemicals entering the marine environment. Work by NIWA[65] shows that the concentrations of contaminants in marine water and benthic sediments are predicted to be very low in the four shipping lanes and low in Milford Sound. While NIWA uses a scenario approach, the findings show that there are discharges but the overall effects on concentrations levels are likely to remain below water or sediment quality guidelines and therefore negligible risk to marine biota in shipping lanes or in nearby areas, such as those used for aquaculture, fishing or shellfish harvesting. This study does not capture other shipping lanes with greater concentration of ships, so the findings should not be simply transferred to other locations in New Zealand. It does however illustrate a situation with a low risk in the Milford Sound.

2.4.3 Environmental risks

The grounding and sinking of the HMNZS Manawanui in October 2024, is a stark reminder that maritime accidents can and do occur. Unfortunately, this also applies to cruise vessels. Recent cruise accidents include:

- The Viking Sky suffered engine failure and a loss of propulsion for 30 minutes[66]. The vessel nearly ran aground and relied on helicopters to rescue passengers (1,373) because sea conditions did not allow for the use of lifeboats,
- 2013 - Engine fire on the Carnival Triumph,
- 2012 - Costa Concordia capsized off Italy after running aground (32 deaths)
- 2010 - Passengers on the Celebrity Mercury suffered a norovirus outbreak.
- 2023 - In September, a cruise ship (MV Ocean Explorer, 206 passengers on board) ran aground in Greenland and could not be towed free for three days.

There are many international examples of cruise ship accidents that do not make international headlines. Many of these events are contained and do not result in significant disruptions or the loss of vessels. Minor events can include fires, collisions/allisions[67], ship grounding, loss of propulsion and so forth. In New Zealand, the Seaborne Encore broke mooring in Port of Timaru (2017) during high winds, with the cruise ship contacting

[65] (National Institute of Water and Atmospheric Research, March 2021)
[66] (Allianz, 2024)
[67] Collision is when two moving objects strike each other, and allision is where only one object is moving.

a cargo (cement) vessel, damaging both vessels and the wharf. These events can escalate with loss of life and vessel, but such events are rare.

Potential for accidents as well as accidental discharges/spills from cruise ships exist. The scale of the environmental effects is related to the size and location of the accident. A vessel that sinks will generate more extensive environmental damage than an accidental and limited wastewater discharge. The effects also depend on the type of pollution that occurs and include:

- Marine pollution in the form of fuel and oil spills as well as any chemicals. These are normally the main concerns due to the toxic nature of oils and the effects on marine ecosystems, including marine animals (mammals, birds, and fish). The oil and chemicals can wash ashore, contaminating coastlines and the associated ecosystems.
- Waste Discharge: Accidental discharges of grey- or black-water into the ocean can release harmful bacteria, pathogens, and nutrients into the marine environment. The contamination can cause dead zones, but areas can recover within a moderate timeframe.
- Solid waste: Accidents can lead to the release of plastics, metals, and other debris into the ocean. These materials can harm marine wildlife through ingestion or entanglement and contribute to long-term ocean pollution.
- Air pollution through fires: Some accidents, like onboard fires, can release toxic smoke and air pollutants such as sulphur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter.
- Damage to habitat: When cruise ships run aground, they can physically damage marine habitats that can have long-lasting effects.

While the global incidences of severe cruise ship incidents are limited, risks do remain. The scale of the environmental effects is related to the size and location of the accident. A vessel that sinks will generate more extensive environmental damage than an accidental and limited wastewater discharge.

The response to accidents includes the immediate activities to manage the event to mitigate the immediate severity and scale of the accident. Sometimes chemical dispersants are used to break down oil spills. While they can reduce the visual impact of the spill, these chemicals can be toxic to marine life, especially in sensitive environments. The physical cleanup includes removing wreckage or spilt materials. The salvaging process and cleaning the coastline can be costly and time-consuming. In addition, the cleanup process can lead to further adverse environmental effects.

While the global incidences of severe cruise ship incidents are limited, risks do remain. Cruise ships frequently visit pristine natural environments, and these areas are often exposed to extreme weather events. Therefore, while the probability of a large-scale event might be low, the consequences would be material. There is potential for an oil spill, accident, or adverse event.

The ability to respond to an adverse event is guided by New Zealand's Oil Spill Readiness and Response Strategy (2022-2026)[68] which outlines the tiered approach. Tier 3 is the highest level and consists of a nationally led response, coordinated by Maritime NZ. Tier 1 is the lowest level, undertaken by the operators responsible for the spill. The Oil Pollution Fund is derived from the Oil Pollution Levy as required under the Maritime Transport Act (1994). The fund covers:

- Purchasing of equipment and other requirements associated with a Tier 2 or Tier 3 response.
- Reasonable cost to investigate a suspected marine oil spill and in controlling, dispersing, and cleaning up any marine oil spill.
- Costs associated with planning and responding to marine oil spills that are services provided for under a contract.

[68] (Maritime New Zealand, 2021)

- Costs to Maritime NZ or a regional council of taking measures to avoid marine oil spills.

The Oil Pollution Fund holds $1.9m in cash and cash equivalents out of its total current assets of $6.8 million. The value of the inventory held for oil spill dispersant is estimated at $561,000 (after accounting for impairments). The New Zealand Government approved contingency funding of up to $40m in favour of Maritime NZ and the Oil Pollution Fund for the purpose of maintaining regulatory compliance and response capability to deal with the COVID-19 disruptions. This contingency has increased appropriation to $63m and extended through to 30 June 2025. Importantly, these funds relate to the entire maritime sector and are not cruise-specific.

In addition, regional response plans will also add to an oil spill event with additional resources made available. However, the exact scale of available resource is unknown.

Although a spill event could be considered unlikely to occur, if it did, it could be of substantial spatial scale, persistent (long term recovery), and have significant environmental consequences.

There are no recent examples to draw on to illustrate environmental effects of a cruise ship sinking and the resulting oil spill. One New Zealand example is the MS Mikhail Lermontov. The Mikhail Lermontov was an ocean liner owned by the Soviet Union's Baltic Shipping Company, built in 1972. It was later converted into a luxury cruise ship with a carrying capacity of around 700 people. The ship ran aground in Marlborough Sounds in early 1986 and sank five hours later with the loss of one life. The wreck is now one of New Zealand's largest dive sites and accessible to various diving experience levels. Unfortunately, there is little information about the environmental effects, oil spills, or cleanup and salvaging costs. To provide some context for the potential scale of a spill event, the costs associated with the Rena grounding and sinking are described even if it is not a cruise ship.

MV Rena

During October 2011 the MV Rena ran aground on Astrolabe Reef near Tauranga. This wreck caused an oil leak and littered the ocean with debris. The Rena was carrying 1,368 containers and 1,733t of heavy fuel oil (HFO) at the time of grounding. An oil leak was detected, and the vessels owners and insurers appointed a salvaging company to respond. An estimated 1,350t of oil was removed from the Rena. The spilled oil is estimated at between 355t and 360t was spilled.

The MV Rena sank off Tauranga and an estimated 1,350t of oil was removed from the Rena. The spilled oil is estimated at between 355t and 360t was spilled. Small cruise ships carry around 500t of fuel, and large ships can carry up to 7,500t.

The oil spill itself was small by comparison to the world's worst oil spills, such as the Exxon Valdez oil tanker spill, which released 36,000 tonnes of crude oil into the nearshore zone of Prince William Sound, Alaska in 1989 (Paine et al. 1996), or the Deepwater Horizon event (2010) that resulted in the loss of between 628,000 and 846,000 tonnes of crude oil into the Gulf of Mexico (Griffiths 2012).

However, the Rena oil spill was significant in a New Zealand context. The Rena recovery has proven to be one of the most expensive salvage and oil spill clean-up operations ever attempted. To date, over NZ$660m in costs have been incurred through the clean-up of oil and the salvage of container debris (Murdoch 2013; BECA 2014). Close to 4,600t of debris has been brought to the surface so far and 17,400t of ship structure have been removed from the sea.

Reports about total costs vary but the cleanup costs are estimated at:

- Clean up and salvaging costs $660m to $700m (paid for by international insurance)

- New Zealand government costs $47m[69] (with $27m contributed by the vessel owners).

These costs exclude regional council and community costs. Following the grounding and oil spill, a clear message from the Bay of Plenty community was that the beaches and local environments were 'their beaches', and they wanted to help clean them up. The cost associated with volunteers is unknown. A four-year recovery plan to deal with the Rena grounding ended in 2015. Experts expect that the shipwreck shouldn't have any long-lasting effects on Bay of Plenty beaches and coastal fisheries.

2.5 Social and cultural

The cruise sector generates a variety of cultural and social impacts, both positive and negative. These impacts are predominantly reported in qualitative terms and therefore are often overshadowed by the more tangible (quantitative) measures. As the cruise industry continues to grow, there has been increased attention given to the socio-cultural impacts. There is considerable overlap between cultural and social impacts and the cultural attributes of a community is often intertwined with visitor product offers i.e., cultural events are sold as part of the tourism industry. However, the cultural elements are directly related to how a community sees itself, and its sense of identity.

The social and cultural dimensions of the New Zealand cruise sector mirror the patterns observed in the global situation, specifically that views about the sector are polarised and diverging.

A central observation about the social and cultural effects of cruise is that views are polarised – with some segments of the community seeing value in the exposure opportunities the cruise sector offers, while other parts of the communities have negative perceptions about the cruise sector. Literature suggests that the congestion, and inadequate infrastructure, are the visible issues. However, the potential effects on locals' quality of life form the cause of negative views. At the same time, unique world views and conflicts about how to respond to social disruptions add complexity to how communities respond to changes in cruise vessels, as well as how local interactions (between community members) unfold.[70] Appendix 12 summarises the findings of the review of international literature regarding the social and cultural effects of the cruise sector. Compared to the economic or environmental effects, literature covering social and cultural considerations are not as extensive.

The social and cultural dimensions of the New Zealand cruise sector mirror the patterns observed in the global situation, specifically, views about the sector are polarised and diverging. Despite differing views, available perceptions about the cruise sector remain overwhelmingly positive. The sector's positive economic effects underpin this positivity. The diverging views are associated with the environmental effects and the trade-offs.

The section starts with a summary of recent perception surveys before reporting insights relating to the cultural considerations. Other elements that have social values, such as volunteering and congestion, are discussed.

2.5.1 Perceptions and destination management

Most New Zealanders (93%) agree[71] that international tourism is good for New Zealand and similar views are evident at a regional level even if views are marginally less positive – 87% agree that international tourism is good for their region. Despite the benefits of international tourism widely acknowledged by New Zealand

[69] (Treasury, 2013)
[70] (Jeannotte S. , 2021).
[71] (Angus & Associates, 2024)

residents, a third (34%) believe that international visitors put too much pressure on New Zealand, and more than a quarter (28%) believe that international visitors put too much pressure on their region. These findings highlight the tensions around the economic values and views around protecting local ways of life and not putting undue pressure on infrastructure and amenities. These views are consistent with international observations.

With reference to the cruise sector, a single 'whole of New Zealand' survey is not available, but several regions have undertaken regional perception surveys. With reference to the cruise sector, perception surveys show that New Zealanders have a positive view about it:

- Confidential surveys[72] for CLIA shows that most people in both the North and South Islands see the cruise sector as critical. This is based on views around the economy, businesses, and opportunities. The positive views about the economic effects outweigh environmental concerns. The sector is seen as well-managed, and the sector is seen in a favourable light and seen as making a positive impact.
- In the Bay of Plenty, the cruise sector has a +76% Net Promoter Score, underscoring the positive views about the sector and its local importance.
- In Timaru, the sector has a very high positive score (+93%, 2023).
- In Hawke's Bay, the opportunities presented by the cruise sector are acknowledged and perception surveys covering the local businesses have positive (+70%) views about the cruise sectors' contribution (2022).

The engagement process confirmed the mixed position of how communities viewed the cruise sector. That is, most people see the positives, and the overall view is favourable. Perceptions about the New Zealand cruise sector are broadly aligned with views about tourism including:

- 80% of New Zealand residents personally benefited from tourism activity in their local area in the year ending March 2024.
- More than one third (37%) see that tourism activity means more local businesses are open or able to stay open, and a similar proportion (37%) benefit from tourism activity providing opportunities for employment/income (for them or their family).
- However, 68% of New Zealanders report that tourism has negatively impacted their local area in some way.
- 29% have experienced more litter and waste generation and
- 23% experience greater difficulty finding a car park or believe that it takes longer to get to places due to traffic congestion caused by local tourism activity (22%).

Asked whether enough action is being taken to address the negative impacts of tourism, 71% agree that there is (the same result as the previous year). Key actions that New Zealand residents believe will help mitigate the negative impacts of tourism include greater improvement of community infrastructure, managing or lowering living costs, improving safety, and taking better care of the environment.

Local views about the opportunities offered by the cruise sector are embedded in economic development strategies and/or local tourism development plans (often referred to as Destination Management Plans (DMP)). These plans are normally formulated following community consultative processes. A key action outlined in the DMPs where there are actions relating to the cruise sector, relates to managing the impacts of large passenger numbers. However, there is little evidence of a complete ban on cruises, although there is a clear focus on limiting the number of passengers at any given event. For example, the maximum number of vessels that can be in port at any one time is limited and managed via the local port. The port limits vessel bookings (i.e., berth availability) to limit vessel numbers per port per day.

[72] (CLIA, 2024)

The careful management of cruise vessels and passengers can have a meaningful influence on perceptions. Following the Christchurch earthquakes, Akaroa saw a substantial lift in cruise ships. In the 2009/10 season, eight cruise ships visited Akaroa, but following the earthquakes, cruise ship numbers increased ten-fold to more than 80. Passenger arrivals increased from around 8,750 to over 125,000. A study[73] into the effects and perceptions indicated that the main effects on the community were:

- Overcrowding and congestion (within the town),
- Bus/tour coach-related issues (especially increased traffic),
- Concerns about environmental problems.

Overcrowding, congestion, and bus-related issues were reported three times more often than environmental concerns. However, 89% of respondents expressed these negative views in the context of believing that Akaroa benefited from the cruise. The direct community and social benefits identified were the cruise passengers' contribution to the atmosphere, mood, and ambience, as well as their ability to 'make the town feel alive.' Other benefits that were noted included:

- Meeting people,
- Adding to social diversity,
- Fostering pride,
- Raising the town's profile.

An overarching finding was that Akaroa is a tourist town, and cruise is a part of the tourism landscape.

A wider effect of the cruise sector on Akaroa was the perceived division within the community by some parities. Perceived community division and debate surrounding cruise tourism generated negative effects, undermining social cohesion processes. The negative effects were also related to the distribution of benefits, and inequities. Individuals that experienced the benefits were more likely to take a positive view of the cruise sector, and place lower weight/importance on the disbenefits than someone that did not receive any benefits. The analysis suggests that while cruise tourism can exacerbate capacity issues, careful planning and management can mitigate these effects while optimising the benefits. At a local level, the debate and interaction between residents can often lead to disharmony arising from differing views – it is how the debate occurs, and not the discussion that is causing issues.

Perceptions about cruise tourism remain mixed, but still largely positive. It is not a given that social licence will remain positive and therefore imperative to carefully manage cruise vessels and passengers. Destination management can have a meaningful influence on perceptions and mitigate potential adverse impacts.

The engagement process provided insight into how local areas manage and respond to the pressures associated with cruise ship visits. The key focus of the management activities relates to ensuring that communities are not overrun, that congestion is minimised and that visitors have a positive experience.

Responsiveness in terms of providing information and addressing misinformation was paramount. In downtown Auckland, a resident's association raised issues around safety (in general) and indicated that the additional visitors and tourists that are in downtown when cruise ships visit provide vibrancy and add to a sense of security during periods of high visits. The trade-off between vibrancy and congestion was noted.

An ability to actively participate in, and contribute to, the planning processes associated with managing cruise passengers is seen as a positive. In the large ports (Auckland, Lyttelton and Tauranga), the management of the visitors is normally done through formal mechanism (paid contracts), but in smaller locations, local residents

[73] (Wilson J. , Shone, Simmons, & Stewart, 2015)

are highly active in engaging with passengers. This lifts the quality of visitors' experience, guides spending towards dedicated areas (e.g., markets[74] or central business areas) and provides a sense of identify and purpose for residents. Additional detail is provided in the section dealing with volunteers (2.5.4).

2.5.2 Cultural considerations

Tourism has a range of impacts on host communities and destinations. These impacts can be both positive and negative and may vary depending on the scale and nature of tourism. Assessing the impact of tourism on indigenous cultures is a growing topic of discussion in academic literature. However, there are significant literacy gaps with respect to the documented socio-cultural impacts of tourism in New Zealand. Academic literature and the available reports from central government agencies are limited. Using both academic literature and stakeholder interviews, the socio-cultural impacts of cruise tourism in New Zealand are unpacked and expressed in qualitative terms. These impacts do not represent an exhaustive list but rather seek to highlight some of the key socio-cultural impacts of the cruise industry in the local context.

For tangata whenua, water is a taonga of fundamental importance, and thus maintenance of its quality and integrity—physically and in cultural and spiritual terms—is an ongoing priority for kaitiaki. The responsibilities of kaitiaki[75] include:

- working towards the appropriate management and protection of coastal systems,
- harbours,
- mahinga kai,
- customary fisheries, and
- places of spiritual and historical significance, such as:
    - wahi tapu or tauranga waka.

To assess the socio-cultural effects of the national cruise sector, there are a range of Māori concepts that are important to understand. Socio-cultural effects of cruise tourism in New Zealand must be viewed through a Te Ao Māori lens. Te Ao Māori denotes the Māori world and is rich in meaning and vast in breadth and depth. Underpinning Te Ao Māori is a belief that all forms of life are interconnected and interrelated. For example, the sea is not an impersonal thing but the ancestor god Tangaroa, and from him all fish and reptiles are descended.[76]

Key to understanding Te Ao Māori is recognising that the natural environment is intrinsically linked to identity. Therefore, the wellbeing of the people and communities is closely linked with the wellbeing of the attributes of the natural environment. A common Māori saying summarises this relationship:

> *"Ko au ko te taiao, ko te taiao ko au – I am the environment and the environment is me"*

The physical, cultural, and spiritual health of the environment is an ongoing priority for kaitiaki. Water is considered a taonga (treasure) and protecting its mauri is of upmost importance. Mauri is a Te Ao Māori concept that describes the life force or essence and the binding force that holds together the physical and spiritual components of a being or thing.

Compared to other tourism sectors, cruise tourism relies heavily on ocean and marine resources to transport cruise passengers. Coastal systems, harbours, customary fisheries, and places of spiritual and historical significance come under threat from cruise tourism. Cruise ships generate a range of waste streams including grey water, sewage, solid waste as well as hazardous wastes. While discharges in coastal locations are

[74] The Timaru Artisan Market is coordinated with cruise ship arrivals.
[75] Person, group or being that acts as a carer, guardian, protector and conserver.
[76] (Rangiwai, 2018)

prohibited, any accidental or deliberate discharge of sewage (including treated sewage) or other wastes into water and the sea is likely to be offensive to many iwi and hapu, and seen against tikanga and traditional values.[77]

Environmental issues can impact greatly on the lifestyles and tikanga of Māori and their relationships with the land. During the engagement process, the need for a pragmatic and solution-based approach was highlighted. Environmental issues associated with tourism, cruise tourism as well as everyday life were pointed out as areas where improvement is needed, but the cruise sector was not specifically targeted. While experiences and impacts will be diverse within the Māori tourism sector, some Māori tourism operators see opportunities and benefits from the cruise industry. Similarly, some view the risks and potential effects of the cruise sector on environmental and cultural elements as limiting factors. It is important to ensure that Māori culture and values are respected throughout the tourism value chain to avoid perceptions of cultural commodification.

Indigenous tourism is a significant component of the tourism mix in New Zealand and has the potential to provide sustainable employment and benefits for Māori (Puriri & McIntosh, 2019). New Zealand Māori Tourism identified approximately 537 Māori tourism businesses in 2020[78]. At least 300 were in accommodation and food services, 141 in arts and recreation and the remaining 96 come under other tourism industries such as transport services, travel agency services and motor transport equipment rental and hire.

The pre-COVID growth in cruise tourism and anticipated growth represents a relatively untapped potential market for Māori tourism development. Targeted shore-side cultural experiences for the growing cruise tourism industry are considered a key opportunity for Māori tourism development[79]. However, caution is required to ensure cultural tourism for tourist consumption is not commodified which can lead to the loss of traditional meanings and values (Jeannotte M. S., 2021). There remains an important need to consider how Māori values and principles can facilitate authentic Māori tourism development that is about Māori, by Māori. This also includes the cruise industry in general and the tourism activity it facilitates, and ensuring that Māori culture and values are respected.

Within the cruise industry, there are opportunities for cruise lines to partner with local communities to deliver meaningful benefits. Delivering experiences for cruise passengers is highly dependent on maintaining the natural environment, landscapes, and wildlife. In turn, cultural experiences often involve showcasing unique landscapes and wildlife, along with their respective histories.

Māori culture is synonymous with the environment, and therefore any investment in environmental preservation is also cultural preservation aimed at safeguarding the wellbeing of the environment for future generations.

There is some evidence of environmental and cultural preservation partnerships in various regions across New Zealand, but the scale of investment remains minimal:

- In 2019 Princess Cruises Local Partnership Program pledged $2 from every passenger visiting the Bay of Islands and raised a total of $100,000 prior to COVID-19.[80]
- A partnership was formed with Kiwi Coast which supports volunteer pest control groups across Northland. Conservation efforts supported the return of kiwi and other native species to the area as well as bringing back the forest's mauri (life force).

[77] For example, Te Hao o Ngati Whatua. 1999. Report prepared for North Shore City Council, Auckland. Source: Burrowes, J., Klaessens, Y., & Appels, D. (2003). Just Cruising?: Environmental Effects of Cruise Ships. Office of the Parliamentary Commissioner for the Environment.
[78] (NZ Māori Tourism, 2020)
[79] (Puriri & McIntosh, 2019)
[80] (New Zealand Cruise Assoication, 2021)

- Post pandemic, Princess Cruises have expanded their partnership program to Dunedin based Natures Wonders, an organisation that aids in safeguarding the regions iconic wildlife[81]. Funding will support building habitat for an emerging little blue penguin colony and preservation of the last major yellow-eyed penguin colony in Otago.

The need to maintain and enhance the relationship with local communities, including iwi, is acknowledged. It is seen as an area of opportunity for growth. Forming local partnerships is seen as a way to deliver meaningful benefits that are based on local values.

2.5.3 Concentration and congestion

Similar to the international communities discussed in Appendix 12, port towns in New Zealand have faced challenges related to congestion and high visitor numbers attributed to cruise tourism. These communities have expressed mixed views about cruise tourism, acknowledging its economic benefits, but some groups in the communities can feel overrun and frustrated with congestion and strain on infrastructure and amenities.

For example, reports indicate that Akaroa, a town with a population of about 770, experiences strain when cruise ships dock. This was especially acute after the 2011 Christchurch earthquake made Lyttelton Harbour temporarily unavailable. Seven cruise ships visited Akaroa in the summer of 2009/10. This increased to ninety cruise ships in the 2019/20 season. This sudden and unexpected influx put pressure on local infrastructure and services, creating congestion (and frustration) in the small community. The community acknowledged the tensions between the benefits and pressures of higher cruise activity.

Total cruise calls have now dropped back to 19 vessels in 2022/23, with fewer and smaller cruise ships arriving in Akaroa since New Zealand opened its borders post-pandemic. Lyttelton Port reopening to cruise ships in the 2022/23 season was the main reason for the change, but community concerns about congestion and seabed disturbance also contributed to the change. Twelve cruise ships visited Akaroa last summer (2023/24) and seventeen are scheduled to call in the coming season according to the NZ Cruise Association's schedule. Only one of these cruise ships has a capacity greater than 1,000 passengers – the total passenger numbers are well down from the peaks.

It appears that the change has transferred the pressures to Lyttelton. When cruise activity resumed in 2022/23, Lyttelton experienced significant congestion, particularly with its public transport services. This caused frustration and tension for residents. Members of the public reported not being able to get on their usual bus to school or work because of cruise passengers getting onto public transport rather than shuttles provided by the cruise lines. A price differential between the shuttle and public bus was said to cause this behaviour.

Stakeholders made efforts during the 2023/24 cruise season to alleviate issues and reduce community frustration. In Lyttelton, Environment Canterbury, Christchurch NZ, Christchurch City Council, NZTA, and Lyttelton Port worked together to provide additional bus services to transport cruise passengers into Christchurch city. The cost to ECan was estimated to be between $400,000 and $600,000 for the season. However, ECan has indicated it will not be providing the funds again this season (2024/25). During the engagements, stakeholders have signalled that cruise lines are trying to ensure prices remain lower than 2022/23 levels. However, the anticipated passenger numbers are significantly down on peak levels and the pressures are not expected.

An influx of cruise ship passengers at Port Chalmers also caused disruptions on public bus routes in 2022/23, as many tourists opted for public transport between Port Chalmers and Dunedin to avoid shuttle fees. Some

[81] (Carnival Corporation and Plc, 2023)

passengers reported shuttle fees ranging from $20 to as much as $77, prompting them to use local buses instead. Port Chalmers residents reported overcrowded buses, leaving many residents unable to secure a seat. Residents expressed frustration, saying affordable transportation alternatives need to be provided for tourists to prevent disruption to their regular commutes.

During the upcoming cruise season (2024/25), the Otago Regional Council is taking proactive steps to manage the increased demand for bus services to and from Port Chalmers, particularly during peak times when cruise ships bring in large numbers of passengers. The council will replicate last season's successful measures to ensure local passengers have sufficient space on the Route 14 bus, aiming to balance the needs of both local commuters and tourists.

Managing passenger's effects is a key focus area for ports as well as local entities associated with the cruise sector (e.g., economic development agencies, local government). Active management steps to alleviate congestion issues include:

- staggering ship visits to reduce the number of passengers going ashore at one time,
- investing in infrastructure such as installing more toilets,
- improved road markings and signage, and
- providing additional bus services on cruise days.

During the stakeholder engagements, some ports indicated that they manage congestion by not accepting bookings from multiple ships on the same day, while others indicated that going forward, they will not accept bookings from two 'large' ships on the same day.

To compare the level of concentration in New Zealand's port towns, a ratio of annual cruise visitors per capita was estimated. The results are presented in Table 2-5 – the PAX per capita indicator provides a way to compare NZ port towns with communities such as Juneau and Sitka (see Table 2-5) which have implemented measures to manage cruise tourism.

Table 2-5: Cruise Passengers relative to hosting community (2023/24 season)

Port City	Port calls	Annual PAX	Average PAX per call	Ratio (PAX per capita)
Akaroa	13	5,500	420	7.14
Auckland	83	226,500	2,730	0.15
Paihia	86	130,100	1,510	75.64
Bluff	15	4,100	270	2.23
Dunedin	111	191,000	1,720	1.80
Gisborne	20	9,400	470	0.25
Kaikoura	16	5,800	360	2.46
Lyttelton	79	155,800	1,970	48.99
Whangarei	3	1,500	500	0.03
Napier	90	139,100	1,550	2.06
Nelson	8	3,700	460	0.07
New Plymouth	7	6,900	990	0.12
Picton	56	101,300	1,810	20.76
Tauranga	109	182,000	1,670	1.13
Timaru	13	16,500	1,270	0.57
Wellington	109	184,200	1,860	0.86
			Source: StatsNZ; NZ Customs and ME Calculations	

The table shows:

- Paihia, Lyttelton and Picton stand out as having the highest passenger per capita ratio. However, it is important to keep in mind that passengers are distributed across the larger areas of Kerikeri, Christchurch and Picton. The 'dispersion' effect relieves the perceived impact on small communities.

For example, if Kerikeri's population is included, Paihia's ratio decreases to 13.2, and including Christchurch city's population implies a ratio of 0.4 pax per capita for Lyttelton. Regardless, the passengers need to move through the immediate port communities, generating congestion.

- When comparing New Zealand port towns with international port cities where overtourism has been reported as a significant concern, the scale of the issues needs to be considered. In cities such as Juneau, Sitka, Ketchikan, and Skagway, where the ratios range from 50 to 146 passengers per capita, there can be between 5 and 7 cruise ships in port visiting at one time. The average number of visitors per call is between 1,400 and 2,300. In New Zealand, few ports regularly have more than one cruise ship in port at any given time. Auckland is the only city that has an average passenger per call greater than 2,000.

It is crucial to recognise that overseas communities affected by cruise-related overtourism are not advocating for the complete elimination of cruise tourism. Instead, they aim to manage the influx of visitors in a way that minimises disruption and reduces the strain on local infrastructure. These communities seek a balanced approach that allows them to benefit from the economic advantages of cruise tourism while ensuring that the quality of life for residents is maintained and the local environment is protected. Effective management strategies could include regulating the number of cruise ships docking at ports, improving public transport options, and enhancing infrastructure to better accommodate the increased number of visitors. By implementing such measures, communities can create a sustainable tourism model that supports both local needs and visitor satisfaction.

In other areas such as Timaru, New Plymouth and Whangarei, where cruise tourism is seen as an emerging opportunity, the local communities are interpreting growth in a very positive light. The ability to put measures in place before pressures emerge is seen as a way to avoid the disbenefits emerging and diluting the social licence.

2.5.4 Volunteers

Volunteering plays an important role in supporting the smooth delivery of tourism activities at a local level. Volunteering provides a range of benefits that accrue to the individual as well as the wider community. This section explores the multifaceted value of volunteering within this industry and provides an overview of insights into volunteering as revealed during the stakeholder engagements. The main benefits that are experienced by volunteers and in local communities are:

- Enhancing visitor experience and enhancing destination attractiveness – volunteers often serve as the first point of contact for cruise passengers, providing a warm welcome and essential information about local attractions, culture, and services. Their local knowledge and enthusiasm significantly enhance the visitor experience, making tourists feel more connected and engaged with the destination. This personalised touch can lead to higher satisfaction rates, positive word-of-mouth, and encourage repeat visits and longer stays. While volunteers add to the visitor experience, many of the benefits are also felt in the local communities. Cruise lines confirmed that New Zealand's net promoter score is high in all ports, with volunteers contributing to this and thereby the relative attractiveness of destinations is enhanced.
- Supporting local communities – volunteering helps foster a sense of pride and sense of identity and generate a sense of purpose and involvement. Residents who volunteer can showcase the unique features of their towns and share unique anecdotes with visitors. This process creates an authentic experience for visitors. This engagement not only benefits tourists but also strengthens community bonds and promotes cultural preservation. Stakeholders pointed to the different types of volunteers

that they recruit, including residents of different demographics, ranging from retirees to families. Volunteering creates a sense of comradery between volunteers, strengthening social bonds.

- Economic contribution – while volunteers do not receive monetary compensation, their contributions can lead to economic benefits because they provide labour. By providing services that might otherwise require paid staff, volunteers help reduce operational costs for tourism organisations, such as regional tourism organisations, which are partly funded by local councils. The enhanced visitor experience facilitated by volunteers can lead to increased spending in local shops, restaurants, and attractions, boosting the overall economy. Cruise lines are very focused on the visitor experience at the ports they call when designing an itinerary.

Stakeholders pointed to volunteering as a vital component of the cruise tourism sector in New Zealand, with various regions implementing unique approaches to manage volunteers effectively, but in all instances, it is a collective effort between local communities, ports, RTOs, and EDAs. During the stakeholder engagement, we explored the role of these volunteers and their contribution to the cruise sector. Below is an overview of the responses for the key locations:

- Auckland: Tātaki Auckland Unlimited (TAU) is responsible for coordinating and training volunteers that assist during cruise days. The volunteers are used across events and are not solely for cruise days. Before the COVID-19 pandemic, there were typically 20 volunteers on days when a vessel was in port. This number has since been reduced to around 10 volunteers, and they do not operate on exchange days. They play a vital role in welcoming visitors, providing information, and directing them around the city. TAU have also made use of volunteers to mitigate the effects of construction-related disruptions on Quay Street and other downtown areas. This minimises negative visitor perceptions, enhancing the city's appeal as a premier cruise destination.
  An emerging issue is that volunteers are receiving extra training in relation to de-escalating situations where protesters might come into conflict with cruise passengers, volunteers, or members of the public. This additional training is an extra cost.
- Christchurch - Lyttelton/Akaroa: Christchurch NZ manages the volunteer program in Lyttelton and Akaroa, deploying "volunteering champions" at these locations, as well as more widely in tourist hotspots throughout Christchurch City. These representatives play a crucial role in welcoming passengers and visitors. During the peak season, up to 50 volunteers are active, aiding with cruise-related as well as other tourism events. Their presence ensures that visitors receive a warm welcome and helpful information, which enhances their overall experience.
- Napier Port: In Hawke's Bay, the local i-Site manages the inflow of cruise passengers, particularly those who arrive without prior planning. Volunteers assist with traffic management, oversee pedestrian crossings, set up event signage, and organise parking for vendors. This comprehensive support system helps maintain order and safety, ensuring a smooth and enjoyable visit for tourists.
- Northport: In Whangarei the District Council oversees the management of volunteers and provides access to a 'pop-up' i-Site at the Town basin on cruise event days. Volunteers are used over the summer season to 'meet and greet' visitors, provide information, recommendations, directions, and so forth. Volunteering is not limited to cruise event days.
- Port of Tauranga: At the Port of Tauranga, ambassadors are largely managed through the Mount Business Association. These ambassadors meet and greet visitors, hand out visitor maps, provide directions, answer questions, and offer local recommendations. Although not exclusively for cruise tourism, their efforts help visitors navigate the area and make the most of their time in the Bay of Plenty.
- Port Otago: Port Otago employs a mix of paid staff and volunteers to welcome cruise passengers, assist with customer service, security, and other cruise-related tasks. This ensures a high level of service and safety for visitors. Three permanent employees are dedicated to this task, and during the peak season,

an additional 35-40 semi-retired locals and families are employed for seven-hour shifts (on cruise event days).

- Port Taranaki: Volunteers at Port Taranaki are managed by the New Plymouth District Council through the i-Site. These volunteers are not limited to cruise events but also support other community activities. A steering group oversees operations, holding briefs and workshops to ensure volunteers are well-prepared.
- Port Timaru: Venture Timaru organises 'community navigators', who are members of the local Lions Club. Volunteers tally their hours and efforts, and at the end of the year a donation is made to the club by Venture Timaru based on their contributions (number of hours multiplied by an agreed rate). The total cost varies from year to year, but recent donations were in the order of $8,000 - $10,000. The donation not only positively impacts the Lions Club's work but also benefits Venture Timaru by reducing administrative costs, creating a mutually beneficial situation. This model has proven so successful that it is now used for other events, such as street markets, community events, and the like. Volunteers assist with traffic management, provide information and recommendations, and focus on the safety of cruise passengers, specifically managing the risks associated with large trucks and busy streets.
- Port Marlborough: In Picton, 5 to 7 volunteers are managed by Destination Marlborough. On cruise days, volunteers typically work 1 to 3-hour shifts, usually starting around 9am and finishing around 5pm. These volunteers meet and greet passengers, providing a friendly welcome and essential information to help them enjoy their visit. Locals can register their interest in advance, with training and preparation provided prior to the cruise season.

The diverse approaches to volunteering across New Zealand's cruise ports highlight the importance of community involvement in enhancing the cruise tourism experience. Volunteers provide essential services, support local economies, and contribute to the overall safety and enjoyment of visitors. Their efforts are invaluable in maintaining New Zealand's reputation as a welcoming, well-organised cruise destination.

2.5.5 Broad exposure to regional New Zealand

Cruise passengers come ashore at local ports, engaging with local businesses, spending money and enjoying local product offers. Shore excursions are a major part of the cruise experience, with passengers often opting for a mix of prepaid excursions, independent tours, and exploring on foot. Various stakeholders quoted an industry-recognised rule of thumb, indicating, of passengers coming ashore:

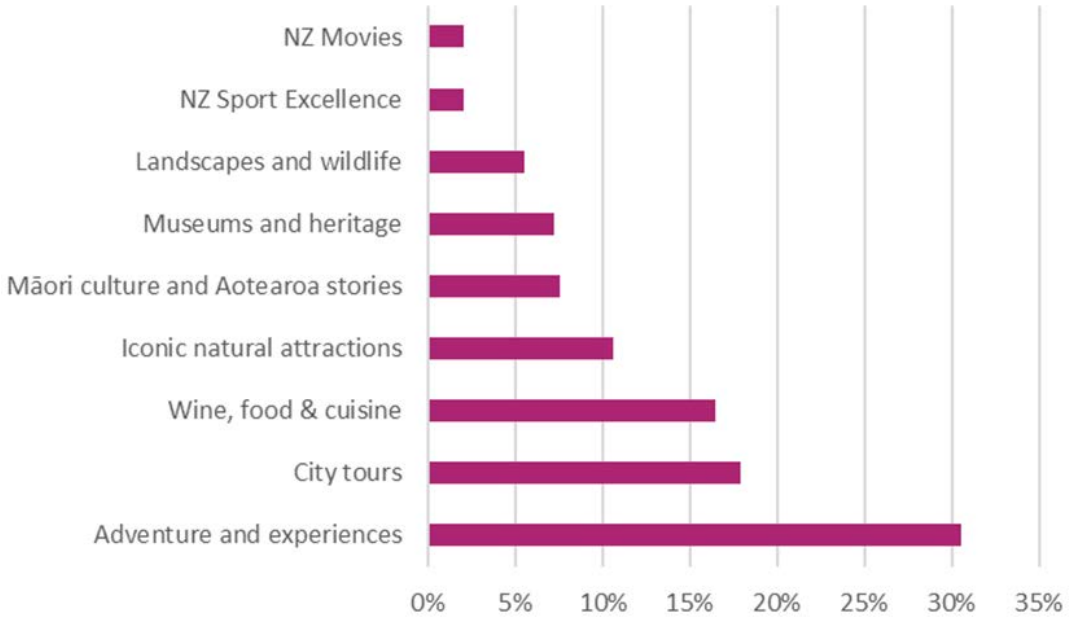
- A third buy excursions through the cruise company,
- A third of passengers buy experiences/tours once they have come onshore, and
- A third of passengers 'wander around' without booking a formal excursion – likely shopping, dining, and sightseeing.

A review of shore excursions shows the spatial and functional patterns. The distance from the port to the activity was estimated and the overall travel time calculated. The activities were reviewed and classified into nine broad groups. Figure 2-8 lists the categories as well as the relative distribution of options within each category.

The shore excursions provide significant options to engage with local businesses and the heritage and culture of the cities and towns where the ships visit. The top three categories are directly linked to local attractions and experiences:

- Adventure and experiences, include activities such as jet boating, e-bike hires, nature walks and beach experiences.
- City tours are the second largest opportunity, with widespread and diverse options relating to private tours of cities, city sightseeing, botanic gardens, walking tours and city basin walks.
- Wine, food, and cuisine excursions offer the third most options and include private wine tours, 'look, taste and sense' tours, and cooking classes with local produce.

Figure 2-8: Shore excursion opportunities



Source: Calculations based on information sourced from ground handlers

Excursion options build on and reflect the unique and significant landscapes of New Zealand, focusing on regional opportunities. Therefore, the cruise sector provides wide exposure across New Zealand's iconic and regional natural attractions and noteworthy options include:

- Nature experiences
    - Whale and dolphin watching (different formats e.g., swimming, helicopter, and experiences with marine biologists),
    - Albatross experiences,
    - Penguin experiences,
    - Glowworm experiences.
- Accessing national parks (cruise and walk, flights, glaciers).

New Zealand's unique cultural experiences are also offered but this is generally fewer (in count) and concentrated around key areas of significance i.e., Waitangi Treaty grounds, Te Puia experiences, and cultural experiences. Immersive Māori experiences (Te Puia in Rotorua) are noted as 'highlights' of the New Zealand itinerary, as is natural beauty (e.g. the Sounds in Fiordland/Marlborough/Bay of Islands).

Other attractions featured in the excursion options draw on New Zealand's global successes and profile in areas around sport (All Blacks experience), and films (Lord of the Rings). Surprisingly, the formal shore excursions do not link with Hobbiton in Matamata. The reason for this is due to congestion and overcrowding issues. Ground handlers worked with Hobbiton, and the risk of undermining the experience was identified as a key risk and it was decided to maintain a high-quality experience instead of risking an adverse and low-quality experience.

On average, shore excursions last between 4 and 5 hours. Excursions have minimum numbers, as well as maximums. These thresholds ensure viability while ensuring that quality is maintained. The relative size of excursions varies across regions, with the New Zealand minimum average being 15 and the maximum average per excursion put at 44. The Bay of Plenty and Lyttelton/Christchurch have the largest average values – at around 60-70 persons. This reflects the type of excursion around to Rotorua as well as the Christchurch Gondola and Lord of the Rings-based excursions, and an ability to safely transport and manage numbers.[82]

There is potential for repeat visitation from cruise passengers as well as land-based visitors. It is acknowledged that this statistic is very uncertain, and just because a traveller indicates they would visit again does not mean that it materialises. Nevertheless, stakeholders suggested around 30% to 40% of cruise ship passengers indicate they will be returning as land-based tourists over the two years following the cruise. Some of the cruise lines we engaged with indicated that this is likely to be somewhat lower for visitors coming from further afield (such as USA, UK and Europe). A similar question asked in a Norwegian study suggested around 31% of cruise tourists expect to return to Norway on a land-based holiday. CLIA's global economic impact study released earlier this year suggests 6 in 10 people who have taken a cruise say they have returned to a destination that they first visited via cruise ship.

2.6 Other observations

Semi-structured interviews were conducted to collect data and information from the wider sector. During these discussions a range of topics were aired and some of these point to policy elements that are beyond the immediate scope of this work. The relevant points have been integrated into the preceding discussions, and the balance is summarised below for completeness and transparency.

There is significant overlap within the sector due to its relatively small size, so we had to be cautious when engaging with stakeholders. For instance, the Tourism Industry Association (TIA) CEO is a member of the NZ Cruise Association board, the IDNZ CEO represents cruises on the TIA board, and the Port Otago cruise representative chairs the Dunedin Enterprise cruise action group, among others.

2.6.1 Network of ports

Cruise ports in New Zealand is a network model – if one is taken out, it influences how the network operates and in turn has an impact on how cruise vessels are deployed. Some ports are 'more important' than others, and the main points are identified as Auckland and Milford – at the north and south of New Zealand.

Ports are working to attract vessels, so to some extent there is also competition within New Zealand. However, it was highlighted by stakeholders that port proximity (distance between ports) is an advantage for cruise lines when designing an itinerary. Cruise lines prefer to offer itineraries that offer a mix of destinations, allowing passengers to experience diverse landscapes and activities, and the New Zealand situation is an advantage.

Almost all stakeholders agreed that the removal of cruise ships' ability to enter the sounds (Milford/Dusky/Doubtful) in Fiordland would significantly change New Zealand's relative attractiveness with impacts across the entire network. However, the effects are likely to be concentrated around the South Island. Some were of the view that it would mean no more cruises for the South Island, while others remained more optimistic, suggesting that it would largely impact Dunedin/Port Chalmers. Conversely, a small group of interviewees voiced their personal opinions, supporting a ban on cruise ships from Fiordland, irrespective of the potential flow-on implications. Most stakeholders were of the view that banning would not be the appropriate response, but rather managing access was seen as appropriate mitigation. It was also suggested by some interviewees that using size to determine access is not appropriate since the larger ships are generally newer and therefore have lower emissions.

[82] Excluding these above average options lowers the local patterns to be in line with national rates.

2.6.2 Destination management

Destination management was seen as a more appropriate response to mitigating risks and overcrowding effects. Some ports are already actively managing access and, in effect, limiting passenger numbers through how access (berthing) is managed (e.g., limiting vessel sizes that can be in port in any one time such as one smaller and one larger ship in port on any given day). Some groups want port management to extend further – i.e., only one ship in port at a time. An advantage of limiting access is that it aids in distributing passenger numbers and reduces the risks of being overwhelmed. The sentiment around management instead of total bans aligns with the messages from non-cruise stakeholders – managing growth is seen as critical.

In a small number of instances and after natural events (earthquakes), communities' ability to respond was hamstrung, and the diverted cruise movements translated into adverse community effects. The negative messaging then appeared to have outcompeted any positive news, and consequently the social licence for cruise was diluted.

2.6.3 Diverse views

Community views on the cruise sector are diverse. While some express concerns about environmental impacts, overtourism, and economic leakage, others recognise the potential benefits of cruise tourism, particularly following disruptions caused by events like COVID-19. Community opposition seems to be more prevalent in smaller communities, like Lyttelton and Akaroa, with vocal, articulate, and organised groups. Environmental concerns (e.g., emissions, impact on wildlife, and visible congestion) are cited by locals. However, some interviewees suggested the concerns have no solid basis, and the cruise sector is an easy target. Similarly, the expressed views were not necessarily representative of the entire community's position.

It is the view of some stakeholders that engaging with local communities and addressing their concerns about the cruise sector's operations will foster trust and support for future growth. Education and transparency are seen as key to improving relations and maintaining social licence.

Communities are not the only ones with diverse viewpoints. Tourism operators within the cruise sector also have diverging views on the value of the sector. Some stakeholders pointed out the power imbalance between small operators and cruise lines. There appears to be very little ability to negotiate with cruise lines and low levels of flexibility around shore excursions. For example, when there is an unexpected tangi (funeral) at a marae, it is frowned upon by cruise lines when passengers are taken to a different marae. Some tourism operators raised concerns about the use of the commission model. Concerns from operators centre on, firstly, the perceived 'significant' markup by cruise lines of product (tours/excursions) and secondly, the value flowing off-shore to large multi-nationals.

Other representatives of tourism operators presented a much more positive view, citing the significant benefits cruise brings, such as vibrancy, economic stimulus, and opportunity for growth. Representatives of communities where cruise activity is a relative new phenomenon, e.g., Whangarei and New Plymouth, where 2023/24 was the first season that cruise ships called, reported a high level of excitement and acceptance of cruise ships.

Smaller communities like Lyttelton face challenges in maintaining social cohesion, with some residents pointing to cruise tourism as an environmental and social challenge. Congestion on public transport further amplifies negative sentiment. However, stakeholders noted that once public transport services were effectively coordinated and managed, there was a much-improved view of cruise activity. Media reports on disruptions to commuters, such as on the ferries in Auckland, seem to fuel anti-cruise sentiment among some groups in the community. However, based on the engagement with other stakeholders, it appears to be a group of affected people that are controlling the narrative.

During the engagements, it was also pointed out that social licence from mana whenua to operate ports is not always guaranteed, presenting ongoing challenges for port authorities. Several stakeholders voiced their frustration in mobilising local iwi to be a part of decision-making groups and strategic bodies that are involved in developing the cruise sector in their towns.

2.6.4 Environmental elements

Stakeholders have repeatedly stressed the importance of not singling out cruise ships but rather taking a holistic view of the entire maritime industry's environmental footprint. There appears to be a general acknowledgement that cruise lines are working to improve the sector's environmental sustainability, but the extent of this work is not understood. There appear to be some (incorrect) views about discharges occurring while in port.

Environmental group(s) and some community groups are of the view that it is insufficient and more urgent action is necessary. The main concerns with regards to the sector are:

- Emissions from cruise ships are not included in any country's inventory, and does therefore not form part of a reduction strategy. This discrepancy poses challenges in managing the environmental impact of the cruise sector, as emissions from ships are treated differently than land-based sources[83].
- Effect of engines (sound and vibration) on marine mammals.
- Marine animals getting struck or caught in rudders (and other moving parts of vessels).
- Waste being dumped at open sea.

Although these effects extend beyond cruise vessels, this sector is perceived as 'luxury' travel, rather than a necessity (like trade vessels). Consequently, the cruise sector receives greater attention than other parts of the economic transport network and tourism sector.

Environmental concerns extend beyond local communities, with pressure also coming from climate activism. Several ports and tourism organisations mentioned that regular protests occurring on days when there are cruise ships berthed. Safety concerns were raised by stakeholders. Clashes in Auckland between protestors and members of the public, including volunteers, have required the police to get involved. Moving forward, multiple stakeholders are collaborating to create a risk management strategy for implementation during cruise event days. Ports are also exploring options to change infrastructure layouts and structures to better separate visitors from potential protestors.

Several ports pointed out that very little solid waste (food, plastics, pallets, etc.) comes off the ship, and are mostly dealt with at the ship's home port. One of the ports mentioned having to dispose of small amounts of oily water, and it was mentioned that sewage is treated onboard to two stages before drinking water, before being discharged at sea. There are strict regulations around when, how and under what circumstances this can be done. Nevertheless, cruise line representatives pointed out that some of the waste management practices onboard are more advanced than what New Zealand ports require[84]. Cruise lines all have waste minimisation policies that align with MARPOL guidance around limiting items that would become waste after use e.g., no single-use plastics.

[83] We understand that the cruise sector's preference is to have the sector's emission included.
[84] We were unable to verify this statement with ports.

2.7 Conclusion

The New Zealand cruise sector has seen growth post-COVID, but like the rest of New Zealand's tourism sector, it has not fully recovered to pre-COVID levels. The sector brings foreign spending to New Zealand and accounts for around 6% of international visitor spending – a significant portion. Total spending includes expenditures associated with regulatory compliance. However, the NZ cruise sector is trailing behind the pace of international recovery, with a less optimistic outlook. Following a successful 2023/2024 season, the market is showing signs of contraction, accompanied by a projected decline in short-term port visits.

The cruise sector has a regional footprint, with spending aligning with where the main ports are Auckland, Tauranga, Wellington, Christchurch, and Dunedin[85]. Fiordland is a major destination even if it doesn't have a port where passengers can disembark and spend money. The smaller regional ports (e.g., Napier, Gisborne and Timaru) also receive a portion of the cruise spending. The ports act as a network, and cruise itineraries are designed around the network. Losing access to a key destination, is likely to have network effects.

Ensuring that the New Zealand regulatory landscape is fit-for-purpose, is acknowledged and appreciated. However, feedback from the industry suggests that the scale and speed of changes (e.g., levy and biofouling) are undermining confidence in New Zealand as a destination. While there is demand from passengers to come to New Zealand, the additional regulatory challenges and costs mean that cruise lines' ability to generate the necessary yields is reduced. In turn, this erodes the relative attractiveness of New Zealand as a destination with deployment decisions difficult to motivate in New Zealand's favour.

New Zealand faces the same pressures as other countries to reduce emissions and other environmental effects associated with the cruise sector. The views about the sector's local impacts are diverse and polarised. Some communities have found innovative ways to engage with the cruise opportunity and are leveraging off the cruise sector to lift engagement and improve social cohesion. However, these tend to be communities where total cruise numbers are still relatively minor.

Balancing the economic gains that the sector facilitates against the environmental effects (and externalities) is important. The analysis shows that the two largest components (that can be quantified) associated with the cruise sector relate to the new spending attracted to New Zealand and the sector's emissions. The new spending flowing to New Zealand is treated as a gross benefit, and the value of the emissions is seen as a cost.

There are several costs and benefits that cannot be expressed in dollar terms. These include aspects such as disruptions to ferry users, some environmental effects (seabed disturbances) and cultural issues.

The growth outlook for the cruise sector is clouded with the 2024/25 season's booking down around 25% to 30% from the 2023/24 season. Further, the outlook for the 2025/26 season is even more bearish and down a third. However, it is still early in the booking cycle and bookings for the 2025/26 season are subject to change as more bookings come in. Clearly, the sector is at a low part of the cycle, and activity is down. This slowdown provides headroom for the sector and parties engaging with it to address gaps and issues and to position for growth.

[85] Includes the operations at Port Chalmers.

3 Values and Outlook

Section highlights

- The New Zealand cruise outlook compared to the global cruise sector is less favourable, especially over the short term. The 2024/25 season is significantly down on the 2023/24 season and early signs are that the 2025/26 will also be challenging.
- Different tools are used to assess the outlook – including a multi-criteria analysis structure, economic impact assessment, and a high-level overview of the costs and benefits.
- The multi-criteria analysis (MCA) considers the economic, environmental, social, and cultural effects of the cruise sector – different weights are assigned to mimic alternative preferences. There are thirty-seven criteria covering the direct and indirect effects/impacts of the sector.
- A scenario approach is used to illustrate the growth outlook. The scenarios show different growth scenarios, ranging from a low, medium to a high outlook. The scenarios reflect constrained and unconstrained growth. In addition, six pathways are considered. These pathways reflect:
    - a shift to green technology,
    - uptake of shore power,
    - a focus on boutique cruising,
    - fleet changes towards megaships,
    - a maritime disaster (sinking of a vessel), and
    - a biosecurity incursion.
- The MCA reveals the tensions between economic elements and environmental elements. It also shows that the social and cultural elements are closely interrelated to both the economic and environmental elements.
- Shifting to green technologies and enabling shore power improves the relative scores. However, achieving growth via large or mega ships sees a drop in the environmental, social, and cultural scores.
- There are several limitations to consider when comparing the costs and benefits. A key challenge is that many of the cruise sectors' costs cannot be expressed quantitatively, or in dollar terms. This includes pricing in the risks associated with the sector. Using the available information suggests that the benefits outweigh the costs with the annual net positive in the order of $90m to $185m – these estimates do not reflect environmental or cultural risks. Further work is needed to understand the size (and value) of these risks.
- In terms of the economic impacts, the average annual GDP impacts across the three growth scenarios (over the next 30 years)

Scenario	Effect	GDP (Average) $'m	Supported employment
Sc 1: slow decline (-0.5% per year)	Direct and indirect Induced	350 100	5,420 1,940
Sc 2: slow recovery moderate growth (1.5% per year)	Direct and indirect Induced	1,080 300	16,510 5,900
Sc 3: recovery and annual growth of 2.2% per year	Direct and indirect Induced	1,410 400	21,580 7,720

Globally, the cruise sector has a positive outlook with ongoing investment in new cruise ships, investing in cleaner[86] technology, and reporting strong passenger numbers. While the outlook is optimistic, some locations are seeing increases in protests associated with over tourism and 'people pollution', as well as environment-related protests. The global cruise sector is entering a period of adjustment.

In contrast to global growth seen in cruise activity, the New Zealand outlook is less favourable. The number of scheduled cruise ship and passenger arrivals for the 2024/25 season are significantly lower than the 2023/24 season. The downward shift is in the context of overall New Zealand tourism levels that are still below pre-COVID levels. The low cruise levels are also seen in Australia with domestic cruise trips remaining below pre-COVID levels, but visitor spending is exceeding pre-COVID levels[87]. International cruise passenger numbers and spending are however still lagging pre-COVID levels.

There is considerable uncertainty about the New Zealand cruise sector's outlook and pathway over the short, medium, and long term with available data suggesting that the short term is likely to see further drops in the number of cruise visits to New Zealand.

While New Zealand has a positive reputation and is seen as a bucket list destination that creates demand for cruises around New Zealand, cruise lines also consider commercial factors when planning their deployments. An important part of the deployment process followed by the cruise lines is to analyse the market along two dimensions[88]:

- Maximising return on the experience in terms of guest satisfaction and repeat rates,
- Maximising return on investment, integrating revenue potential, cost controls, and risks.

New Zealand's relative position for the second dimension is however not as clear-cut with New Zealand competing against other global destinations during deployment decisions. Cruise lines have indicated that New Zealand is seen as a high-risk destination, with regulatory pressures and shifts contributing to uncertainty. Inflationary pressures across the supply chain (e.g., port charges and other fees) are presenting further challenges.

The preceding section described observed patterns relating to the economic, environmental, social, and cultural considerations associated with New Zealand's cruise sector. These considerations cover multiple features, qualities, and attributes. Valuing the different attributes and qualities is difficult because many aspects cannot be expressed quantitatively or in dollar terms. In addition, people give differing values and importance to different considerations.

Notwithstanding the challenges associated with sizing and valuing the different considerations, the cruise sector's outlook and potential values are explored in this section. A scenario approach and a multi-criteria analysis are combined to explore the cruise sector's values. The section starts by introducing the scenarios before the results are discussed. The section concludes with an overview of the opportunities and risks associated with the cruise sector.

3.1 Framework parts

There are several challenges associated with estimating the value of the cruise sector, including:

- The sector is dynamic and constantly changing. Using a single year, or a short snapshot, is unlikely to capture the sector's true effects because the sector changes, grows, and contracts.

[86] Such as Exhaust Gas Cleaning Systems, and new engine technology (e.g., multiple fuels and more fuel efficient).
[87] (Labine-Romain, 2024)
[88] (Berkshire, 2024)

- The cruise sector has diverse effects that are expressed in qualitative and quantitative terms. Combining qualitative and quantitative metrics presents challenges because they are complex and not readily combined.

Therefore, a multi-criteria assessment framework was used to illustrate the potential values associated with the cruise sector. Such a framework provides a way to balance different perspectives while dealing with qualitative and quantitative data. In addition, different weightings were used to illustrate different perspectives, i.e., for example assigning greater 'value' to environmental considerations relative to economic considerations.

The framework covers thirty-seven criteria, and these are categorised into the four wellbeings. Table 3-1 shows the criteria and Appendix 13 provides a description of each criterion.

Table 3-1: Criteria in the Framework

Wellbeing	Criteria
Economic	Vessel and visitor spend ($), new money flowing into New Zealand
	Direct and Indirect impacts (GDP)
	Economic Impact (Total GDP - $)
	Distribution of port profits
	Levies
	Conferences
	Return Visits (additional visitors to New Zealand)
	Leverage events (accommodation)
	Disruption (productivity losses and adverse effects)
	Infrastructure spending (developing new infrastructure to support activities)
	Business confidence effects
	Seasonal effects
	Contribute to town centre performance and vibrancy (vs congestion)
Environmental	Emissions from voyages + shore excursions (CO_2-e)
	Emissions of tourist goods (embodied)
	Waste
	Health effects (emissions related to cruise ships)
	Biofouling
	Visual amenity – diminish or enhance
	Water quality effects – waste discharges by cruise ships
	Effects on marine animals and seabirds (e.g., vessels strikes, behavior and migration shifts)
	Effects on the marine environment – seabed disturbance, water column effects
	Oil spill, accident, or adverse event
	Unsustainable consumption patterns (e.g., 'fast tourism')
Social	Perceptions about the cruise sector
	Destination management and regional development ambitions
	Concentration/congestion (over-tourism and people pollution)
	Volunteers
	Exposure to regional NZ
	Protestors
	Infrastructure and amenity constraints
	Social cohesion – enhance or diminish
Cultural	Cultural considerations (Opportunities)
	Cultural considerations (Risks)
	Generate opportunities for the Māori tourism economy
	Exposure of local artisans to international markets
	Development of new tourist attractions

The criteria include quantitative and qualitative measures. Where practicable, the quantitative measures were estimated and used to inform the scoring. However, many effects cannot be quantified or monetised and consequently, qualitative interpretations were applied. In terms of scoring the qualitative effects, the baseline outlook was assessed for each scenario. A 10-point scale was used with 1 being a negative (adverse) effect, 5 being seen as neutral, and 10 being the upper end of positive effects. Each criterion was scored individually

with a view to reflect the anticipated direction of change relative to the existing situation. Many of the criteria are qualitative in nature, and it is not viable to assess each one in quantitative terms. A strength of an MCA approach is that it can deal with such gaps. The scoring was undertaken using the insights gained during the engagements as well as the literature study. The anticipated direction of change associated with the pathway is then considered and scored. If the change (for each criterion, and the level of cruise ship activity as reflected under the scenarios) is expected to be neutral, then a score of 5 is allocated. If the change is more than minor, and positive, then a score of 6 is returned. However, if that change expected to be minor and negative, then a score of 4 is returned. A similar logic is applied where the anticipated effects are more pronounced and scores of 7 and 8 are given to effects that are more significant (and positive), and 2 and 3, where the effects are negative. We note that the scoring was completed by senior team members. An advantage of this approach is that consistent views and understandings of the criteria and the growth scenarios are used in assessing the pathways[89].

The 2023/24 season was used as benchmark. and the insights gained during the engagement informed the scoring. Next, a set of pathways was considered for each scenario – the scenarios and pathways are introduced in the next section.

It is acknowledged that the relative importance of the different wellbeings could vary depending on where the emphasis of the analysis is placed. For example, if the economic elements are seen as 'more' important than others (i.e., the environmental, social, or cultural), then the weighting assigned to the economic wellbeing should be increased. The analysis reflects different perspectives where the relative importance of the economic, social, environmental, and cultural wellbeing is increased. In these instances, the weight assigned to the perspective is double that of the other perspectives (i.e., 40% vs 20%). In addition, a situation where all wellbeings are assigned the same (equal, 25%) weight is included. Table 3-2 reports the weights for the different perspectives.

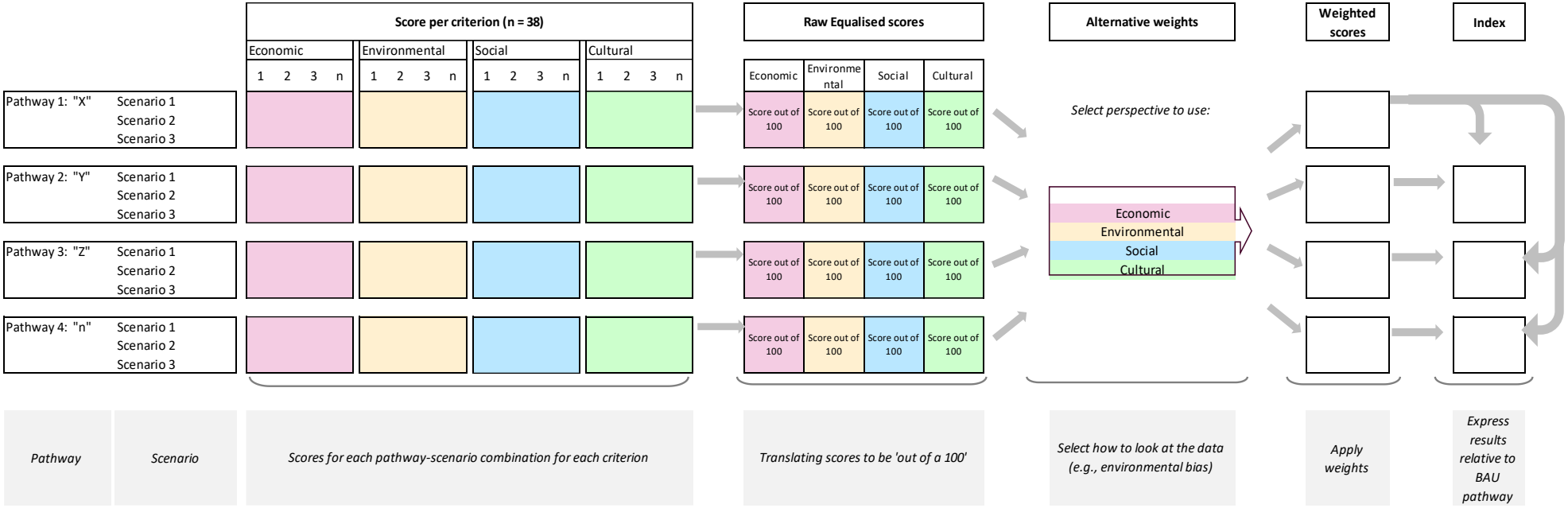
Table 3-2: Weights applied to illustrate different perspectives

	Weights applied to				
Perspective	**Economic**	**Environmental**	**Social**	**Cultural**	**Total**
All Equal	25%	25%	25%	25%	100%
Economic	40%	20%	20%	20%	100%
Environmental	20%	40%	20%	20%	100%
Social	20%	20%	40%	20%	100%
Cultural	20%	20%	20%	40%	100%

The weighted results estimated for each pathway-scenario combination are indexed against the benchmark (baseline pathway-scenario) results. The index forms the basis for assessing the anticipated outcomes under different outlooks. Figure 3-1 shows how the parts fit together.

[89] Another approach this is often used when scoring an MCA is to use an expert panel to evaluate and score the relevant criteria. This approach was however beyond the scope of this assessment. The mix of the parties interviewed included entities with direct interests in different aspects. For example, the environmental groups have strong views about the environmental effects of the cruise sector, whereas economic development agencies have similarly strong views about the economic elements. Therefore, using the parties that were interviewed for this project to score the criteria is unlikely to yield robust results.

Figure 3-1: Structure



3.2 Scenarios and pathways

The cruise sector is responding to market shifts and challenges. Despite an increase in passenger numbers post-COVID, the outlook over the short term suggests a downward trend. Comparing the 2023/24 season with the 2024/25 season shows the decline across several metrics, including vessels, voyages, and passengers. Overall, passengers are expected to be down 25% to 29% from 2023/24 totals. In addition, preliminary indications are that the 2025/26 season could see a further decrease in cruise ship visits and passenger numbers. The decline for the 2024/25 season is a function of different vessels (sizes) as well as a loss of winter cruising (20,000 fewer passengers across the overall season). The outlook for the 2025/26 season is still in flux because the 2025/26 season is more than a year out and cruise lines are still deciding and planning their itineraries, and therefore the expected cruise ships are likely to change.

The scenarios and pathways are described before the results are presented.

Scenarios are used to deal with uncertainty and to reflect different growth trajectories. A total of six scenarios were modelled to show a mix of growth rates and short-term responses/recoveries. After discussions with the Ministry, three were discarded because the retained scenarios cover the likely spectrum of outcomes. The three scenarios reflect a low/declining growth future, a moderate growth outlook, and a more positive recovery of the cruise sector:

- Scenario 1: a low growth scenario that reflects the downsizing from 2023/24 to 2024/25. However, this scenario then stabilises at this level (no additional downward step changes for the 2025/26 season[90]). The long-term trend used in this scenario is a continued rationalisation with a slow (0.5% per year) decline over the long term. This scenario shows a restrained growth outlook.
- Scenario 2: a moderate growth profile that includes a five-year recovery that will see passenger numbers approaching those seen in 2023/24 as well as annual growth of 1.5% per year over the medium and long terms.
- Scenario 3: shows a strong recovery of a three-year period and then ongoing growth of 2.2% per year[91]. The scenario shows a higher growth scenario that is unrestrained relative to recent trends.

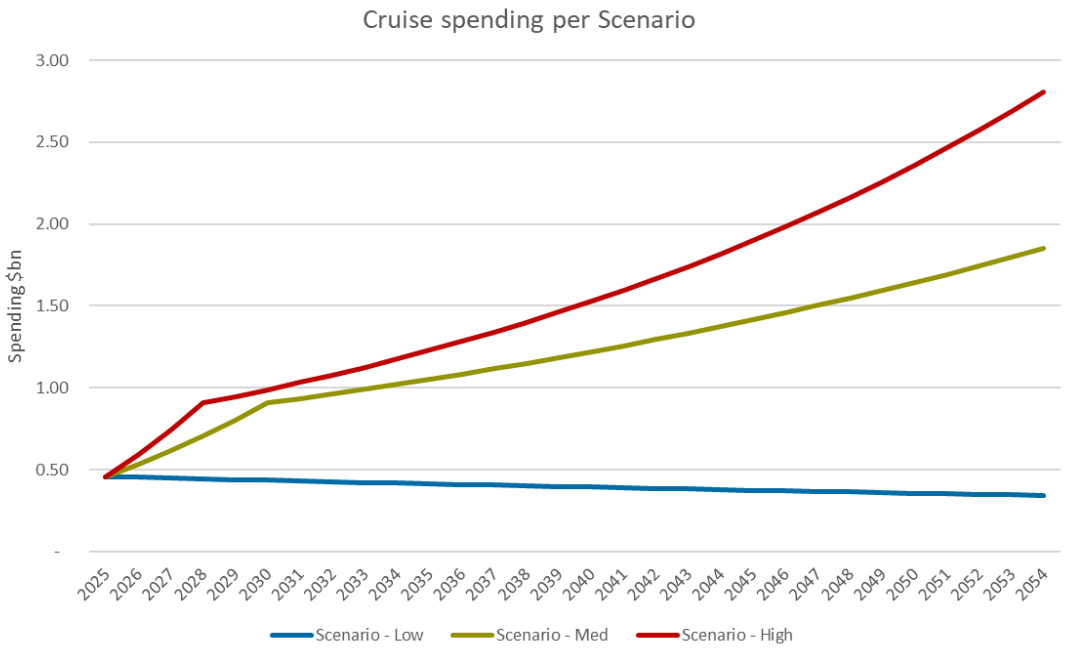
The three scenarios reflect a low, medium, and high growth outlook. The three scenarios can also be interpreted as showing constrained and unconstrained environments. The scenarios show different growth pathways and are meant to show how cruise lines respond to international developments and how New Zealand as a destination sits within the international cruise landscape. However, it is beyond the scope of this research to model how cruise lines could respond to alternative policy positions or market conditions. Figure 3-2 shows how the different scenarios compare in terms of visitor/passenger spending. The three main scenarios are shown. The three other scenarios that are not used in the wider assessment are shown for illustrative purposes.

The spending and passenger levels associated with the scenarios are based on observed patterns. No specific allowance is made to reflect changes in passenger behaviour, i.e., changing spending patterns. It is assumed that spending levels (e.g. spending by passenger by port day) would remain constant. Information about differences in spending by vessel size is not available, so these patterns are held constant.

[90] We understand that initial bookings for subsequent seasons are trending below par, but work is still underway to secure cruise ships for the future seasons.

[91] To put this in perspective, CLIA projects 2.6% growth per annum globally, over the next five to six years. It is not clear what their forecasts are beyond that.

Figure 3-2: PAX spending profile per scenario



The second part of the analysis deals with different pathways, or events. Table 3-3 outlines the pathways used in this assessment. The pathways illustrate the potential direction of the effects and are illustrative in nature. That is, the pathways reflect potential changes and are not intended to model a definitive growth outlook or future. In reality, a combination of the pathways could occur.

Table 3-3: Pathways

Pathway	Description and key assumptions
Cruise lines adopt new technology resulting in a lowering of emissions and associated environmental effects. (This pathway is referred to as transition to green technologies)	The adoption of new technology as well as the use of those technologies to reduce emissions is the focus of this pathway. These technologies might involve upgrading the current fleet with newer, more fuel-efficient vessels or incorporating other solutions like Exhaust Gas Cleaning Systems (scrubbers) and alternative fuels to reduce emissions. The pathway does not model specific technologies, or the uptake rates. Instead, is it used to show the potential effects of such a transition. The focus is on reducing emissions associated with the cruise sector (vessels specifically). The pathway uses a twenty-year period (2030 to 2050) for the change to occur and it is assumed that the total emissions would decline to a quarter of current levels. The scale of change aligns with the ambition of the cruise sector, but acknowledge that the ambitions are in 'net terms'. The transition pathway is assumed to be linear over the assessment period.
A shift to shore power	Shore power is highlighted as an option to reduce the emissions associated with cruise ships while they are in-port. This pathway reflects the emissions savings associated with cruise ships while they are in-port. Crucially, the pathway assumes that renewable electricity is used to provide the energy to enable onboard power generation to be turned off. In terms of the timing, the pathway uses a fifteen-year period, starting in 2030 (until 2045) for the transition. During this period, the emissions associated with the in-port (at berth) activities are reduced to 5% of 2024/25 levels.
Developing the New Zealand cruise market with a specific focus on smaller vessels, i.e., boutique cruising	The cruise fleet is weighted towards the mid- to megaships (more than 1,500 PAX capacity) with 69% of passengers associated with segment. Cruise passengers traveling on smaller vessels represent a comparatively smaller group, making up about one-third of the total passengers. The pathway builds on the growth scenarios and adds further growth to the boutique segment – for this pathway, an additional 15% is added to the growth for each scenario. For the low scenario, with declining passenger numbers, the decline is converted to growth.

	The growth is projected to occur on top of the growth associated with the scenarios. The additional 15% growth is achieved during the period between 2030 and 2050, and is equal to compound growth of 0.7% (per year).
Ongoing growth in the cruise market with large vessels delivering the change	This pathway mirrors the preceding one with the difference being that the growth is delivered via large vessels, specifically large and megaships. Recall, a large ship has 2,500 – 3,499 PAX and a megaship has capacity of >3,500 PAX. These ships account for 23% of PAX capacity (2023/24 seasons). This pathway adds an additional 15% growth to these ships over the medium to long term (2030 to 2050). The rate of change is 0.7% and is applied on a compounding basis.
A maritime disaster (large vessel sinks)	The maritime disaster pathway considers an event during which a vessel is lost (sinks). The pathway uses a large ship (2,500 – 3,499 PAX) that loses power, grounds, and eventually sinks leading to adverse environmental effects associated with fuel spillage. The human factor (loss of life) is not a key part of the pathway, and the emergency response is assumed to operate as expected (the emergency response is not assessed) and a specific location for the event is not considered.
A bio security event	Biofouling presents risks to the marine environment around New Zealand and managing the risks is a key action. This pathway contemplates a biosecurity incursion that is contained. The potential responses of the wider community are integrated into the assessment. The pathway does not seek to estimate the potential GDP or economic losses associated with an incursion but instead the potential effects and community responses are reflected.

The pathways consider the change in passenger numbers relative to post-Covid numbers. The different growth scenarios help to contemplate the potential effects of the different pathways.

3.3 Results and values

The cruise sector has a range of effects across different wellbeings. Some of these effects can be expressed in dollar, terms but many cannot be monetised. Applying the framework (introduced in section 3.1), the broad outcomes associated with the pathways across different growth futures (scenarios) can be assessed. Such an assessment is useful because even though the outlook reflects assumed growth rates, the position (over time) relative to the baseline sheds light on areas of opportunity and risks. It is important to note that it is possible that some combinations (scenarios and pathways) could result in a net negative return – a positive position is not guaranteed.

The framework reflects both qualitative and quantitative aspects, and the quantitative measures are reported separately to maintain transparency. These metrics include:

- Economic
  - Additional (new) spending attracted to New Zealand,
  - GDP impacts (direct, indirect, and induced),
  - Employment supported.
- Environmental
  - Emissions ($CO_{2\text{-}e}$).

The scores for each scenario are presented in Appendix 14.

3.3.1 Qualitative findings

The pathways are considered against the baseline. The baseline outlook assumes a stable growth trajectory without material disruptions to the way the cruise sector operates. How communities relate to and engage with the cruise sector is a function of the level of cruise visitors and passengers arriving per port, duration, and concentration. Appendix 14 presents the raw scores.

The baseline uses the estimated level of the 2024/25 season as a starting point to align with the short term. Initial indications are that the 2025/26 season could see a further drop in cruise activity. However, it is plausible that additional cruises could be added over the next 6-12 months. Therefore, the 2024/25 levels used as the starting point are seen as relatively balanced. Importantly the change across the scenarios is used in relative terms (not absolute terms) because there is considerable uncertainty around the growth outlook for the cruise sector (this is also the reason why three growth scenarios with low, medium, and high growth is used).

The factors and elements considered in establishing the baseline scores are outlined, but they are not repeated for each pathway unless they are significantly different or seen as having a material influence on the scores. Each pathway is dealt with separately, and the focus is on how the alternative pathways diverge from the baseline.

Important note:

The subsequent section is structured for brevity. The first section deals with the baseline. In this section, details about the relationships and dynamics between parts are presented. Each criterion is discussed to portray how it is interpreted in the context of the baseline. This detailed discussion is not repeated for the other pathways. Instead, the other pathways are discussed in a way that shows how it scores relative to the baseline. The relative position of the three scenarios is incorporated into the discussions.

3.3.1.1 Baseline

The baseline shows the potential outcomes under the three growth scenarios. This outlook is described by first assessing the future situation under Scenario 1 (i.e., declining growth), and then scenarios 2 and 3 are discussed (in the next section). The baseline shows a continuation of existing patterns and trends, with the main elements being:

- Distribution of passengers per vessel size category,
- Movements of cruise ships around New Zealand (i.e., visits to different ports),
- Relative spending by cruise ships,
- Vessel emission factors,
- Regulatory requirements,
- Community perception relative to the level of cruise activity, and
- Level of infrastructure provision.

The scoring reflects the anticipated scale of the effect and direction (positive or negative) of the change under the low, medium, or high growth scenarios. The anticipated shifts as well as the rationale for the scoring are described below.

Economics

Scenario 1 will see the overall spending generated by the cruise sector decline over the long term. This decline sees a score that is less than neutral. Similarly, the size of the cruise sector and the level of economic activity it facilitates also experience a decline. These scores reveal the relationship between cruise ship spending

(vessel and passengers) and the indirect or facilitated effects as that spending flows through the rest of the economy. These include the GDP effects as well as the associated employment impacts. Other flow-on risks associated with a declining cruise sector are the drop in demand for the support industries and the potential exit of international companies (e.g., stevedores C3 Limited closed their Auckland stevedoring activities in September 2024, with a loss of 115 jobs).

Cruise vessels pay fees to port companies to use the harbour infrastructure, and ports are run as commercial enterprises with profit returned to shareholders, who are often ratepayers. An indirect effect of the cruise sector is that it supports many cities and regions around New Zealand to supplement local government income. A contracting cruise sector will see a reduction in the portion of profits that are returned to shareholders. These interplays mean that a score that is slightly negative (4) is allocated to reflect the drop in profits.

The levy criterion is also seen as marginally negative in line with the declining cruise activity. Parts of the levies are collected from cruise ships and the maritime sector. While a contracting cruise sector will also reduce the need for funds associated with the levies, a base level of resource is likely to be needed. Recovering the necessary funds from a smaller count of vessels (and passengers) could increase the levies collected from cruise ships. If over time, there are too few cruise ships to recover the levies from, then the levy approach could become unworkable.

In terms of conferences, return visits and leveraging events, Scenario 1 returns neutral scores. Conferences associated with the cruise sector are a function of the overall sector and not solely the count of cruise ships. Therefore, the potential effects are minor. Nevertheless, cruise ship visits are not the sole marketing channel for stimulating demand for New Zealand travel. In terms of leveraging events, using cruise ships to supplement accommodation is an option that remains unchanged even if the cruise sector declines. Therefore, this criterion is seen as neutral.

Historic examples of cruise ships disrupting some communities exist. From an economic perspective, these examples include delays to ferries outside the curfew periods that impact ferry passengers on their morning commute with productivity implications. There are also disruptions to public transport users in locations such as Lyttelton that are included under the economic wellbeing (these disruptions are also dealt with under the social wellbeing). Scenario 1 projects a decline in cruise visits, indicating a reduction in disruptions compared to current levels and a decrease in frequency. Therefore, Scenario 1 sees a neutral score. It is also important to note that there are different views around the scale of disruptions to ferry users – some parties suggest that arrival and departure schedules are known in advance, providing opportunity to make alternative plans. Regardless, the disruptions are acknowledged.

The cruise sector relies on infrastructure, including wharves and infrastructure associated with other related activities, such as customs clearance, passenger handling, and supporting logistics. A neutral score is returned because if the outlook for the cruise sector is seen as declining or flat, then additional investment is unlikely to occur, and the available infrastructure could be used for alternative uses if demand was available (e.g., more containers). At the same time, however, the potential financial returns to the ports would reduce. A potential risk is that smaller ports could be left off itineraries, and over time, these smaller ports would not be able to adequately maintain wharf and supporting infrastructure due to economic (financial) challenges.

Cruise spending in regional New Zealand is acknowledged as a key revenue source for local businesses. A declining cruise sector with lower spending levels will erode local business confidence and, in turn, have an indirect impact on spending (investment) and employment intentions. Under Scenario 1, the declining outlook is interpreted as a negative, and a score of 4 (marginally negative) is assigned.

The cruise sector is seasonal, with most cruises occurring during the summer period. Although winter cruises can distribute demand over a longer duration, the majority of cruises still take place in the summer months.

The seasonal effects flow through, impacting aspects such as labour force availability and income patterns. It creates price variation (dynamic pricing) and makes it difficult for businesses to use all resources efficiently throughout the year. Dependence on seasonal tourism can limit long-term economic stability because trading patterns are volatile. Under Scenario 1, the downward trend will reduce the overall seasonal effects, but they will remain in place because options around winter cruise are unlikely to be taken up. Therefore, a neutral score of 5 is assigned.

The final criterion under economic wellbeing is the contribution to town centre performance and vibrancy. Cruise passengers add spending to town centres and contribute to the overall vibrancy. However, small ports are within small economies, and structural shifts in regional economies could see an increasing reliance on tourism, including cruise spending, to support regional (port) towns. The declining spending associated with Scenario 1 could interact with other local dynamics, such as ageing population dynamics and growth, economic shifts, climate change, and natural hazards, to amplify the negative outcomes. Hence, a less than neutral score (4) is provided. It is acknowledged that the towns could implement other measures to reverse the activity that is lost and to diversify the economy. However, this is to address the lost opportunity, and it is this lost opportunity that is considered relevant in the scoring.

Environmental considerations

The environmental considerations under the baseline pathway and related to Scenario 1 is for the most part slightly negative. However, under Scenario 1 the cruise sector is projected to contract and consequently many of the environmental effects will reduce (i.e., the situation will improve relative to existing levels) over time. Sector-based work to address environmental concerns and to reduce net emissions are built into the evaluation. Regardless, the cruise sector will continue to have adverse environmental effects, and all criteria are scored a 4. Waste is, however, neutral because total waste levels will reduce over time in line with a smaller cruise sector and environmental commitments that limit 'general waste' such as plastics, cardboard, paper, and other recyclables.

The dynamics associated with the criteria influencing the scoring include:

- Emissions from voyages and shore excursions (CO_2-e): The cost of emissions is estimated using the approach outlined earlier in the report and using the medium value for the shadow price of carbon. For this pathway, fleet changes and new technologies are not included because they are covered as part of another pathway.
- Emissions of tourist goods (embodied): Tourism goods and services have embodied carbon, and these emissions include all parts of the supply chain associated with tourism. Similarly, cruise tourism also has embodied carbon. However, estimating the value of such emissions is complex, and data availability limits the ability to estimate these emissions. The scoring considers the size of spending based on visitors/passengers as well as vessel spending. Under scenario 1, the spending patterns are constrained and projected to contract. This will see a lowering of embodied emissions. Existing accreditation mechanisms (e.g., Qualmark) provide opportunities to generate a fuller understanding of the embodied emissions and better reflect this important aspect as part of the tourism landscape.
- Health effects (emissions related to cruise ships): Cruise ships emit air pollutants while voyaging and while in port. During port visits, people close to ports can be subjected to air quality that is lower than what would have been the case without cruise ships. Estimating the change in air quality attributable to a cruise ship is difficult, and there are many variables and parameters to consider. Approaches to value the health effects associated with air quality are available, but there are challenges in linking these health effects to a specific cruise ship and its emissions. Therefore, the direction of the effect is based on factors such as the number of vessels, count of port days, and age of the vessels. The baseline

does not reflect a shift to new technologies and consequently the 'baseline' change in air quality while in port reflects the sector's ambitions to reduce emissions.

- Biofouling: This is an issue that is central to several other criteria. For example, if an incursion occurs, then there could be several flow-on implications. These include economic effects (loss of production), social elements (perceptions) and cultural considerations (ability to generate Māori opportunities) are all reduced. For Scenario 1, an incursion is not contemplated, so the biofouling scores reflect the risk situation. As the level of risk is related to the number of vessel movements, the declining number of vessels will see the risk profile drop marginally over time. However, the scale of change is relatively minor, resulting in a return score of 4.
- Visual amenity – diminish or enhance: Views around cruise ships' visual impacts are mixed, with some people enjoying the grandeur of a cruise ship, yet other individuals see cruise ships as visual pollution. Whereas, in a port environment, the overall opinion is likely to be closer to neutral. However, in the assessment, we also consider the air pollution (exhaust) and the environmental context, i.e., a cruise ship with air emissions in a pristine environment is likely to be seen in a negative light. In Scenario 1, a marginally negative score (4) is assigned to show the air emissions and the visual considerations specifically. The number of vessels (frequency and duration) form part of this process and the scenarios with low or negative growth see an improvement in the score over time.
- Water quality effects: MARPOL regulates the waste discharges including wastewater discharges. These underlying processes and operating procedures associated with managing wastewater are mostly automated with strict controls. Nevertheless, human error and malfunctioning could result in a discharge with adverse effects. The size and effect of such an event are likely to be relatively small but risks remain. These risks are associated with the number and type (age) of vessels operating in New Zealand. Under Scenario 1, these risks diminish marginally but the risks remain and therefore the score has to be less than neutral – a score of 4 is assigned.
- Effects on marine animals and seabirds (e.g., vessel strikes): The level of interaction and potential conflicts between vessels is related to total vessels, location, and distances travelled. Mitigations such as slow sailing help to reduce the risks but as total vessel miles increase, so too do the risks. Increasingly, more value is placed on locations (e.g., the Hauraki Gulf) and high-value species (Hector's Dolphins). Scenario 1 sees a decline in vessels and cruise activity, and the associated risks are also perceived as declining, but the risks do not return to a 'no-risk' situation, hence the score is not neutral, and a score of 4 is returned.
- Effects on the marine environment – seabed disturbance, water column effects. Cruise ships operate around New Zealand in already modified (port) locations as well as pristine and sensitive environments (e.g., Akaroa). Some of the effects on the marine environment can be mitigated or avoided but some impacts will still accrue. Generally, as the number of ships increases (in sensitive areas), the risks of adverse effects on the marine environment also increase. In contrast, if the number of ships decreases, then the risks will trend down.
- Oil spill, accident, or adverse event: The risk of an oil spill, accident or adverse event associated with a cruise ship is generally low but not zero. Total loss events (sinking) are extremely rare. The potential environmental effects are therefore associated with smaller, adverse events such as a grounding or a fire. The age and number of vessels influence the risk profile. Scenario 1 sees a decline in the number of vessels in New Zealand, and consequently, the risks decline, but it does not fall to zero. A score of 4 reflects this pattern.
- Unsustainable consumption patterns (e.g., 'fast tourism'): Highly structured and short port visits, where a passenger experiences a quick overview of the destination instead of a deep experience, limit the local (within host community) spending. The degree to which these patterns emerge is a function of demand, where travellers seek to visit multiple locations in a short period of time, i.e., lots of experiences, instead of fewer, high-quality ones. Sailing times between ports restrict the ability for

wholesale changes towards fast tourism. In addition, New Zealand's driving distances (times) limit the degree to which fast tourism could be rolled out. With slower growth (declining under Scenario 1), a value-for-money approach is expected to see itineraries focussed on enabling access to iconic visitor experiences.

Social considerations

The social considerations encompass several criteria covering diverse aspects, such as perceptions about the cruise sector, concentration, and congestion effects, as well as social cohesion and volunteers. Perceptions about the cruise sector around New Zealand are generally positive. While these reflect cruise activity over the recent past, it supports a positive score. For Scenario 1, a score of 8 is allocated. The scenario is based on a declining sector. A decline in cruise ships and the facilitated spending is then seen as becoming more 'valuable' to local economies, and the fewer passengers are seen as lowering the risks of adverse events, e.g., bad behaviour or environmental issues arising, that could reduce/lower the positive perceptions.

The importance of the cruise sector across several regions is acknowledged, and cruise activity is identified as a specific activity to support while mitigating/managing the effects. The sector's role is acknowledged and earmarked for specific targeted actions in Destination Management Plans. A positive score of 6 is assigned to this criterion. A higher score is however not allocated when the sector is assumed to decline. A decline could lessen the necessity for proactive management, as the potential benefits perceived in the region might not warrant the effort.

The downside of an increase in passengers that spend locally and add to vibrancy is the congestion and nuisance that they can add. Defining a specific threshold where congestion becomes intolerable is difficult because these thresholds are highly subjective. The scoring drew on the international literature relating to the passenger per capita ratios seen in locations where the social acceptance of cruise activity is being challenged, as well as New Zealand patterns and pressure points (e.g., Lyttelton). The analysis incorporates existing successes in managing concentration. For example, some ports limit the number of cruise ships that can berth at any one time with the explicit purpose of limiting pressures on amenities and infrastructure and managing the risks of concentration and congestion. Scenario 1 is scored at a neutral level to reflect the generally low congestion and concentration issues that are currently occurring, and these levels are expected to remain low or even improve with fewer cruise ships and passengers.

Local volunteers benefit from their time and interactions with passengers and help create a positive experience for cruise visitors in port towns. However, there is potential for conflicts between volunteers, cruise staff and protestors. The wider benefits of volunteering are well-known, and they accrue to individuals and associated organisations (e.g., the Lions). The size of benefits is associated with the level of volunteering. Scenario 1 assigns a neutral score (5) to this criterion. This scenario assumes a decline in passenger numbers, which implies a gradual reduction in the overall benefits over time.

Cruise ships visit over twenty ports around New Zealand, and the spatial pattern provides regional exposure and distributes the spending around the country. The degree of distribution can change as the fleet and cruise itineraries adjust. A marginally positive score (6) is allocated to reflect the distributed nature of the spending to include regional New Zealand.

Globally, there is an increased awareness of environmental issues and challenges. While the business community and society are generally aware of these issues and responding, parts of the community are organised and are advocating for significant and speedy change. Protestors have a legitimate right to voice their views. However, tensions between protestors and other parties can boil over. Growing intolerance could see tensions escalate to more serious behaviour. The risks around such negative events are acknowledged and reflected in the score for Scenario 1 with a marginally negative score of 4. A lower score is not returned

because, with declining growth, the overall visibility of the sector and the number of port days during which to protest are lower.

An important social consideration that influences how locals view and experience cruise sector activities are infrastructure pressures and amenity constraints. A part of the potential discord arises from views about how the infrastructure and amenities are funded. Where rates are used, households could feel that they 'subsidise' the amenities and cruise passengers benefit from the investment without contributing to the costs. In reality, households do benefit from economic activity through employment opportunities, the availability of retail opportunities (access to services) and so forth. Businesses also pay rates and the benefits that business enjoy due to available amenities (that serve customers) are normally factored into setting business rates and differentials. In small communities, however, the rating policies are often kept uncomplicated, and these nuances are sometimes not captured. For Scenario 1, the pressures put on local amenities and the anticipated drop in passengers means that a neutral score is allocated.

Social interactions and how individuals communicate regarding key issues influences social cohesion. Currently, New Zealanders have a positive view about the cruise sector but there are pockets where social cohesion is strained (e.g., Lyttelton).

Social interactions and how individuals communicate regarding key issues influence social cohesion. Currently, New Zealanders have a positive view about the cruise sector, but there are pockets where social cohesion is strained (e.g., Lyttelton). Under Scenario 1, social cohesion is expected to remain stable with limited change, and it is seen as marginally positive (6) with the opportunities and benefits provided by the cruise sector seen as positive.

Cultural

The cultural criteria capture opportunities offered by the cruise sector. These opportunities include heritage and are not limited to Māori-related culture. There are existing, iconic attractions that support the sector; however, the declining outlook suggests that competition for the cruise dollar is likely to intensify. It is difficult to see cultural start-ups getting traction in a declining market. However, the declining market does not foreclose or reduce any cultural opportunities, and therefore a neutral score of 5 is returned.

In terms of cultural considerations (risks), fewer passengers mean that a focus on high-quality events and tourism offers is likely to support a move toward niche and premium goods. Therefore, the risk of commodifying culture is seen as low and avoiding the associated risks is deemed a benefit. A marginally positive score of 6 is assigned.

The cruise sector provides a range of tourist-facing and non-tourism opportunities for Māori. The degree to which local iwi respond to and capture such opportunities is influenced by the commercial areas within which they have a (commercial) competitive advantage. For example, aquaculture opportunities are emerging in the Bay of Plenty (mussels and finfish farming) which could be linked to the cruise sector as a supplier and/or culinary experiences. While the cruise sector provides a potential market, successfully establishing such opportunities requires more than a market. The scoring takes into account the potential market that fluctuating passenger numbers and associated spending offer. For scenario 1, a neutral score of 5 is allocated. The same dynamics influence local artisans and their exposure to international visitors, with cruise passengers providing a potential sales market. The size of this opportunity is a function of the cruise sector's size and distribution around New Zealand.

At a more general level, the cruise sector is part of New Zealand's tourism landscape. Existing businesses tap into regional economic strengths to serve cruise passengers. Declining cruise passengers (Scenario 1) means that competition between opportunities for the cruise dollar increases. Potential responses could be to lower

the price or improve the product offering. While competition is seen as advantageous for consumers, if the market is too small, business closures with job losses follow. Therefore, a neutral score is returned.

Scenario 2 and Scenario 3

As mentioned earlier, the baseline is assessed for the three scenarios, and the preceding section discussed the scoring associated with Scenario 1. The scoring process is repeated for each scenario with the results presented below. There is considerable overlap between the scenarios for instance where the aspects associated with the criteria do not change. Scenarios 2 and 3 both project higher cruise activity. The increase in activity has a positive effect on some scores and negative on others. In the interest of brevity, only the key differences and the reasons for those differences are discussed.

Economic

The higher growth scenario returns greater passenger and vessel spending to New Zealand (and the regions). The higher spending increases the direct economic impacts as reflected in GDP and employment. The greater the increase in cruise activity, the higher the returned score. The higher cruise activity translated into higher scores for the distribution of port profits and a marginal increase in the cruise conference score – higher spending translates into a larger supply chain with more linkages. A lift in business confidence and contribution to town centre performance and vibrancy is noted.

However, not all economic effects see an upward shift in scores. Greater cruise activity will see an increase in disruptions (e.g., ferry disruptions) so this criterion's score is reduced to reflect more adverse effects over time. Seasonal patterns and the challenges accompanying the peak-trough nature are expected to be amplified if growth is not spread across other seasons.

Several criteria remain unchanged. These include the potential effects associated with return visits, leverage and supporting events (providing accommodation) and infrastructure spending.

An overarching observation is that the economic effects are mostly positive and increase as cruise grows.

Environmental

The environmental effects of the cruise sector are inversely proportional to the level of cruise activity – as activity increases, so too do the environmental costs. The environmental scores reflect these patterns, indicating more adverse outcomes and higher risks. These patterns can be seen in scores associated with emissions dropping to 3 and 2 for the two scenarios, respectively. The health effects associated with cruise ship emissions while in port follow the same patterns. The effects on the marine environment, mammals and birds are treated in the same way, reduced to reflect greater activity levels.

Greater cruise activity and higher risks also lower the biofouling score. However, the assumed cruise sector compliance with regulatory requirements and monitoring sees the score reduced to 3 and not any lower.

An important point is that many of the environmental risks and effects are already managed with the potential effects avoided, but the risks are not zero. Consequently, the environmental scores remain at the low end of the scoring range (less than neutral).

Social

Under the baseline outlook, the higher growth scenarios see mixed outcomes, with criteria moving in opposite directions. Some of the divergence is in the context of different views about cruise activity, tourism, and beliefs about climate change and environmental effects.

Current views about tourism and the cruise sector as well as local ambitions to capitalise on economic opportunities related to cruise, are seen as positive and increase as scale is achieved. With higher growth manifesting, the successful achievement of actions in the DMPs will provide credibility to local efforts, enhancing the status of local efforts (e.g., of Economic Development Agencies). A marginally negative score acknowledges the downside of activity growth, which manifests as concentration/congestion. The growing cruise sector will see more passengers visit regional New Zealand, thereby distributing the spending around the country.

Higher cruise activity sees the local value and benefits delivered by volunteers increase. But the potential size of this is limited because with activity growth comes complexity and the potential need for more professional inputs and structuring of the passenger management activities (e.g., traffic management, way finding, and transport). Therefore, the scores for scenarios 2 and 3 are put at 6 and 7, respectively.

The social position of the community is influenced by the activities of local champions. Large weather events related to climate change and the visible profiles of these events can shift public views about the need for enhanced environmental protections and action. Accelerating the rate of emissions reductions in the cruise sector is likely to form a specific target of protesters and groups wishing to influence public opinion about the cruise sector. Consequently, an increase in protests can be expected, and the scores associated with this criterion are lowered.

Infrastructure constraints and strains on amenity are seen to increase in line with a lift in cruise activity. These pressures will become more acute without investment. But funding the investments and addressing questions around who pays and who benefits are important matters. At relatively low growth levels (e.g., Scenario 2), the potential for significant reduction in social cohesion is difficult to see. Under Scenario 3, higher growth is anticipated to translate into a more neutral position for social cohesion.

Cultural

As expected, the cultural criteria are tied to the level of cruise activity. Cultural opportunities and opportunities for the Māori tourism economy draw on the markets created by cruise passenger spending. These opportunities increase with more spending. So, the scores for these criteria increase under Scenarios 2 and 3.

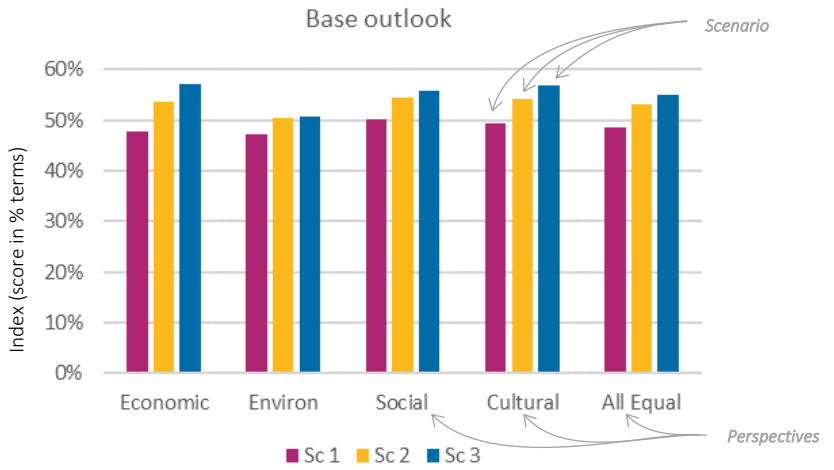
BASELINE SCENARIOS - OVERALL POSITION

Three growth scenarios showing different growth trajectories are considered in terms of the likely changes in scoring for each criterion. The scores are combined to summarise the results into a single metric. As mentioned earlier and shown in Table 3-2, different weights can be applied to the scores to elevate and put more emphasis on the different wellbeings. Figure 3-3 shows the combined scores for the three scenarios for the baseline outlook.

The figure shows:

- *The scores for each of the three scenarios (the purple, orange and blue bars).*
- *The scores for each of the five perspectives.*
- *The scores reflect the entire assessment period*.

Figure 3-3: Baseline outlook



Key observations about the relative performance of the three scenarios against each other under the different perspectives are:

- Placing more emphasis on the economic elements combined with the low, medium, and high growth scenarios shows that achieving greater growth is viewed as more favourable relative to the low(er) growth scenarios.
- Using an environmental lens reveals that there is little difference between the medium and high growth scenarios. This is because the effects of more cruise activity are tempered by the trade-offs between environmental and economic factors. When looking at things through the lens of the environment, there isn't much difference between the medium and high growth scenarios.
- The results suggest that the social and cultural perspectives are relatively insensitive to the level of growth.

Giving equal weighting shows that while the change in cruise activity has a large influence on the overall scores, it is not simply the case that 'all growth is good'. The level of change across the three scenarios (for this weight) is moderated by the environmental risks and considerations.

3.3.1.2 P2: Transition to green technology

The shift to green technology could include several technological solutions through which the overall environmental effects of cruise ships could be reduced. These technologies could include:

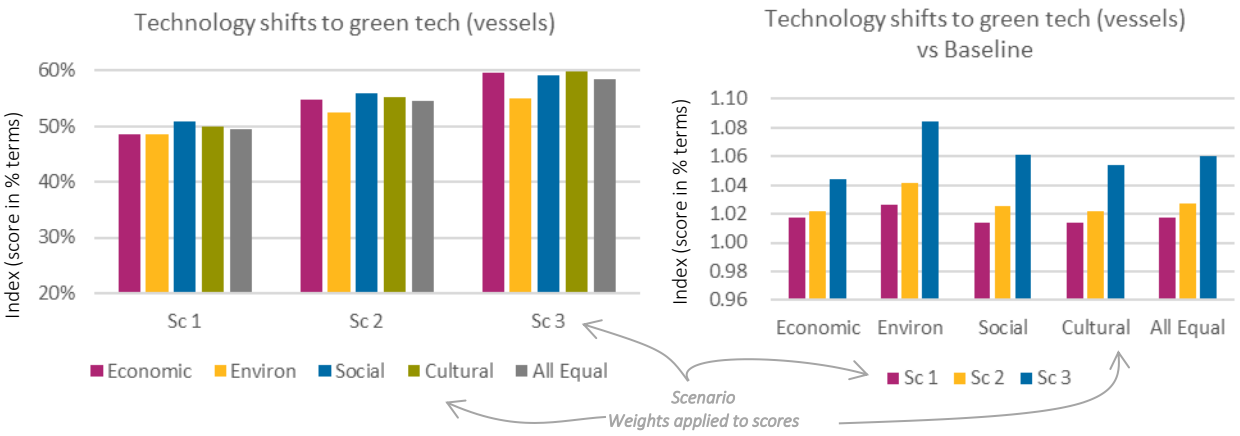
- Energy saving technologies:
  - Main engine improvements.
  - Enhancements and improvements in auxiliary engines.
  - Propulsion improvements (e.g., such as better propellers, contra-rotating propellers).
  - Air lubrication.
- Increased use of renewable energy:
  - Reduced auxiliary demand (low energy lighting, shore power).
  - Wind power (fixed wing or sails).
  - Solar energy.
- Use of alternative fuels
  - Use of alternative fuels with carbon (LNG, ethanol).
  - Use of alternative fuels less carbon (e.g., synthetic fuels, hydrogen, biomass ethanol).

Investing in new technologies is mostly associated with cruise lines' activities and the attributes of the fleet, but on-land investment in the supporting infrastructure will also be required, especially for energy storage and transportation. However, it is plausible that cruise ships would only top up in New Zealand if needed. The behaviour would be influenced by availability as well as relative fuel prices (e.g., compared to prices in Australia).

Shifting to green technologies could have a significant impact on the total emissions of the cruise sector. Changing the emissions profile has a range of other positive effects that go beyond environmental aspects. All scenarios reflect the benefits and improved outcomes of shifting to green technologies with Scenario 3 delivering the greatest overall position (see Figure 3-4). The analysis highlights the following:

- While shifting to green technologies will reduce many of the environmental effects associated with the cruise sector, other potential effects remain in play. Effects on the marine environment, such as risk of mammal strike, seabed disturbance, and water column effects do not change. So, the environmental effects do not return to a neutral state, but rather, they improve, becoming less negative.
- The risks associated with adverse events, such as accidents, with resulting environmental effects also remain.
- Emissions embodied in cruise passenger activities (goods purchased, services and onshore travel) continue to be generated.

Figure 3-4: P2: Green technology scores



Shifting to green technologies and reducing the direct emissions and environmental effects such as air pollution will generate indirect effects across the other wellbeings. Improving social acceptance of the cruise sector and maintaining or improving community perceptions about the sector are key indirect outcomes. Similarly, improving the sector's green image will support volunteering and remove emissions as a talking point, or point of contention, when local economic development agencies seek to leverage cruise activity for local economic benefit.

Reducing the environmental effects will also have a positive effect on the cultural acceptance of the cruise sector, but other risks, such as those related to cultural commodification, are not impacted by shifting to green technologies.

Specific details of the new technologies are unknown, but local investment in infrastructure can be expected. The funding of these investments would depend on their specific nature and requirements. If the infrastructure is provided by ports or other service providers, then the due diligence is expected to factor in an appropriate commercial return. Therefore, the shift to green technologies will present opportunities to New Zealand companies. In addition, the green technologies are also expected to present new opportunities

for local marine supply service providers to continue the relationship with the cruise sector by providing technical support services. However, the transition between technologies will mean that other opportunities will be displaced.

Compared to the baseline outlook, the shift to a green technology pathway will see an overall lift in the relative scores. As expected, using the environmental perspective sees the largest increase, but the increase is evident across all perspectives. The relative change is the greatest under Scenario 3. This is because the substantial negative effects associated with the emissions as captured under the baseline are avoided. These avoided effects see an improvement in the non-environmental scores.

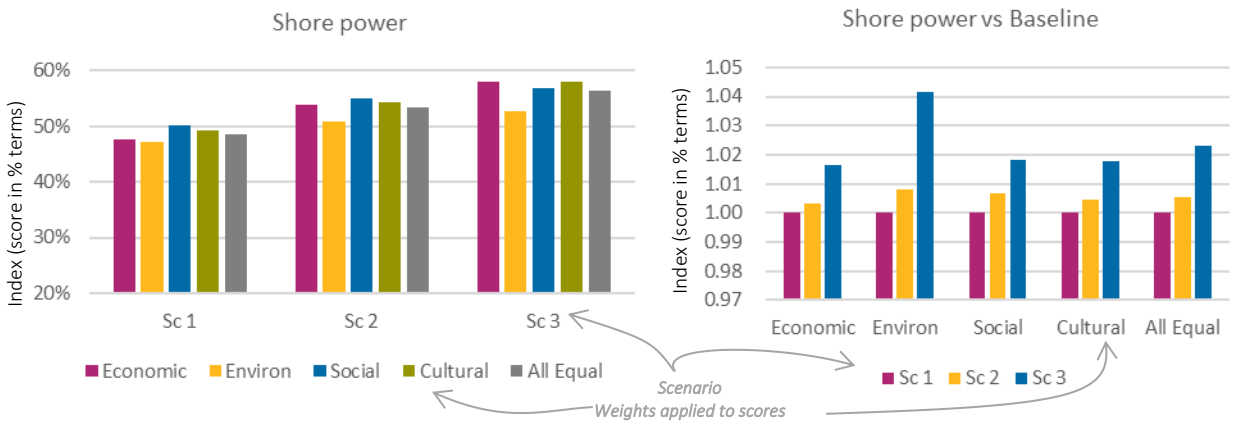
3.3.1.3 P3: A shift to shore power

Shore power is emerging as an option to address a portion of cruise ships' emissions, especially while in port. There are several technical elements to consider in terms of viability. This pathway assumes that providing shore power is technically and financially viable. This includes the availability of electricity as well as capacity on the transmission network to accommodate/facilitate electricity flows. These challenges are reflected in the scoring process, resulting in a somewhat lower economic score.

Figure 3-5 shows the scores for the shore power pathway and how they compare against the baseline. The results suggest that the shore power pathway will have a positive effect on the environmental outcomes of the cruise sector relative to the baseline. The scale is however smaller than contemplated for P2: Transition to green technology.

Comparing the scenarios scores against the baseline shows that there is little difference for Scenario 1, but the difference emerges as the higher growth is assessed. This is primarily due to the infrastructure costs, which lower the economic scores, but also the gains in the environmental (emissions) criteria. Although the environmental gains offset the infrastructure costs, Scenario 1 shows little overall improvement. In contrast, as cruise ship activity increases under Scenarios 2 and 3, then the avoided effects increase. Avoiding the emissions is seen as a benefit. Crucially, simply shifting to shore power does not mean that there are no emissions. If fossil fuel is used to generate the electricity used to power the cruise ships, then the emissions are generated elsewhere. There will only be an emission savings if renewable sources are used to generate the electricity.

Figure 3-5: P3: Shore power scores



The results show that:

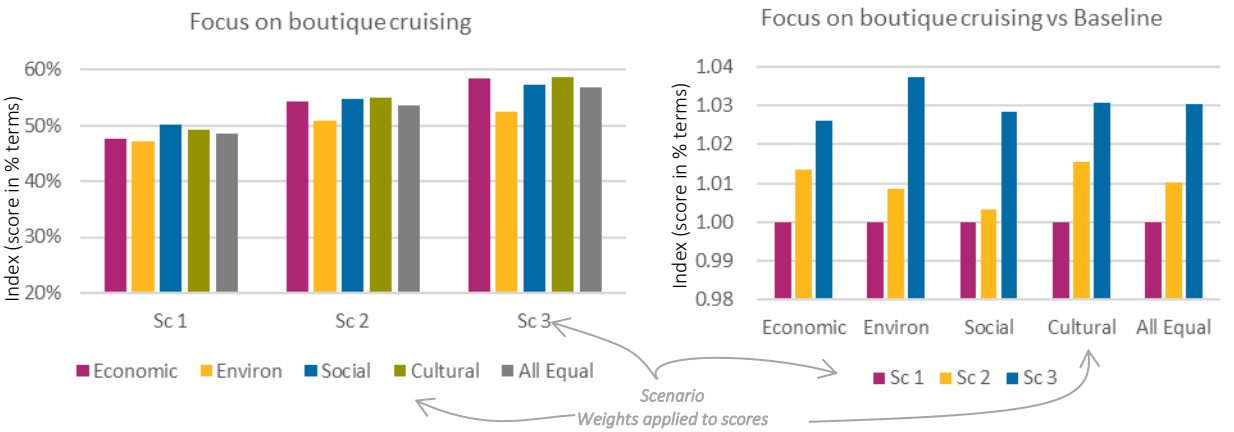
- Under a low/no growth situation, shifting to shore power is expected to see only a moderate improvement in environmental outcomes.
- The indirect impacts of shift to shore power are amplified when combined with cruise ship activity growth.
- Using an environmental lens, the overall gains from shifting to shore power outrank those relating to the economic dimension.

Section 3.3.2 provides quantitative insights about the emission savings associated with the shore power.

3.3.1.4 P4: Focus on boutique cruising

Cruise lines have different fleet configurations and there are differences in terms of vessel sizes. This pathway applies a growth premium (extra growth) to small ships. The small size of the ships means that their visual impact is not as pronounced compared to large and mega vessels. However, under this pathway, more of the smaller vessels are expected (required). The additional movements mean that some of the environmental risks, such as biofouling, rise. However, other environmental risks and potential effects are not as pronounced as those associated with larger vessels (e.g., seabed impacts). Therefore, the adverse effects are not as widespread as might be expected if larger ships are used to accommodate growth. Figure 3-6 shows the scores for this pathway.

Figure 3-6: P4: Focus on boutique cruising



The main observations about this pathway are:

- There is little difference between the baseline and this pathway under the low growth scenario because the outlook for passenger numbers is negative (declining passenger numbers). Any change associated with a move towards boutique cruises will only occur if there is substitution – large ships replaced with smaller ships. If this is to occur, then to achieve the same level of visitor and vessel spending in New Zealand, the total number of vessels in New Zealand waters would need to increase. Such an increase will see a lowering of environmental scores. For example, more cruise ship movements increase biofouling risks, risks of accidents occurring, and so forth – these risks drag the environmental scores down.
- The increase in the number of vessels will add to concentration and congestion effects around New Zealand and potentially have adverse effects on existing port arrangements (i.e., increased ferry disruptions). While the smaller vessels' impacts on visual amenity might not be as intense as those

associated with larger vessels, the increase in number means that there will be more regular events where visual amenity is impacted.

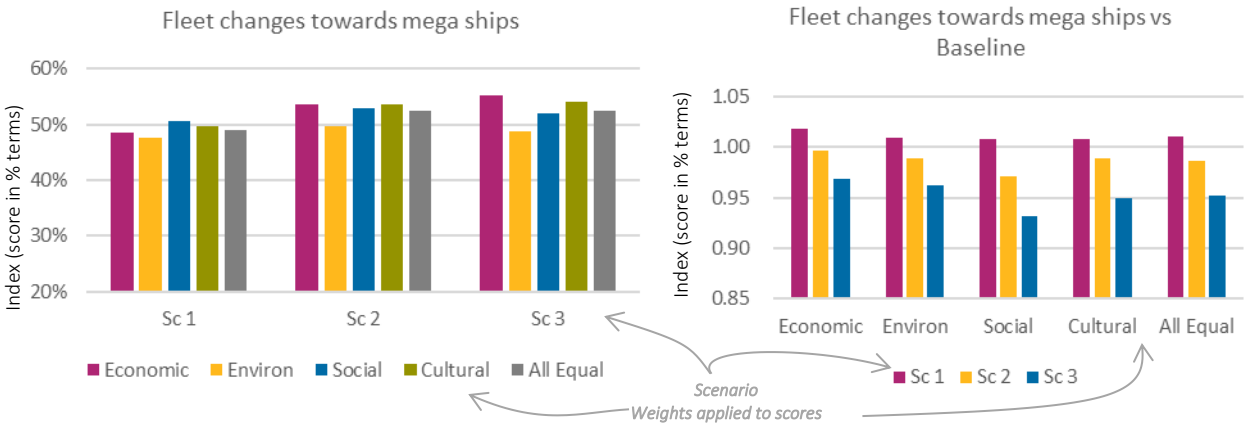
- There is limited direct information about the specific spending patterns of passengers associated with boutique cruises. However, anecdotal evidence suggests that these cruises have an acute focus on the high-quality, premium experiences. This attribute is seen as presenting an opportunity to develop new tourism (Māori and conventional) opportunities. By pursuing high-value and immersive tourism opportunities, the risks and downsides of 'fast tourism' are avoided.
- The more bespoke nature of boutique cruise opportunities may mean that local efforts to capture the benefits of cruise activities could be somewhat undermined with the activities being explicitly targeted at high-end tourism providers, thereby bypassing mainstream operations. However, the growth in total passenger numbers and spending would offset some of this loss.

The boutique pathway illustrates the relative importance and potential gains of a high-value approach. The benefits are seen when using the cultural as well as the social perspectives.

3.3.1.5 P5: Fleet changes towards megaships

Globally, cruise ships are becoming larger. The change is aimed at enhancing economies of scale, thereby optimizing return on investment while reducing effective costs. Large ships bring new challenges as well as opportunities. While the economics associated with more spending translate into greater economic effects and impacts, the large ships have several downsides if the alternative perspectives are applied. Figure 3-7 shows the scores for the three scenarios.

Figure 3-7: P5: Fleet changes towards megaships



Using the economic perspective reveals that the spending associated with larger vessels increases and delivers more economic impacts to New Zealand. However, the environmental effects as well as pressures associated with the cultural and social considerations mean that the overall scores do not rise as high as those using the economic perspective. The relative position against the baseline shows that, apart from the economic considerations, the other perspectives score comparatively lower. The greater the cruise activity, the lower the scores for the environmental, social, and cultural perspectives. The *main* elements that lower the scores are:

- The adverse effects associated with concentration and congestion associated with the large number of passengers that can enter town centres, thereby creating overcrowding and related issues.
- A likely increase in protests against cruise activities with increasing erosion of goodwill towards tourism and the positive perceptions people have towards the economic contribution of the sector.
- Potentially less regional distribution of effects due to infrastructure and port constraints and limits around cruise ship access. Large ships and the peaky distribution of passengers require careful management, and the issues that are addressed and highlighted in Destination Management Plans will likely be magnified under this pathway, thereby placing additional pressure on local resources.
- Tensions around infrastructure pressures (e.g., access to amenity and crowding) on the one hand, and flow-on benefits to residents/business (sales) on the other, will also increase in small towns especially if resident-funded facilities cannot be accessed. The diminished social cohesion and conflicts could also reduce residents' willingness to volunteer. In turn, this reduces the sense of enjoyment that residents gain from such activities and reduces the visitor experience for cruise passengers.
- With mega cruise ships the focus is often on the 'on-board experience' and many experiences (and not a smaller number of in-depth experience) and the risks around 'fast tourism' with superficial engagement with local opportunities are expected to intensify under the higher growth scenarios.

Some of the effects associated with a shift towards large and megaships are neutral relative to the Baseline, including aspects such as potential effects on port infrastructure spending[92], return visits and the distribution of profits via ports (to shareholders and ratepayers).

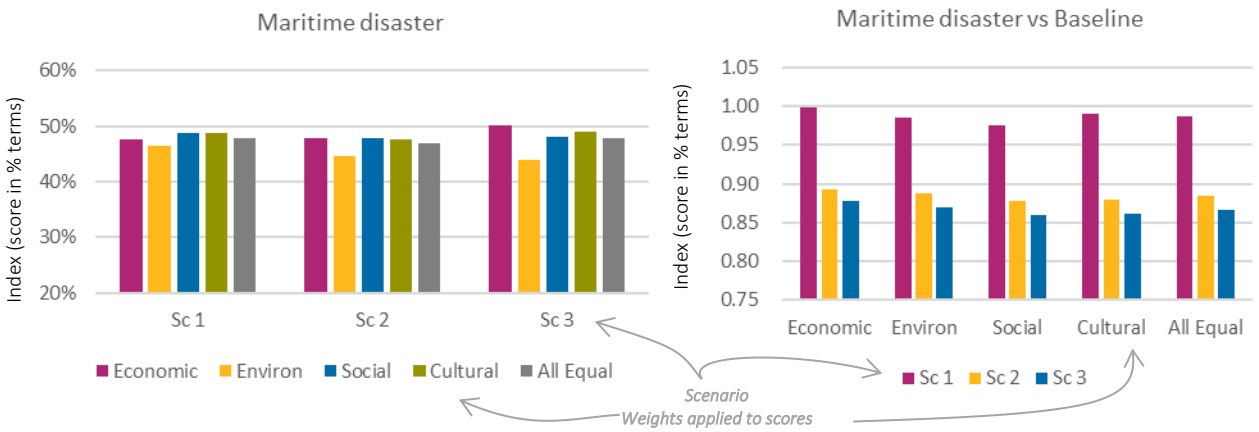
3.3.1.6 P6: Maritime disaster

As outlined earlier, this pathway considers a maritime disaster/event during which a cruise vessel is lost (sinks). The direct effects relate to the environmental impacts associated with the event, i.e., the oil/fuel losses and environmental impacts, and then the indirect impacts associated with change in community perceptions around the cruise sector and shifts in demand for cruises to New Zealand. The immediate market response (for cruise) is likely to be a short-term downward step change in services coming to New Zealand, especially those offered by the associated cruise line. Figure 3-8 summarises the scores for this pathway.

A maritime disaster will suppress the long-term economic benefits that the sector delivers. A short-term spike in economic activity associated with the disaster can be expected. Insurance funds used for salvaging, clean-up, and other responses will lift economic activity over the short term. But the community response is likely to be targeted at the social, environmental, and cultural effects. While the immediate effect on passenger demand patterns will be down, a recovery over the medium- and long-term can be expected. Despite New Zealanders acknowledgement of tourism's role in the economy, a large adverse event in a high-value location (e.g., Fiordland) can be expected to change perceptions and how New Zealanders view the cruise sector. The cultural significance and associated effects on important landscapes and marine environments are also likely to see strong and high-profile responses. The scoring shows that while the economic effects are likely to remain positive, the social and cultural scores will be reduced.

[92] It is assumed that infrastructure spending will only occur if a commercial return will be generated. This is marginally positive but there are risks that the return might not occur, and some parties might see additional infrastructure investment and the associated environmental investment in a negative light. The infrastructure investment is treated as neutral.

Figure 3-8: P6: Maritime disaster



Compared to the baseline, the scenarios with growth (Scenarios 2 and 3) will see a significant step down under this pathway. This reflects aspects such as:

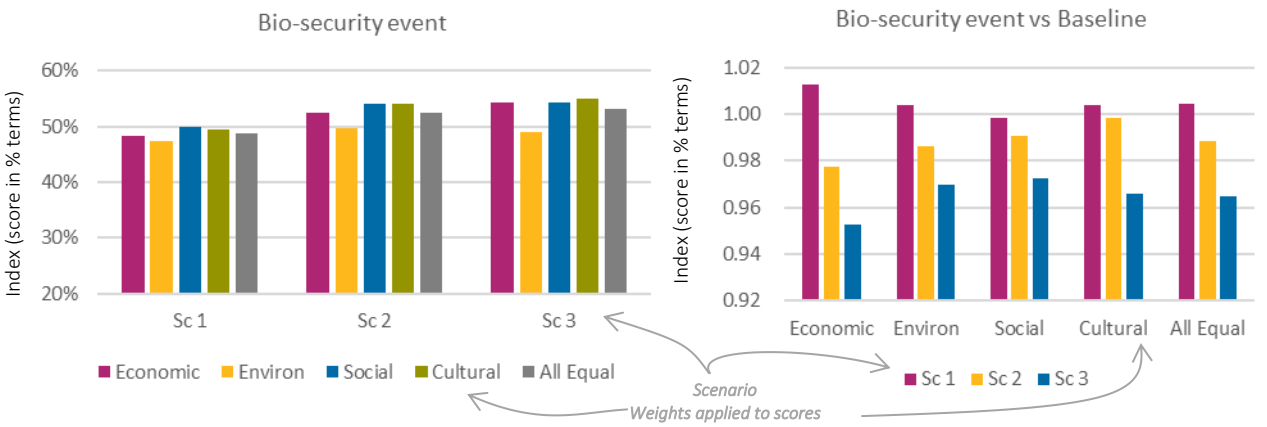
- Increased protests and a more sympathetic community (towards protestors' messages), with increased social disharmony and risks that tensions escalate into more serious confrontations.
- Reduces acceptance of cruise activities and a 'risk-off posture' with pressures to ban cruise from sensitive and high-value locations.
- A reduction in volunteers and extra demand for resources to manage cruise passengers and their interactions with local communities.
- A reduced spatial offer that lowers the regional distribution of cruise activity and benefits around New Zealand.
- Increase regulatory pressures and requirements that increase the costs. In turn, this reduces New Zealand's relative attractiveness as a destination (for cruise lines), and further deployment away from New Zealand. This reduces the cruise ships over which levy and associated costs are recovered, further increasing costs and giving rise to a potential situation where taxpayers are required to fund some activities.

The scale of the potential effects and the intensity of a shift in how society views New Zealand is a function of the size, location, and type of maritime disaster as well as the available alternatives and substitutes.

3.3.1.7 P7: Biosecurity event

In contrast to a maritime disaster, a biosecurity event is less visible. But the direct economic damage to New Zealand communities can be significant. The type of incursion, efforts to eradicate it, and nature of the damage all combine to determine the overall effect. The relative impact of a biosecurity event could be substantial if it impacts aquaculture production areas and has lasting impacts. However, if the incursion is quickly eradicated, then the effects will be comparatively minor. This adds complexity in trying to reflect the potential effects and scores. The scores of a biosecurity event together with a comparison against the baseline are reported below (see Figure 3-9).

Figure 3-9: P7: Biosecurity event



The economic effects are however still associated with the size of the spending facilitated by the cruise sector, less any lost production. The wider and indirect effects associated with a biosecurity event include:

- The loss of biodiversity and effects on the marine environment – these include the effects that arise during any response as well as legacy issues.
- The change in cultural values is based on how the marine environment is affected. Specifically, marine environments are integral to Māori whakapapa (ancestry), connecting people to their ancestors and the natural world. Loss of biodiversity can disrupt these connections[93], affecting the spiritual and cultural identity of iwi and hapū.
- Shifts in community-level acceptance of the cruise sector – these are expected to be localised within the immediate communities where the incursion occurs. If the incursion is not contained, then the community impacts will gradually spread to other locations. However, environmental conditions (e.g., water conditions and temperature) could act as a natural barrier, limiting the spread.

3.3.2 Quantitative metrics

The cruise sector generates a range of effects that can be expressed in quantitative terms (Dollars) and this section summarises these values. The section covers two approaches. Firstly, the gross costs and benefits are reported. This approach treats the new spending attracted to New Zealand as a benefit and the externalities, especially air emissions, are presented as costs. The second part reports the economic impacts using a Multi-regional Input Output (MRIO) model[94]. Both approaches have limitations and caveats, and these are outlined below.

3.3.2.1 High-level costs and benefits

As mentioned in the preceding section, the additional spending from passengers, crew and vessels is seen as a gross benefit to New Zealand. However, there are wider costs to consider, including the resources used to service cruise-related spending, as well as environmental costs, such as air emissions and labour effects. Importantly, labour is often seen as a benefit, but any labour gains must be adjusted for the opportunity costs

[93] (Kenny, 2021)

[94] Another modelling technique that is used to estimate the economic impacts of events and programmes is Computable General Equilibrium (CGE) models. Our experience suggests that CGE models return GDP impacts that are 40% to 60% of those estimated using IO.

of labour as well as any displacement. New Zealanders are also on cruises (around New Zealand), and they derive a benefit (consumer surplus).

Importantly, the costs and benefits considered here should not be equated to GDP or economic impacts. The flow-on (supply chain) effects are not included in this section and the following section outlines the GDP and employment effects.

The three scenarios introduced above are summarised into the key elements and the headlines are presented in Table 3-4. A thirty-year period is assessed and a discount rate of 5% is used to express future values in today's terms[95].

Table 3-4: Costs and Benefits (Headlines, present value @5%, $bn) – Baseline Pathway

	Scenario 1	Scenario 2	Scenario 3
New Spending to Economy[1]	6.6	17.1	21.4
Emissions and resources used[2]	4.3	10.2	17.9
Other benefits	0.4	0.9	1.2

1 – Spending attracted to New Zealand (passenger, crew and ship spending)
2 – Estimated $-value of emissions based on Shadow Price of Carbon, plus estimated value of economic resources used (including labour costs)
3 – Consumer surplus (of New Zealanders cruising)

The table shows the baseline pathway across the different growth scenarios. The potential values associated with the environmental effects beyond air emissions, as well as cultural values, are not included above. In addition, the above does not include any risk pricing or how much New Zealanders would be willing to pay to avoid the potentially adverse events discussed above.

With reference to the other pathways, Appendix 15 summarises the key results across the pathways. The effect of faster growth is evident in the new spending as well as the air emissions. With reference to emissions, all scenarios reflect the increase in the shadow price of carbon going forward.

Under the constrained outlook (Scenario 1) and using a low starting point (2024/25), the present value of the new spending coming to New Zealand is substantial at $6.6bn. The average annual spending is estimated at $396m, over the next 30 years, including passenger, crew and vessel spending. This spending is around half of the spending in 2023/24, highlighting the conservative position of the assessment. A common critique of the cruise sector is that it has high levels of emissions and air pollution. Translating vessel movements around New Zealand, including half of the international segments into emissions, and then expressing the emissions in dollar terms aids in providing a fuller picture of the sector's overall value. In addition to emissions, the sector uses goods and services. These goods are not 'free' and consuming them has costs. A part of these costs relates to goods that are imported from the rest of the world e.g., marine diesel. These costs must be accounted for and are estimated at $4.3bn for scenario 1. The estimated emissions for this scenario amount to $1.6bn. Other cost elements include the value of labour that is employed by the businesses that service the cruise sector (it includes businesses that service passenger and crew). These costs are already reflected in the reported value ($4.3bn).

Scenario 2 provides a more optimistic outlook, with passenger numbers growing over the medium to long term. Under this scenario, the estimated passenger spending increases to those seen in 2023/24 by circa

[95] The discount rate is consistent with NZTA guidance. At the time of writing, the default discount rate used in social cost-benefit analysis was also 5%. However, Treasury have subsequently released updated guidance with two rates – one for non-commercial projects (circa 2%), and one for commercial projects (8%).

2033/34. Under this scenario, the present value of emissions (@5% over 30 years) is estimated at $2.4bn and the value of resources used is $7.9bn. The increase reflects the lift in passenger spending, the associated increase in cruise vessel spending, and how suppliers respond to the higher demand levels. Again, the costs associated with imported goods are captured.

Scenario 3 shows the higher growth outlook associated with an unconstrained position. The spending and emissions cost shows a broadly proportional increase relative to Scenarios 1 and 2, with new spending coming to New Zealand estimated at $21.4bn. Emissions are valued at $2.7bn and the resources used are valued at $11.0bn. The effect of high growth is evident – emissions do not grow at the same rate as passenger spending because of the mix of ship sizes (ships will only be added if they can be filled and larger ships are more efficient on a per passenger basis).

The analysis highlights the following key features of the New Zealand cruise sector:

- The sector is an important foreign exchange earner, attracting spending to New Zealand.
    - While the 2023/24 season was strong, a downward shift is expected over the short term.
    - The outlook for the sector is somewhat muted but the spending outlook remains positive – the expected spending for the 2024/25 is estimated at $460m. This is lower than the peak seen before COVID as well as the past season.
    - While there is medium-term uncertainty about the sector's growth, it facilitates positive spending, and the sector will earn export revenue for New Zealand.
- The cruise sector has environmental effects and air emissions are arguably a key externality. Estimating emissions and translating these into Dollar terms show that the present value of the emissions is between $1.6bn and $2.7bn (baseline). However, emission costs are sensitive to the development pathway. Under the green technology and shore power pathways, the emissions costs see material downward shifts – under the green technology pathway, emissions costs reduce by between 42% and 48%. The shore power pathway also sees a downward shift, but the changes are smaller, ranging between 22% and 26% below the baseline.

Based on the available information, it appears that the direct benefits of the cruise sector outweigh the direct costs. The net position (annual) of the baseline pathway is estimated at between $90m and $185m – over thirty years, the present value of this position is between $2.7bn and $5.6bn. However, this does not reflect environmental and cultural risks that needs to be considered and priced in. The pathways that focus on green technology see this net position improve by between 8% and 25%.

- In terms of growth achieved via different ship size classes, achieving the growth via mega ships can have some relative gains in emissions changes relative to change in spending levels (change in emissions costs relative to change in passenger spending) due to economies of scale. In contrast, achieving growth via smaller ships adds more to the overall emissions costs. For large ships (and using scenario 3), passenger spending increases by +0.9% and emissions costs increase by +0.4%. The same movements for boutique vessels show a 1.2% increase in passenger spending and a 2.4% increase in emissions costs. The reasons for these patterns are, as mentioned the reduced emissions efficiency when considered relative to the number of passengers.

Our analysis shows that New Zealand derives value for the cruise sector in the form of new spending that comes to New Zealand, providing an economic impulse. However, the sector generates environmental externalities, with air emissions an important factor.

3.3.2.2 Economic impacts – GDP and employment

The new spending attracted to New Zealand flows through the economy, creating GDP and supporting employment. Some of the goods are purchased from overseas (e.g., fuel, and some retail goods) and the money associated with those transactions flows out of New Zealand and does not add further to the economy. Analysing all the transactions provides a way to estimate GDP and employment impacts across the economy.

The strengths and weaknesses of GDP as a metric is well documented. As a measure, it reflects all economic transactions and is useful in tracking economic production and consumption. However, GDP does not capture activities such as unpaid work or volunteering[96]. In addition, GDP does not account for environmental effects such as pollution and emissions and wider impacts. Despite the limitations of GDP as a metric, it remains useful in understanding the economic impacts, and how a set of transactions flow through the economy.

The results (Table 3-5) show the GDP impacts for the 2024/25 season. The modelling reflects the anticipated cruise arrivals that are translated into passenger, crew and vessel spending.

Table 3-5: GDP and Employment impacts (2023/24 and 2024/25)

	2024/25 (Estimate)	
Cruise sector Spending* (incl. GST)	$529m	
	GDP ($m)	Jobs (MEC)
Direct and indirect	406	6,240
Induced	162	2,230
Total	568	8,470
**Includes spending by passengers, crew and vessel*		

Based on the 2024/25 outlook for the cruise sector, $529m spent by passengers, crew and vessels, is expected to generate around $406m of GDP (direct and indirect impact). This implies a 29% fall in spending, and an accompanying fall in total GDP, from the previous season. The direct and indirect impacts include supply chain effects (businesses selling to each other). Another round of impacts is generated when businesses pay salaries and wages to their staff, who in turn spend their incomes. These wider effects are referred to as the induced impacts. The induced impacts are often controversial and are therefore reported separately. The induced impacts are estimated at $162m. In terms of employment, approximately 6,240 jobs[97] are supported by the direct and indirect economic activity (GDP) in 2024/25. The induced impact is estimated to support a further 2,230 jobs, suggesting a total impact of 8,470 jobs supported by cruise activity in 2024/25.

Importantly, the cruise sector is a durable part of the New Zealand economy and is not seen as a 'one-off' impact (like building a wharf). Therefore, the sector's value includes anticipated or future values. Table 3-6 presents the present value (discounted at 5%) of GDP associated with the cruise sector over the next 30 years. The outlook is based on the three growth scenarios outlined above[98].

The results suggest the present value of the cruise sector's GDP under Scenario 1 is $7.6b (present value over 30 years). On an annual basis, the cruise sector will support around 7,350 jobs throughout the economy. This includes an induced impact of $1.7b (1,940 jobs). The employment effects show the employment supported

[96] These non-market elements are captured in the qualitative part of the analysis (section 3.3.1).
[97] Modified Employment Count is a proprietary measure developed by M.E to represent a headcount of workers. It is based on the employee count from StatsNZ and modified to include working proprietors.
[98] No allowance is made for additional spending to New Zealand (e.g., to provide electricity for shore power, or additional capital spending (constructure effects) to deliver new wharf or port infrastructure).

on an annual basis - average jobs (MECs) per year. This scenario represents a downbeat outlook in which cruise tourism to New Zealand declines over the long term.

Scenario 2 shows a situation where cruise activity recovers over the next five years to 2024/25 levels, and slowly grows from there at 1.5% per annum. Under this scenario the present value of total GDP is estimated at around $19.5b, which includes $4.3b induced impact. This level of activity would sustain 22,410 jobs[99] annually (including 5,900 jobs supported by induced impacts). The average annual GDP under this scenario is estimated to be around $453m (or $353m if the induced impacts are excluded).

Scenario 3 presents a more unconstrained growth future (from an economic perspective), suggesting a strong recovery over three years, followed by ongoing growth of 2.2% per annum. Under this scenario, the longer-term economic value (GDP) of the sector is estimated to be around $24.5b (includes $5.4b induced impact). This suggests an average annual impact of $1.8b (or $1.4b per year with the induced effects excluded). The employment that is supported across the economy under this scenario, is around 29,290 jobs[100], including 7,720 jobs supported by the induced impacts.

Table 3-6: Long-term economic value of the cruise sector (GDP and Employment)

		GDP (30 years, 5% discounted) - $bn		
		Direct + Indirect	Induced	Total
Present Value (30 years @ 5%)	Sc 1: 2024/25 rebase, slow decline (-0.5% per year)	5.9	1.7	7.6
	Sc 2: 2024/25, 5yr recovery + 1.5% per year	15.2	4.3	19.5
	Sc 3: 2024/25, 3yr recovery + 2.2% per year	19.1	5.4	24.5
Average per year values				
			GDP	
		Direct + Indirect	Induced	Total
Annual (average)	Sc 1: 2024/25 rebase, slow decline (-0.5% per year)	353	100	453
	Sc 2: 2024/25, 5yr recovery + 1.5% per year	1,075	304	1,379
	Sc 3: 2024/25, 3yr recovery + 2.2% per year	1,405	397	1,803
	Employment (average jobs supported per year) – Modified Employee Counts			
		Direct + Indirect	Induced	Total
	Sc 1: 2024/25 rebase, slow decline (-0.5% per year)	5,420	1,940	7,350
	Sc 2: 2024/25, 5yr recovery + 1.5% per year	16,510	5,900	22,410
	Sc 3: 2024/25, 3yr recovery + 2.2% per year	21,580	7,720	29,290

The different scenarios show that the cruise sector adds to the New Zealand economy, supporting jobs. Looking only at the jobs supported by direct and indirect impacts, the sector would sustain between 5,410 and 21,835 jobs. The GDP impacts are estimated at between $5.9bn and 19.1bn (30 years @5%) – while the range is substantial, even under the low scenario, the sector delivers substantial economic impacts and supports jobs.

IMPACT RATIOS

[99] The employment effects show the employment supported on an annual basis and presented as modified employment count (MEC).
[100] The employment effects show the employment supported on an annual basis and presented as modified employment count (MEC).

The information underpinning the economic impacts can be used to generate impact ratios. Table 3-7 summarises key impact ratios. Specifically, the table presents:

- GDP per port day for direct and indirect impacts and separately for total GDP impact.
- The number of visitor days (port days) that support one job is presented (port days per MEC).

These ratios provide insights into the economic contributions generated by each cruise passenger during port visits, as well as the employment supported per passenger. Note that the spending per port day provides a more comprehensive indication of the economic activity of the sector. This metric presents the cruise sector spending (passengers, crew and vessel spend) relative to the number of passengers moving around ports. This does not only include the passengers' personal spend. The employment metric can be interpreted as the number of port days required to support one job for a year.

Table 3-7: Cruise sector economic ratios (2023/24 and 2024/25)

	2023/24	2024/25 (Provisional)
Port days*	1,594,000	1,152,000
Cruise sector spending**	$468 per port day	$459 per port day
GDP impact per port day (direct + indirect)	$359 per port day	$353 per port day
GPD impact per port day (total)	$502 per port day	$493 per port day
Port days per job (MEC)*** – direct + indirect	181 port days	185 port days
Port days per job (MEC)*** – total	134 port days	136 port days
rounded to the nearest 1,000* ***includes spending by passengers, crew and vessels.* ** Modified Employee Count – a headcount of all employees (part time and full time) as well as an allowance for working proprietors*.		

3.4 Opportunities and risks

The cruise sector and how it interacts with the wider economy and community present both opportunities and risks. The decline in cruise activity provides an opportunity to establish a shared understanding of the sector's role in the New Zealand tourism landscape and to position to manage growth as it returns. At a regional level, most regions explicitly acknowledge the sector's economic role and contribution by referencing it in their local destination management plans and making it part of economic development activities. Risks associated with the sector relate to losing the community licence as well as the environmental risks associated with the sector. Table 3-8 outlines the identified risks and opportunities. The risks are categorised in terms of economic, environmental and social risks but many of the risks have cross-overs between these areas. A New Zealand-centric perspective is used.

Table 3-8: Risks and opportunities – New Zealand-centric perspective

Risks		Description and comment
Economic	Branding risk	New Zealand has a strong global brand and cruise marketing, and local activities generally capture the essence of the "100% Pure New Zealand" brand. Protecting, maintaining, and enhancing the 'pure' part of the brand is essential and there are risks that the actions of a small group(s) (cruise related or unrelated) could tarnish the brand's position. New Zealand trades on its global brand, with clean and green image now attached to other industries such as dairying and agriculture. Twenty years ago, New

		Zealand's tourism brand was valued at US$13.6bn, underlining its importance. The green image is key, but it is also important that the image be translated into economic opportunities. It must also be supported by the overall business landscape, but negative views about New Zealand's value for money proposition are being aired. Such inconsistencies could undermine and damage New Zealand's brand. • Who carries the risk: The downside of these risks will be felt across the business community, especially sectors that are exposed to cruise activity (retail, tourism products and tourism transport).
	Risks to growth	The New Zealand growth outlook for the cruise sector is currently suppressed and the sector is in decline (for the 2024/25 season, and possibly for the 2025/26 season). This trend is inconsistent with ambitions to see the visitor economy grow to $5bn over the next 2024-2028 period (Tourism New Zealand). A decline in one segment (cruise) means that the total sector (aggregate spending) also drops. While existing efforts and ambitions aim to accommodate growth via off-peak growth, the recent loss of winter cruises, as well as a drop in peak season activity, means that overall growth (all seasons) will be lower than anticipated. • Who carries the risk: The effects of these risks will be felt by all parties associated with the cruise sector. The indirect flow on effects extend to the parties that receive benefits from the cruise sector (including ratepayers via port dividends, and small business owners that sell to/service cruise passengers).
	Unbalanced distribution	The cruise sector services large parts of New Zealand but a cost-pressured cruise sector with lower growth could see cruise lines seek to minimise costs by changing itineraries to focus on the large and icon-related ports. • Who carries the risk: Reducing port stops will see some locations dropped form the network. These indirect effects would see less cruise passenger spending flowing to regional New Zealand. The loss of cruise passenger spending in regional New Zealand will also see fewer opportunities for the regions to share their cultural assets and economic opportunities.
	Geo-political risks	Deployment decisions are influenced by global events, such as conflicts in the Middle East, and congestion through the Panama Canal. New Zealand's ability to address or mitigate these risks is limited. These global events influence the capacity that is made available locally (combination of number and size of ships). • Who carries the risk: the risk to New Zealand is in the form of a market risk i.e., a fast and significant change in demand patterns and a decline in demand for cruise related tourism. The lower cruise activity will affect all parties (business and non-business) that derive a benefit from cruise (including the likes of volunteers).
Environment	Natural hazards	New Zealand is exposed to several different natural hazards, including earthquakes. The Fiordland sounds are key attractions. However, a large-scale event such as an Alpine Fault 8 (AF8) will see significant damage across the South Island and the ability of responders to aid a cruise ship is likely to be compromised. The South Island's road network, fuel, water, air transport, electricity, telecommunications and marine transport infrastructure are vulnerable to disruption from earthquakes and lack redundancy.[101] A worst case scenario could include the loss of a cruise

[101] (Emergency Management Southland, 2018)

	ship, significant loss of life, and environmental damage due to a large oil spill in one of the sounds. The ability to respond to such an event might be limited due to resources used elsewhere. If the response is slow (perceived or real), then negative perceptions about New Zealand could increase, thereby reducing tourism demand. In addition, the natural hazard (e.g., earthquake) could see a cruise ship grounding and sinking. The environmental risks are considerable, and subject to the type of event. Oil and fuel spills would have a marked impact on the sensitive marine and terrestrial environments. The Sounds are deep and land-access very limited therefore, an adverse event would be difficult to clean up and the depth means that salvaging would be difficult. Given the ecological values of the Fiordland sounds, the environmental effects of a cruise ship loss in these pristine areas would have lasting and significant environmental consequences. • Who carries the risk: The risks are environmental in nature, but the potential effects would be felt by business associated with tourism activity associated with the wider Fiordland and Southland. In addition, the local, regional and national communities would all carry the risk of an event, with the significance of Fiordland impacted by an event. The relevant cruise line would see reputational damage, but this is likely to be tempered by the link to the natural hazard event.
Accidental pollution	The cruise sector is regulated by international conventions as well as New Zealand specific (including regional council) regulations. Despite the regulation, accidental pollution can occur due to human error, or a system/equipment malfunction. The likely response (depending on the scale of the discharge) is likely to be relatively limited to a clean-up if the event occurs while in port. • Who carries the risk: The parties that would be affected by accidental pollution depends on the location and scale of the event. If it is in-port, then the communities near the port (and the tidal flows) would be affected. In contrast, if the pollution occurs away for the coastline, then the direct impact on local/coastal communities could be limited. Regardless, the adverse environmental effects would weigh on communities that assign high value to nature (including iwi). In addition, there is reputational risk for the cruise lines.
Collisions, accidents and so forth (financial and environmental risks)	Accidents and collisions affecting port infrastructure, potential sinkings as well as minor events (on-ship events) all carry risk. Small events are relatively common and are mostly contained onboard ships. The wider risks are associated with large-scale events. The environmental risks are similar to those outlined under natural hazards (i.e., environmental damage and impacts on the marine and terrestrial environment). There are different levies that could be used to help fund some of the clean-up activity. However, the ability of existing funds to cope with the events and fund the required activity is unknown. • Who carries the risk: if the existing funds are insufficient to deal with an event, then the environmental damage might not be contained. Government could then be expected to step in to help fund a shortfall and the financial risk would fall to taxpayers (if the costs are not recovered from elsewhere).

Social	Change in social license	Perception surveys show that New Zealanders are broadly accepting of tourism, and cruise tourism but environmental awareness is becoming more prevalent. The ongoing acceptance of cruise tourism by host communities is not guaranteed, and the rate of change can be gradual, or sudden. The change might give rise to social disharmony and a further erosion of positive perceptions. The tensions between economic, environmental, and cultural perspective could generate social discord. • Who carries the risk: the wider society could see overall acceptance levels change – by itself this change is neutral. However, the implications of changing acceptance levels and how the cruise sector is regarded could see change to the visitor experience, because a lack of engaged locals (volunteers) and a general animosity towards cruise passengers. There is also a potential for less social cohesion, i.e., residents of host communities at odds with each other.
	Cultural damage	The cultural risks relate to the impacts of visitors on local communities, sites of cultural significance as well as the commodification of culture. These risks are concentrated in areas with high value cultural assets. The cruise sector's shore excursions are normally developed in a way to provide access to high quality cultural exhibitions and experiences, but the size of the benefit that flows to those communities can be diluted. This undermines the incentive to deliver a high-quality product (because the return is too low). Another risk relates to the peaky nature of the cruise sector (seasonal and by location) where an influx of cruise passengers could overwhelm infrastructure, with resulting damage. The behaviour of an individual that disregards local customs and traditions could damage local cultural assets and cultural significance. • Who carries the risk: the cultural risks are carried by respective iwi around New Zealand. Considering the importance of Māori culture, and its part in New Zealand's national identity, the effects of cultural damage would impact large parts of the New Zealand community.
	Funding load on communities	At a local level, community assets and amenities are normally paid for via rates. The rates are paid by businesses and residents. Cruise passengers use community facilities and there are some views that they do so without contributing to original investment or the day-to-day running of the amenities. However, businesses and residents benefit from cruise activity, but the distribution of costs and benefits can be opaque and uneven. The opacity and unevenness often aggravate views about the cruise sector, especially for parties that hold the sector in a negative light. • Who carries the risk: there are risks that a minority group takes over the narrative about the local-level effects of the cruise sector and spread misinformation. This could give rise to conflicts and tensions between residents, thereby undermining social cohesion.

Opportunities		Description and comment
Cultural and economic	Improved showcasing and integration of Māori culture	Currently, iconic attractions appear to capture a large share of potential visitors. Developing new iconic attractions (such as Waitangi, Whakarewarewa[102]) in other locations could aid in dispersing visitors and spreading the economic effects to other regions. The opportunities could be integrated with the existing offers associated with city tours and experiences. However, care is needed to ensure that only appropriate

[102] Rotorua.

		locations are developed i.e., development might not be appropriate in some locations). • Who benefits: the potential benefits have a spatial component and where the new opportunities are developed would dictate where the benefits are felt. Similarly, the potential benefits would flow to the entities that develop the new attractions.
Economic	Wider roll-out of DMPs and managing local impacts of cruise	Regions around New Zealand are expending resource to optimise local product offers to capture cruise spending. Several operators are actively engaging with the cruise market, but the focus is on visitor types (and not cruise passengers per se). The cruise passengers add to the overall market but there are opportunities to better capitalise on the opportunities. Local economic development agencies, and similar entities, are actively working to manage/mitigate the adverse effects of the cruise sector. The successful growth of the cruise sector will build positive perceptions about the work of these entities. • Who benefits: many regional DMPs explicitly include the cruise sector and identify it as a growth sector. This acknowledges the sector's regional role. Implementing the DMPs and managing/mitigating the effects will benefit residents and give credibility to the work being delivered.
	Off peak seasons	The loss of off-peak activity is a set-back and working to ensure that winter cruises return is an obvious opportunity. • Who benefits: Spreading cruise passengers across a longer season provides more opportunities for businesses that serve the cruise sector. Some business segments, and seasonal workers (e.g. tour guides) could benefit from the longer season when other tourism sectors are not as active.
	Supporting infrastructure	The availability of high-quality infrastructure to support the overall cruise experience is crucial and literature suggests that some regions are using infrastructure investment to facilitate growth. Most port cities have sufficient capacity to deal with cruise ships without experiencing significant disruptions. While the specific degree to which cruise ship activities is disrupting other activities in Auckland is contested. Developing bespoke infrastructure to separate different uses will assist in alleviating these pressures. At the same time, improving the flexibility of port infrastructure to deal with cruise ships will enhance the visitor experience (e.g. better amenities, and weather protection). This will also help to reduce negative perceptions (justified or not) about the effects of the cruise sector on Auckland's downtown area. • Who benefits: the communities and activities that interact with the cruise sector in the port environs, and where there is conflict, will benefit the most from infrastructure investments aimed at alleviating conflicting uses. The cost and financing of the investments are assumed to be recovered using a commercial process (i.e., commercial rate of return on the infrastructure). If this is not the case and the costs are recovered from ratepayers and taxpayers, then those parties would carry the costs (as well as any deadweight losses).
	Coordinate environmental programmes,	New Zealand's natural beauty and cultural endowments are drawcards for tourism including the cruise sector. The cruise lines have environmental programmes that they deliver as part of their wider social responsibilities. Details of these programmes are limited and linking these programmes

credit and avoid 'greenwashing'.	with similar programmes delivered by non-cruise entities could lift the credibility, generate synergies and scale, and put programmes on a more financially sustainable footing. An added benefit is that the potential accusations of 'greenwashing' could be avoided. • Who benefits: local entities involved in environmental management/restoration programmes would benefit from additional capacity and exposure. Concurrently, the synergies with local initiatives will enhance the credibility and profile of environment-related investments as delivered or supported by the cruise sector.
Regulatory space and being responsive to industry needs while protecting New Zealand interests	Protecting New Zealand's marine environment is a key objective of the regulatory landscape, and the recent changes were highlighted as a key point of contention. The interface between regulators and industry provides opportunities to collaborate and to find innovative ways to manage (and protect) the natural environment. The slowdown in the cruise sector provides headroom to review the structures and working relationships with a view to manage risks in a sustainable way. Notwithstanding the upside economic potential, regulatory authorities have a clear role in protecting New Zealand's interest, (e.g., environmental and economic interest). There are trade-offs and managing the wider relationships are key. • Who benefits: regulating the cruise sector and avoiding/managing risks are core requirements for some government departments. The regulatory environment is crucial to mitigate environmental and other risks (e.g. biofouling). There are opportunities to ensure that the regulatory response enhances and supports the cruise sector's benefit to New Zealand without diluting or undermining the importance of regulation.
Workforce and labour requirements	Looking beyond the tourism part of the cruise sector, vessel-related spending is significant. As new technology is embedded in the cruise sector, the labour force requirements will need to change and adapt to align with the additional needs. An upskilling of labour is anticipated to ensure that New Zealand's workers (that service the cruise sector) can undertake the necessary tasks in a safe and efficient way. Considering the potential role of new technology means that the upskilling could see productivity improvements. Such improvements would see salaries and wages increase. • Who benefits: Employees and businesses that service the cruise sector.
Market shifts	The cruise sector is sophisticated and works to optimise yields on vessels. The change in market demographics and how cruise passengers interact with the cruise lines (and the itineraries) could present new opportunities. Addressing challenges associated with enabling inclusive growth and

cruise opportunities by providing land-side infrastructure that supports inclusive growth will aid in capturing these opportunities.

- Who benefits: developing new market segments is mostly done by cruise lines, but the destination market can provide targeted assistance and work with cruise lines to unlock new opportunities. Responding to the needs of different demographic segments will ensure that underserved market segments are serviced and the potential demand is not left unmet.

3.5 Concluding remarks

The global cruise sector is substantial, with a large economic footprint. The sector has recovered from the COVID-pandemic disruptions, and the outlook for the global sector is positive, with economic and demographic trends expected to support it. New markets are being developed in Asia and growth in those locations is expected to be strong – parts of the Asian market, including those competing against New Zealand, have seen significant growth.

The global sector focuses on maximising yield and optimising how vessels service passengers' needs. Despite the visual scale of cruise ships, profitability is directly linked to an ability to have high occupancy rates. As is the case with all commercial activity, managing costs is an important business consideration for cruise lines. Cruise lines closely monitor both direct and indirect costs due to their limited ability to absorb short-term price increases.

The cruise sector has a seasonal component, with cruise ships relocating across the globe to align with the best weather for passengers. The seasonal elements mean that New Zealand forms part of the Australian and Pacific market, and also competes against other regions for deployments. Ship deployment decisions are done in advance and ticket sales go live more than a year out from the actual cruise. This limits the ability to respond to short term changes.

As part of the global maritime sector, cruise ships are regulated by the International Maritime Organisation (IMO) and the International Convention for the Prevention of Pollution from Ships (MARPOL). Specific standards and guidelines cover emissions, discharges, and waste. Cruise ship emissions are addressed using investments in technology solutions, changing fuels, and behaviour change. But cruise ships still have a large share of maritime emissions – the importance of reducing emissions is acknowledged and the cruise sector is working to reduce emissions towards a net-zero position over the long term. Unfortunately, accidents and events that breach MARPOL regulations do occur with the sector liable for fines – this underlines the fact that environmental impacts that fall outside the maximum thresholds do happen.

Views about the cultural and social impacts of cruise tourism are diverse and polarised; the effects can be expressed from a positive or a negative perspective. The effects of new spending in regions where cruise ships berth are seen as a positive, but the commodification of culture is seen as a negative. In contrast, some see the ability to leverage culture as a way to raise awareness and as a mechanism to renew cultural pride.

The most visible social effect relates to the response of some communities due to cruise tourism and its contribution to congestion. Isolating cruise tourism's contribution to tourism's total congestion is difficult. Regardless, in remote locations, a direct link to congestion is undisputed and self-evident. Authorities and cruise lines are responding to these pressures by limiting and restricting access.

Overall, the New Zealand cruise sector is adding to the economy, supporting employment, and generating activity across regional New Zealand. The sector is facing challenges that cloud the short- and medium-term outlook. Regardless, the long-term value of the sector is expected to be positive.

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5 Appendices

Appendix 1: Cruise – Market Share

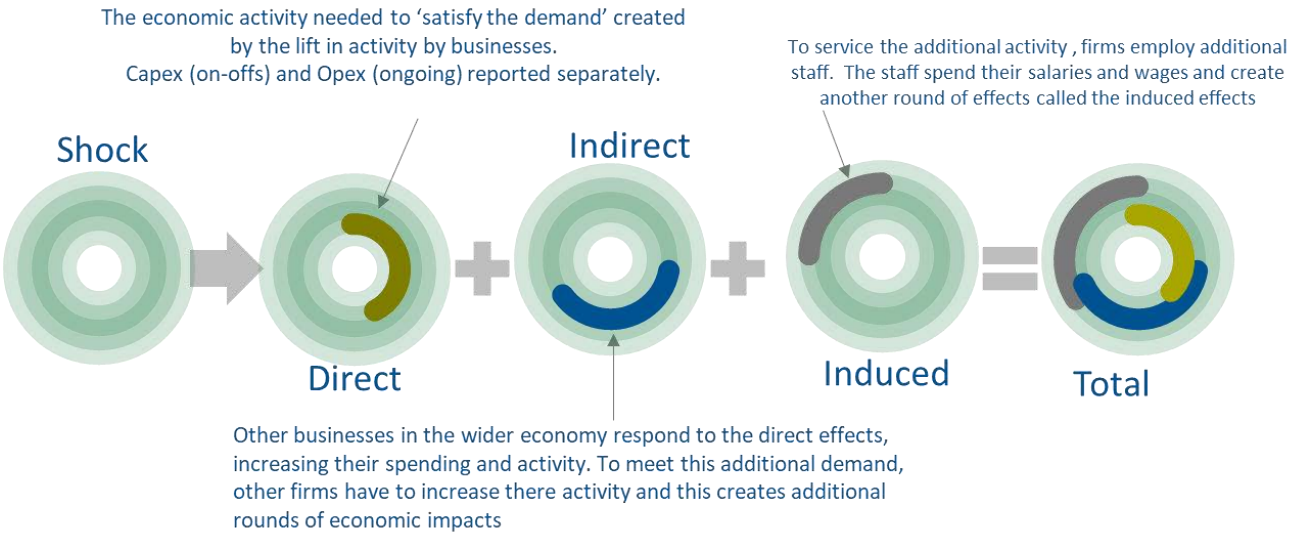
Parent	Brand	Total Passengers	% Passengers	Revenue (US$m)	% Revenue
Carnival	Carnival	6,114,200	20.3%	6,263	9.5%
	P&O Cruises	1,502,300	5.0%	4,299	6.5%
	Princess	1,649,600	5.5%	3,527	5.3%
	AIDA	1,113,500	3.7%	3,186	4.8%
	Holland America	796,500	2.6%	2,655	4.0%
	Costa Cruises	1,409,100	4.7%	2,584	3.9%
	Cunard	250,400	0.8%	1,191	1.8%
	Seabourn	85,400	0.3%	975	1.5%
Carnival	*Subtotal*	*12,921,000*	*42.9%*	*24,680*	*37.3%*
RCI	Royal Caribbean	5,769,300	19.1%	8,587	13.0%
	Celebrity	1,781,000	5.9%	4,808	7.3%
	Silversea	190,600	0.6%	2,415	3.6%
RCI	*Subtotal*	7,740,900	25.7%	15,810	23.9%
Norwegian	Norwegian	2,514,100	8.3%	6,306	9.5%
	Regent Seven Seas	117,800	0.4%	1,633	2.5%
	Oceania Cruises	187,400	0.6%	1,381	2.1%
Norwegian	*Subtotal*	*2,819,300*	*9.4%*	*9,320*	*14.1%*
All Other	MSC Cruises	2,553,400	8.5%	4,719	7.1%
	Disney	848,000	2.8%	2,753	4.2%
	TUI Cruises	517,000	1.7%	1,342	2.0%
	Adora	332,300	1.1%	863	1.3%
	Virgin Voyages	324,000	1.1%	841	1.3%
	Marella Cruises	272,300	0.9%	707	1.1%
	Dream Cruises	250,900	0.8%	651	1.0%
	Azamara	79,000	0.3%	615	0.9%
	Viking Cruises	216,400	0.7%	562	0.8%
	Hurtigruten	203,500	0.7%	528	0.8%
	Fred Olsen	145,500	0.5%	378	0.6%
	Celestyal Cruises	96,500	0.3%	250	0.4%
	Ambassador Cruise Line	83,200	0.3%	216	0.3%
	Ponant/Paul Gauguin Cruises	81,600	0.3%	212	0.3%
	Hapag Lloyd	73,100	0.2%	190	0.3%
	Phoenix Reisen	64,800	0.2%	168	0.3%
	SunStone	59,200	0.2%	154	0.2%
	Saga Cruises	58,400	0.2%	152	0.2%
	Explora Journeys	52,600	0.2%	137	0.2%
	Windstar	45,100	0.1%	117	0.2%
	Crystal	39,400	0.1%	102	0.2%
	Bahamas Paradise Cruise Line	38,000	0.1%	99	0.1%
	Mystic Cruises	36,800	0.1%	96	0.1%
	Lindblad Expeditions	33,300	0.1%	87	0.1%
	American Cruise Lines	30,400	0.1%	79	0.1%
	Ritz-Carlton	21,800	0.1%	57	0.1%
	American Queen Voyages	17,700	0.1%	46	0.1%
	Atlas Ocean Voyages	17,400	0.1%	45	0.1%
	Star Clippers	16,600	0.1%	43	0.1%
	Quark Expeditions	14,700	0.0%	38	0.1%
	Swan Hellenic	14,500	0.0%	38	0.1%
	Scenic Luxury Cruises	13,300	0.0%	35	0.1%
	SeaDream Yacht Club	6,500	0.0%	17	0.0%
	Emerald	5,800	0.0%	15	0.0%
	Hebridean Island Cruises	2,900	0.0%	8	0.0%
All Other	*Subtotal*	*6,665,900*	*22.1%*	*16,357*	*24.7%*
	TOTAL	30,147,100	100.0%	66,167	100.0%

Appendix 2: Introduction to IO Modelling

One of the strengths of Input-Output modelling is that the results are easy to interpret. Similarly, IO models are easy to use and cost-effective to develop for different areas. However, IO analysis is not without limitations, despite being widely applied in New Zealand and around the world. The most common limitations relate to the historical nature of IO Tables. We use IO tables derived from recent Supply and Use Tables.

With reference to IO modelling in general, a key assumption is that input structures of all industries (i.e. technical relationships) are fixed. In the real world, however, technical relationships will change over time. These changes are driven by new technologies, relative price shifts, product substitutions and the emergence of new industries. For this reason, IO analysis is generally regarded as suitable for short-run analysis, where economic systems are unlikely to change greatly from the initial snapshot of data used to generate the base IO tables. In addition to the 'fixed structure' assumption, other important assumptions (and limitations) of IO models are:

- Constant return to scale: This means that the same quantity of inputs is needed per unit of output, regardless of the level of production. In other words, if output increases by 10 per cent, input requirements will also increase by 10 per cent.
- No supply constraints: IO assumes there are no restrictions to inputs requirements and assumes there is enough to produce unlimited products.
- The model is static: No price changes are built in meaning that dynamic feedback between price and quantity (e.g. substitution between labour and capital) is not captured.



The M.E Multi-regional IO tables have 109 sectors, six primary inputs, six final demand categories and international imports are included in the model. The spatial resolution varies and can be changed to reflect the matter being assessed. In this assessment, we used 16 regions – the table has 1841 columns and 1,751 rows.

The MRIO is developed using official information, including national level IO and Supply-Use Tables. For the SUT tables, we use two optimisation models to produce symmetric input-output tables (SIOTs). The techniques

are published[103] – both authors are directors of M.E. The first model produces commodity-by-commodity SIOTs derived from the selection of appropriate technology assumptions, while the second produces industry-by-industry SIOTs derived through the selection of appropriate sales structure assumptions. Both models address the problem of negative coefficients and also permit the use of rectangular SUTs as base input data.

[103] McDonald, Nicola & McDonald, Garry. (2011). Estimation of symmetric input-output tables: An extension to Bohlin and Widell. Economic Systems Research. 23. 49-72.

Appendix 3: Regional impacts (GDP and employment)

Results are for the 2023/24 season

Region	Direct + Indirect Impact		Induced Impact		Total Impact	
	VA ($m)	Emp (MEC)	VA ($m)	Emp (MEC)	VA ($m)	Emp (MEC)
Northland	24	400	7	120	31	520
Auckland	211	3,170	94	1,195	305	4,365
Waikato	10	95	10	115	20	210
Bay of Plenty	58	1,060	18	290	76	1,350
Gisborne	3	55	1	25	5	80
Hawke's Bay	36	560	9	155	45	720
Taranaki	5	40	4	55	10	95
Manawatu-Wanganui	4	45	4	55	8	100
Wellington	71	905	29	345	100	1,250
Nelson-Tasman	4	50	4	60	8	110
Marlborough	23	430	3	45	27	470
West Coast	1	10	1	15	2	25
Canterbury	57	910	23	330	80	1,240
Otago	44	785	16	260	60	1,045
Southland	19	275	5	70	23	340
Area Outside Region	0	-	0	-	0	-
TOTAL	**572**	**8,790**	**228**	**3,145**	**800**	**11,930**
Employment estimates are rounded						

MEC – Modified Employee Counts

A headcount of employees together with an adjustment for working proprietors

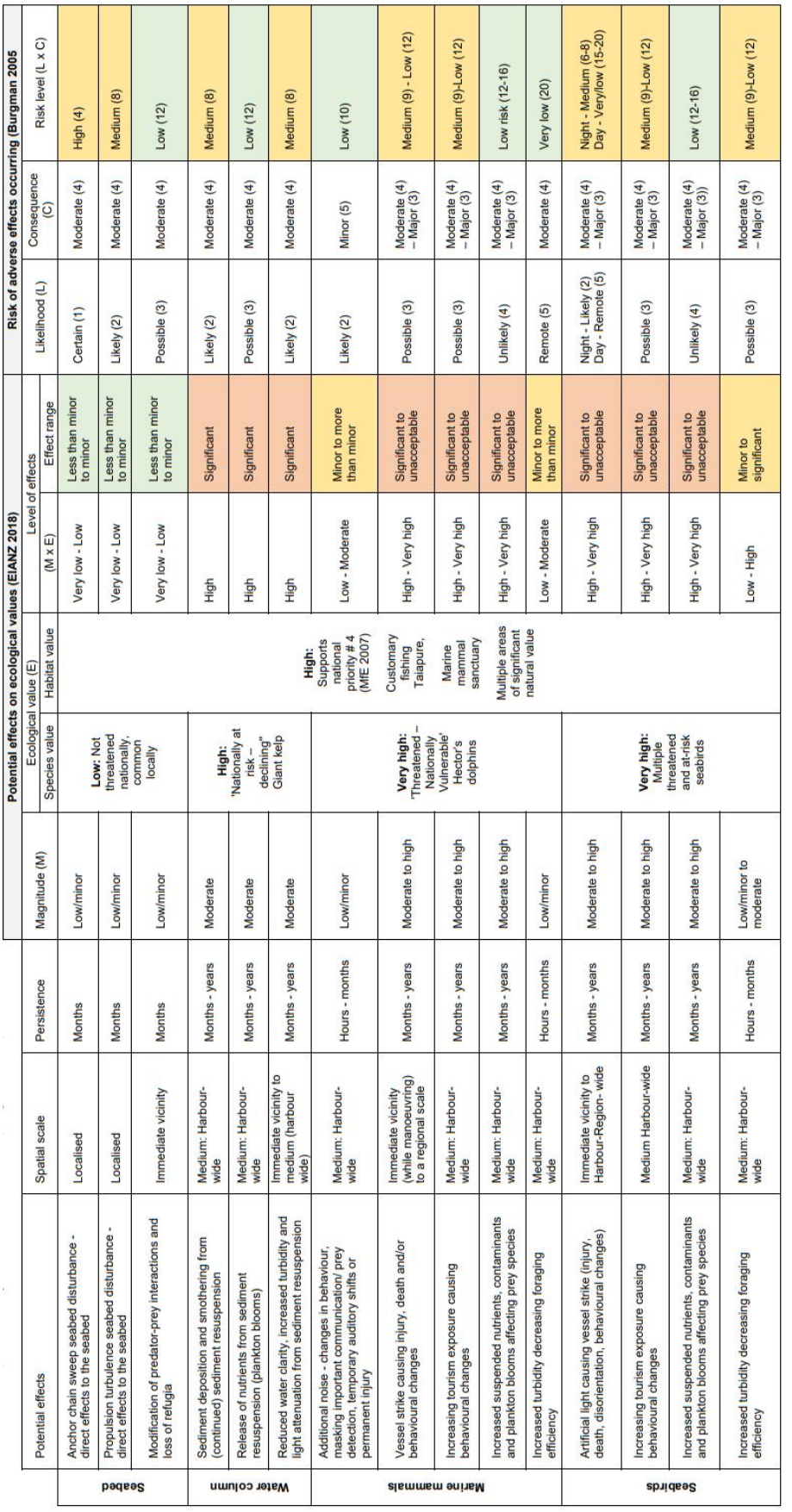
Appendix 4: Change in levies in 2024

	Per Unit	Old	New	% change	Implemented
International Visitor Levy	per visitor	$ 35.00	$ 100.00	186%	*1 October 2024*
Maritime Levy	per GWT	$ 0.1004	$ 0.1282	28%	
	per PAX	$ 2.0248	$ 2.5839	28%	*1 July 2024*
	per DWT	$ 0.0082	$ 0.0105	28%	
Oil Levy	per GWT	$ 0.0054	$ 0.0263	387%	*1 July 2024*
Boarder Clearance Levy					
Arriving cruise ship PAX (Customs)	per PAX	$ 11.48	$ 21.54	88%	
Arriving cruise ship PAX (MPI)	per PAX	$ 10.58	$ 10.58	0%	*1 December 2024*
Departing cruise ship PAX (Customs)	per PAX	$ 4.55	$ 2.31	-49%	

Note: Border processing levies shown in the table above represents amounts originally proposed by Customs during the consultation process of setting the levies for the next 3 years. These figures were used in the modelling of economic effects for this report. Modelling was completed between September and October 2024, so, due to timing, finalised amounts could not be incorporated in the economic assessment. For the sake of completeness, the finalised amounts are presented below.

	Per Unit	Old	New	% change	Implemented
Boarder Clearance Levy					
Arriving cruise ship PAX (Customs)	per PAX	$ 11.48	$ 27.14	136%	
Arriving cruise ship PAX (MPI)	per PAX	$ 10.58	$ 10.58	0%	*1 December 2024*
Departing cruise ship PAX (Customs)	per PAX	$ 4.55	$ 0.68	-85%	

Appendix 5: Summary of ecological risks associated with cruise ship activity in Akaroa Harbour



	Potential effects	Spatial scale	Persistence	Potential effects on ecological values (EIANZ 2018)			Level of effects		Risk of adverse effects occurring (Burgman 2005		
				Magnitude (M)	Ecological value (E)		(M x E)	Effect range	Likelihood (L)	Consequence (C)	Risk level (L x C)
					Species value	Habitat value					
Seabed	Anchor chain sweep seabed disturbance - direct effects to the seabed	Localised	Months	Low/minor	**Low:** Not threatened nationally, common locally	**High:** Supports national priority # 4 (ME 2007) Customary fishing Taiapure, Marine mammal sanctuary Multiple areas of significant natural value	Very low - Low	Less than minor to minor	Certain (1)	Moderate (4)	High (4)
	Propulsion turbulence seabed disturbance - direct effects to the seabed	Localised	Months	Low/minor			Very low - Low	Less than minor to minor	Likely (2)	Moderate (4)	Medium (8)
	Modification of predator-prey interactions and loss of refugia	Immediate vicinity	Months	Low/minor			Very low - Low	Less than minor to minor	Possible (3)	Moderate (4)	Low (12)
Water column	Sediment deposition and smothering from (continued) sediment resuspension	Medium: Harbour-wide	Months - years	Moderate	**High:** 'Nationally at risk – declining" Giant kelp		High	Significant	Likely (2)	Moderate (4)	Medium (8)
	Release of nutrients from sediment resuspension (plankton blooms)	Medium: Harbour-wide	Months - years	Moderate			High	Significant	Possible (3)	Moderate (4)	Low (12)
	Reduced water clarity, increased turbidity and light attenuation from sediment resuspension	Immediate vicinity to medium (harbour wide)	Months - years	Moderate			High	Significant	Likely (2)	Moderate (4)	Medium (8)
Marine mammals	Additional noise - changes in behaviour, masking important communication/ prey detection, temporary auditory shifts or permanent injury	Medium: Harbour-wide	Hours - months	Low/minor	**Very high:** 'Threatened – Nationally Vulnerable' Hector's dolphins		Low - Moderate	Minor to more than minor	Likely (2)	Minor (5)	Low (10)
	Vessel strike causing injury, death and/or behavioural changes	Immediate vicinity (while manoeuvring) to a regional scale	Months - years	Moderate to high			High - Very high	Significant to unacceptable	Possible (3)	Moderate (4) – Major (3)	Medium (9) - Low (12)
	Increasing tourism exposure causing behavioural changes	Medium: Harbour-wide	Months - years	Moderate to high			High - Very high	Significant to unacceptable	Possible (3)	Moderate (4) – Major (3)	Medium (9)-Low (12)
	Increased suspended nutrients, contaminants and plankton blooms affecting prey species	Medium: Harbour-wide	Months - years	Moderate to high			High - Very high	Significant to unacceptable	Unlikely (4)	Moderate (4) – Major (3)	Low risk (12-16)
	Increased turbidity decreasing foraging efficiency	Medium: Harbour-wide	Hours - months	Low/minor			Low - Moderate	Minor to more than minor	Remote (5)	Moderate (4)	Very low (20)
Seabirds	Artificial light causing vessel strike (injury, death, disorientation, behavioural changes)	Immediate vicinity to Harbour-Region- wide	Months - years	Moderate to high	**Very high:** Multiple threatened and at-risk seabirds		High - Very high	Significant to unacceptable	Night - Likely (2) Day - Remote (5)	Moderate (4) – Major (3)	Night - Medium (6-8) Day - Very/low (15-20)
	Increasing tourism exposure causing behavioural changes	Medium Harbour-wide	Months - years	Moderate to high			High - Very high	Significant to unacceptable	Possible (3)	Moderate (4) – Major (3)	Medium (9)-Low (12)
	Increased suspended nutrients, contaminants and plankton blooms affecting prey species	Medium: Harbour-wide	Months - years	Moderate to high			High - Very high	Significant to unacceptable	Unlikely (4)	Moderate (4) – Major (3)	Low (12-16)
	Increased turbidity decreasing foraging efficiency	Medium: Harbour-wide	Hours - months	Low/minor to moderate			Low - High	Minor to significant	Possible (3)	Moderate (4) – Major (3)	Medium (9)-Low (12)

Source: (Cawthron Institute, 2019)

Appendix 6: Global economic context

Global Cruise Revenue

The global revenue across all brands is estimated at $66.2bn (2023/24). The financial profile of the sector (Cruise Market Watch, 2024) suggests that pretax profits are in the order of $10.2bn. Revenue is generated across different activities and the average spending[104], per-passenger, per-day is US$260, consisting of:

ITEM	US$/PAX/DAY
• Ticket	180
On-board spending	
• Casino and bar	44
• Shore excursions[105]	16
• Spa	8
• Other spending	12
TOTAL	*260*

There are direct costs associated with servicing cruise passengers, including:

ITEM	US$/PAX/DAY
Direct	
• Other operating costs	37
• Payroll	28
• Ship fuel costs	20
• Onboard and other	27
• Victualing (food)	14
Other costs	
• Agent commission	34
• Corporate Operating Costs	31
• Depreciation/Amortisation	27
TOTAL	*219*

The direct cost associated with operating vessels and servicing passengers forms the largest cost drivers – accounting for 57% of all expenses. Indirect costs relating to agent commissions, corporate costs, and depreciation/amortisation account for the balance (43%). A cross check of operating costs contained within the Carnival Corporation plc 2023 Annual Report (Carnival Corporation & plc, 2024) revealed comparable costs per passenger per day to those indicated above.

The remaining profit is normally reinvested in new vessels, upgrading existing vessels and other capital expenditures.

The behaviour of the cruise sector is influenced by a variety of economic factors. These factors shape industry strategies, operational decisions, and market trends. The behaviour of the cruise lines is determined by their ability to generate a suitable return (or margin) within the constraints of consumer preferences.

[104] Based on an average cruise duration of 8.5 days. The median duration is 7.0 days.
[105] Cruise line portion

Spatial Patterns

The spatial patterns of cruise ships refer to the typical routes, locations, and movements they follow across oceans, coastal waters, and port cities. These patterns are influenced by several factors, including tourism demand, seasonality, geographical features, environmental regulations, and port infrastructure.

In Europe, there are two distinct markets, the Mediterranean[106] and its adjacent seas and northern Europe[107]. The Mediterranean is one of the largest global destination markets and has seen strong growth over the past two decades or so. However geopolitical turmoil and tensions have curtailed growth.

The Asian market, especially China has seen significant growth over the past decade with a lift in the number of vessels operating in this market. Passenger numbers have also increased significantly. Cruise lines opened sales offices in China, Hong Kong, Korea, Singapore, and Taiwan that translated into passenger numbers more than doubling from the 1.3 million in 2012 before COVID disruptions slowed growth. Beyond China, total port calls increased significantly in Japan, Thailand, Hong Kong, Taiwan, and the Philippines. The increase is mainly based on Chinese cruise passengers, which surpasses all Asian markets combined. The type of vessels deployed and the length of the offered cruise reflect the nuances of the Asian market - large and megaship cruises in East Asia are seasonally operated, middle-size and small-size ships being the most common. Cruises are short with average lengths of less than 4 days. This aligns with shorter leave (vacation) entitlements in the Asian markets. Overall, the growth outlook for the Asian market is positive but there are challenges, including:

- Cruise port infrastructure investment (state and private) with modern terminals supports the cruise sector; however, these are often marred in local (social and political) controversies.
- A lack of destinations for short cruises,
- Price wars, and
- Geopolitical tensions such as the issues involving North Korea and Taiwan,

The submarkets in Singapore, Taiwan, Malaysia, and the Philippines have seen the deployment of more cruise capacity, supporting the overall growth prospects for the Asian market.

The rest of the global market consists of several small(er) markets, including:

- Alaska,
- Australia, New Zealand and the Pacific,
- North Atlantic, West Coast, Mexico, California and the Pacific Coast,
- South America,
- Africa, and
- Other.

While smaller, these markets are important for the cruise sector because they provide some diversification away from the main markets and provide an element of isolation from geopolitical events. Local conditions in these markets are influencing the development trends. For example, infrastructure constraints and high port costs are noted as limiting growth in the Brazilian market.

The overall spatial patterns show the deployment decisions of cruise lines. These decisions consider global markets and costs to move vessels between markets in response to seasonal aspects. Crucially, deployment decisions consider more than port and vessel availability – the overall itinerary and how it fits with market demand is key. Travel distances between ports are also important.

Seasonal patterns are important because cruise lines need to relocate vessels to those locations. The Caribbean and Mediterranean markets are complementary – vessels service different passenger markets (by

[106] The Mediterranean market has four sub-markets: West Med, the Adriatic Sea, the East Med, and the Black Sea.
[107] The Northern Europe market consists of four sub-markets: Atlantic Europe, The UK and Ireland, Iceland, Norway, and Faroe, and the Baltic Sea.

origin) and reflect seasonal considerations. The cruise season varies according to climate conditions and seasons (see Table 5-1), with vessels deployed to align with regional seasons and favourable climate considerations.

Table 5-1: Cruise Seasons around the globe

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Caribbean, Bahamas, Bermuda*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mediterranean				✓	✓	✓	✓	✓	✓	✓		
Asia + China	✓	✓	✓								✓	✓
Non-Med Europe*				✓	✓	✓	✓	✓	✓	✓		
Alaska				✓	✓	✓	✓	✓	✓	✓		
Australia	✓	✓	✓	✓					✓	✓	✓	✓
Northern America, W. Coast, Mexico Calif./Pac. Coast	✓	✓	✓									
South America/Panama Canal	✓	✓	✓								✓	✓
New Zealand	✓	✓	✓	✓						✓	✓	✓

* Slight variation in seasonal patterns

A northern-southern hemisphere distribution is evident with the cruise seasons aligning with the summer periods in the relevant hemisphere. The Asia-China market is somewhat different with the summer period's humidity, rain and heat limiting the overall attractiveness. Some markets have year-round cruise offers with lower prices offered during the off-season but peak periods aligning with passenger demand are evident.

The New Zealand cruise season is illustrated for comparison. The New Zealand and Australian cruise seasons align with the Asian market – a fast-growing market. In the decade before COVID, the Asian market's share of the cruise fleet increased from around 1% in 2008, to 10% by 2018. However, this market has been slow to recover following the COVID disruptions and uncertainty in the Chinese economy. Parts of the Asian market have seen strong recoveries coming out of COVID – Singapore, India and Malaysia recorded strong growth in response to local deployment. Notably, many Asian sub-markets are now larger than they were pre- COVID (Cruise Lines International Association, 2023).

The availability and quality of port facilities, including docking space and passenger amenities, affect cruise operations and route planning. Historically, the global cruise port system has been characterised by a high level of regional concentration as well as clustering of port visits (Notteboom, Pallis, & Rodrigue, 2024). However, this concentration has diminished over time as cruise lines offer more expansive itineraries and a growing interest by ports to host cruise ships. New port facilities are emerging to serve a latent demand from a growing middle and upper class in Asia, the Middle East, and South America. Globally, cruise ports are developing in all parts of the world.

Profitability varies across markets and regions but detailed information about regional profitability is not publicly available. Some of the cruise lines report revenue at a high level, such as in North America, Europe, Australia and others, but these revenue figures are based on where passengers are sourced from and not their destinations. Consequently, these revenue figures cannot be combined with passenger data at destinations to show the value at a destination level.

The cruise lines use complex market analysis and modelling to identify the deployment options that deliver the best yields. Ultimately, the evaluation process seeks to optimise the business response relative to:

- Market demand for a specific destination,
    - Cruise length

- Factors influencing ability to develop an itinerary such as passenger demand and associated visitor/tourism opportunities and support infrastructure,
- Attributes of the destination.

- Alignment with business objectives and ability to optimise yields,
- Fleet considerations associated with seasonality,
- Cost elements:
  - Fleet repositioning costs,
  - Regulatory costs (direct and indirect),
  - Port infrastructure, costs and regulatory considerations,
- Broad economic and geopolitical considerations.

Differences exist among the various markets and regions, the most obvious being the variance in profitability. Each region has factors that support or detract from its attractiveness. The net position and relative attractiveness of a destination (e.g., a country) are based on how that destination compares relative to other destinations.

Demand-Side Factors

As mentioned, the cruise sector is part of the large tourism sector, and it is facing similar competitive pressures as other tourism activities. Consumer demand for tourism goods is related to economic conditions and discretionary funds of households/travellers. The cruise sector competes against other tourism-product offers for visitor dollars. The increase in cruise passengers over the past medium term reflects shifts in consumer patterns as well as how cruise lines have responded to these changes. The main factors that influence demand levels for cruises (from a passenger perspective) are outlined below.

Consumer Demand (demographics)

The cruise sector is relatively small compared to the global tourism sector. By 2028, the sector is projected to capture around 4% of global holiday market spending (JP Morgan, 2024). This is an increase from the pre-COVID environment with estimates suggesting that the cruise sector accounted for around 2% of worldwide travellers (Fernandex-Stark & Daly, 2017). Despite being relatively small compared to the global visitor sector, the cruise sector generates significant market activity (31.7m passengers).

A key driver of the positive outlook is the demographic shifts that are expected to support the sector. Socio-demographic attributes show that historically, Baby Boomers were the core customer base of the cruise sector. However, more recently there has been increased activity of Generation X[108] and Millennial[109] travellers on the back of an ageing global population. The increase reflects the growing disposable income and wealth levels of these generations. Cruise lines are recognising the role of demographics in driving demand and have responded by customising itineraries and providing variety and choice. Shorter cruises are more attractive to the lower age cohorts, providing flexibility to customers. The weighted average age of cruise passengers is 46.7 years[110] and the average age per voyage length[111] is:

[108] 1967 - 1981
[109] 1982 - 1998
[110] (Notteboom, Pallis, & Rodrigue, 2022)
[111] (Cruise Lines International Association, 2018)

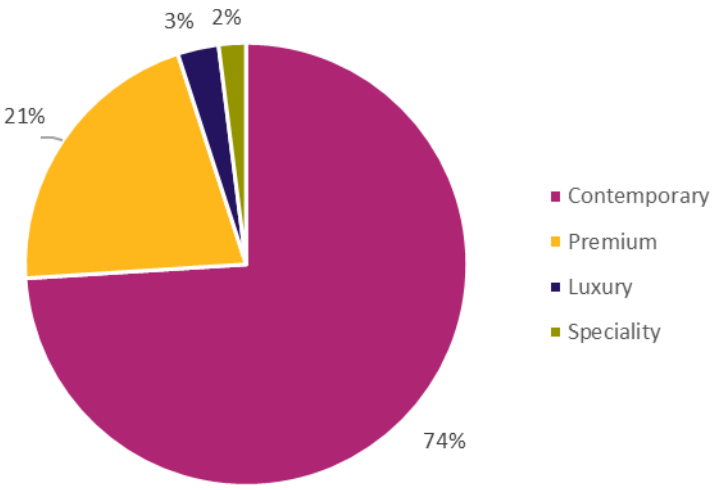
Voyage length	Average age
Under 3 days	38
3 – 5 days	42
6 – 8 days	52
9 – 15 days	56
>16 days	58

The cruise lines work to stimulate demand by expanding the type of services they deliver i.e., changing the mix and variety of onboard services and activities, as well as targeting different age cohorts. In addition, demand growth is achieved through generating repeat passengers (Notteboom, Pallis, & Rodrigue, 2022). These actions are designed to optimise passenger numbers and achieve economies of scale.

Generally, demand is being grown through careful market segmentation that aligns with passenger life cycles. The segmentation is geared towards expanding the overall reach across social and age cohorts. The main cruise market segments are (see Figure 5-1):

- Contemporary cruises represent the main segment with 74% of the market. They tend to be amenity-packed for people looking for many activities and value. This segment operates newer vessels (or extensively renovated) ships offering modern design and comforts. The average cruise duration is around seven days and appeals to all age cohorts. It also includes budget cruises with older vessels, a cruise market segment active in Europe and North America.
- Premium cruises provide upscale offers and amenities with an increased focus on a higher-order service and more space. An important focus of premium cruises is that their value exceeds or rivals the packages offered by upscale hotels and resorts. This is the second largest segment with a share of 21%.
- Luxury cruises form the third segment and have the highest quality and personalised service offered on luxury cruise ships and ashore. The destinations are more exotic, and the visited ports are more exclusive. The vessels associated with luxury cruises are medium-sized. This segment is comparatively small and accounts for approximately 2 to 4% of the cruise market.
- Speciality cruises relate to niches within the cruise market, capturing unique cruising styles and destinations. Speciality cruises include expedition-style cruises, sailing ships and some river cruises. Unique destinations include Antarctica and the Arctic. The market share is approximately 2%.

Figure 5-1: Market Segments



Regardless of the market segment, a critical feature of growing cruise passengers and revenue is enhancing the overall cruise experience as this is a key motivation for why people cruise (Deloitte, 2017).

The overall experience is determined by on-vessel experiences as well as those encountered during the overall visit (i.e., onshore excursions). Cruise itineraries with multiple ports, shore excursions opportunities as well as different experiences are highly valued. According to CLIA, the ability to visit multiple destination and value for money are the top reasons passengers love to cruise (Cruise Lines International Association, 2024).

In the post-COVID environment, cruise passenger numbers saw a lift and strong growth. However, the uncertainty and inflationary pressures have generated a more cautious spending environment. Cruise passengers are focused on value for money with cruises often working out cheaper than land-based vacations (J.P. Morgan, 2024). This price difference has helped underpin short term growth.

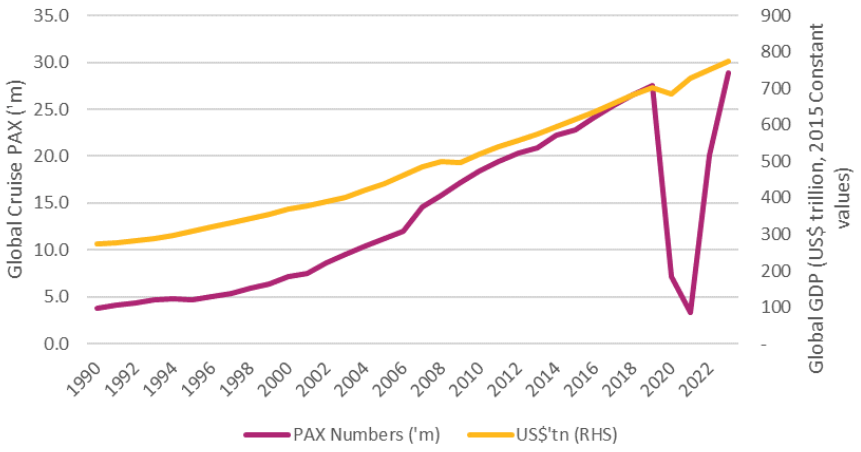
Over the medium term, Generation X and Millennial passengers are expected to increase in line with the lift in the spending capacity of younger generations increases. Attracting new cruise passengers is important because repeat business is an important part of the sector. For those who have cruised before, 82% are likely to cruise again (Cruise Lines International Association, 2024)[112].

Macro-Economic Conditions

The link between macro-economic conditions and tourism is well known. Cruise, like general tourism, is not immune to slowing economic conditions or instability in key markets. Low economic activity affects consumer confidence and spending on leisure activities like cruises. In contrast, in a growing and buoyed economy with positive consumer confidence, higher disposable income levels support spending on the visitor economy and tourism goods, including cruises.

The historic relationship between global passengers and economic performance is positively correlated. Figure 5-2 illustrates the long-term relationship between global cruise passengers and global GDP.

Figure 5-2: Global GDP and Cruise PAX



Source: Cruise Market Watch, 2024; World Bank, 2024

The significant disuption caused by the response to the COVID-19 pandemic is evident in cruise passenger numbers as well as economic activity (GDP). The correlation between cruise passengers and global GDP is positive. Unsurprisingly, removing the effects of the COVID-19 period shows that the correlation coefficient (R^2) is 0.896.

[112] CLIA Sentiment Perception and Intent Survey (March 2024).

Other macroeconomic conditions that influence demand levels are predominantly related to factors that are part of the economic landscape, i.e., business cycles, interest rates, employment, and business/labour market confidence levels.

Exchange rates are also a macro-economic consideration, and they influence the cruise sector in several ways by impacting operational costs as well as how customers engage with the sector. The main channels through which the sector impacts are:

- Operational costs
    - Direct input costs associated with fuel and supplies
    - Fees, levies and port charges
    - Labour costs
    - Revenue management and currency hedging
- Indirect via consumers' spending power and demand patterns (changing discretionary spending):
    - Spending power in international destinations
    - Relative price and affordability of on-board items
    - Choice of destination
    - Choice of alternative tourism models.

Destination attractiveness

The attractiveness of destinations (for cruise lines) is influenced by a range of factors such as proximity to source markets, natural beauty, cultural heritage, and political stability. The relative attractiveness of cruise regions is somewhat driven by proximity to source markets. For example, the United States represents the largest source market for the cruise industry with 16.9m passengers originating from this market in 2023 (Cruise Lines International Association, 2024). The proximity of the Caribbean to the United States contributes to its status as the world's most visited region by cruise. After United States, the next largest passenger source markets (2023) are Germany, United Kingdom and Australia, Italy and Canada.

Other factors that influence deployment patterns and decisions include:

- Incentives, subsidies and tax breaks - government incentives, such as subsidies for fuel or tax breaks for tourism development, can influence cruise sector behaviour and growth strategies.
- Public and private investments in tourism infrastructure, such as ports and transportation networks, support the expansion of cruise operations.

Understanding and responding to economic factors is crucial for cruise operators' ability to navigate the complexities of the market, optimise operations, and ensure long-term sustainability and profitability.

Supply-driven features

The cruise sector operates with a fixed number of ships that service passengers using pre-planned itineraries. The cruise sector cannot adjust its capacity quickly. Ships require significant investment and itineraries take time to establish. Due to this fixed capacity, when consumer demand rises, cruise companies may fill up their available capacity, leading to higher prices rather than an increase in the number of available spots. Conversely, when demand drops, prices often fall because the ships are already scheduled and need to sail close to full capacity to remain profitable. Profitability is crucial, and promotions and pricing strategies are used to optimise yields across the fleet.

Consumer demand in the cruise sector is sensitive to external events such as economic downturns, global health issues, or geopolitical tensions. Consumer demand is highly responsive and can drop in periods of low demand and slow economic activity. However, the sector's supply remains relatively fixed. Cruise lines may cancel itineraries or keep ships idle to avoid sailing with low occupancy, but this is costly.

Cruise lines do have some flexibility in adjusting their itineraries to match consumer demand trends. For instance, if a particular region (like the Caribbean) is highly popular, cruise companies can allocate more ships to that area. However, their ability to pivot is limited by port agreements, ship size limitations, and the time required to reposition ships. Areas of high demand can see premium prices for certain itineraries, especially if there is a 'scarcity effect' (limited tickets due to limited deployments to those areas).

In summary, while consumer demand affects the cruise sector, it operates within the boundaries of supply constraints. The industry adapts by strategically adjusting prices, itineraries, and marketing efforts to maximise occupancy and match consumer interest with its relatively inflexible supply.

Appendix 7: Economic Impact Studies

Research into the economic impact of the global cruise sector is produced by CLIA as part of its sector engagement. These reports are publicly available and can be downloaded via CLIA's website. The annual economic impact reports, dating back several years, are largely consistent with only minor changes in reporting methods over time.

Overall, a standard economic impact analysis approach is used across the reports and therefore the impact of the cruise sector can be analysed over time. Different regions are assessed, with reports provided for these regions. Sub-regional reports generally focus on passenger totals and visitor patterns. Country-level reports are more detailed with most reports using standard Input-Output (IO) methods and models. IO models are widely used around the world and in New Zealand. IO models quantify impact across three different elements related to cruise activity:

- Cruise line operational spending,
- Cruise line staff wages (measured as spending of crew wages in country of residence, or as spending while in port), and
- Passenger spending at ports.

Broadly, the economic impacts of the global cruise sector are reported across four key metrics:

1. Output – value of goods and services that are produced by a company or industry. This is calculated by adding together the value of the inputs used in the production process, including capital, labour, and intermediate goods and services.
2. GDP – measure of the gross value added contribution to GDP. This reflects the value after accounting for costs that a business or sector receives for producing goods and services.
3. Employment – the number of jobs associated with the level of economic activity.
4. Wages – includes the wages paid to workers but also include employee benefits and employer social security contributions.

In 2019, the cruise industry supported 1.7m jobs globally. The sector returned $50.5bn in wages and salaries and contributed over $75.5bn in total GDP[113] to the global economy (Business Research & Economic Advisors, 2020).

However, the COVID-19 pandemic had a significant impact on the cruise industry, suspending global cruise operations over March to September 2020. Suspended cruise operations over this period resulted in an estimated economic loss of more than:

- $77b in global economic activity,
- $24b in wages, and
- 518,000 jobs (Cruise Lines International Association, 2021).

In 2020 the sectors' output was down by 59% and the number of people employed was also down 51%. The gradual restart of the global cruise sector and return to cruising is illustrated in the figure below (Figure 5-3).

The year 2022 saw the rebound in activity with passenger volumes increasing to around 70% of 2019 levels (Tourism Economics, 2023). In 2022, the global cruise sector is estimated to generate $68.9bn of GDP, 1.2m jobs and $42.8bn in wages in 2022. Figure 5-3 reflect the key trends since 2019, and the COVID-19 effects as well as the subsequent recovery.

[113] M.E calculations based on reported Gross Output and historic relationships between output and GDP.

Figure 5-3: Global cruise industry contribution, 2019-2022[114]

**Estimated GDP*

Source: Several CLIA report.

Within the literature there is some criticism of economic impact estimates reported by cruise associations. The criticism relates to assumptions used in the modelling – specifically those related to the capture of cruise passenger spending patterns. Direct spending by passengers is commonly calculated by taking average passenger expenditure multiplied by the number of passengers. However, cruise passenger spending estimates are often the main source of critique and differences. Sampling and data collection are also often areas of contention[115]. These factors can combine to give rise to differences between observed passenger spend and how these are translated and linked to socio-economic, demographics and itinerary related variables.

In the literature, the standard economic analysis used to estimate the global or regional economic impact of the cruise sector utilises an Input-Output (IO) model application. Despite the widespread use of IO models, there are several limitations and challenges. IO models often assume linearity, a simplified relationship between inputs and outputs. Appendix 2 offers a brief introduction to IO modelling.

Real-world systems, especially in economics, are usually much more complex, exhibiting non-linearity, feedback loops, or unusual behaviours. Additionally, many economic models assume that the relationship between inputs and outputs remains constant over time. In dynamic environments these relationships might shift due to external factors like market conditions, technology changes, or policy decisions. While IO models are useful for understanding and analysing systems, they must be applied with a clear understanding of their limitations.

Computable General Equilibrium (CGE) models are an alternative economic analysis tool used to assess the impacts of policies or economic changes. They offer several advantages over IO models, particularly in terms

[114] Sourced from Economic Impact Reports produced for CLIA.
[115] (Kayahan, Klein, Moir, Stevens, & VanBlarcom, 2017)

of their ability to account for price adjustments, substitution effects, behavioural responses, and complex interactions between markets. While IO models are simpler and may be easier to implement, CGE models provide a more comprehensive assessment for understanding the full economic impacts of policy changes or shocks. Further, this assessment covers the existing sector without policy or structural changes. Due to the complexity of the cruise industry and interactions between different markets, as well as the fact that it is an existing part of the landscape, using IO is sufficient (but the limitations should be noted).

In some cases, a cost-benefit analysis (CBA) is included alongside an economic impact analysis to show a more comprehensive approach to evaluating the overall economic effects of a project or policy. The global cruise economic impact studies prepared for CLIA do not include a CBA.

Estimating Emissions

There are several techniques to calculate total emissions, but the availability of information necessitates some imputation. As mentioned earlier, the IMO has a long track record in estimating the total fleet emissions with reports going back to the 2000s. The fourth iteration refines the methodology and input variables. However, the general structure of the approach remains constant even if the focus recently moved to estimated emissions based on where a vessel has operated rather than the ship type and/or size. The recent shift is to enable the analysis to split emissions in terms of domestic or international locations.

Vessel emissions are influenced by a range of factors, including the ship's operations (distance sailed, fouling, and speed), as well as external factors such as the weather. The size of engines is generally related to the size of the vessel (in Gross Weight Tonnes) and the amount of energy that is produced (kW). Emissions tend to increase as engine loads increase. The main formulas are:

Emissions

$$E_{i,j} = \sum_{t=0}^{t=n} \left\{ \left(P_{ME_i} * LF_{ME_{j,k,l,m}} + D_{AE_{p,i,t}} * AF_{AE_{j,k,l,m}} + D_{BO_{p,i,t}} * EF_{BO_{j,m}} \right) * 1h \right\}$$

i = Ship
j = Pollutant
t = time (operating hour, h)
k = engine type
l = engine tier
m = fuel type
p = phase (cruise, manoeuvring, anchor, berth)
l = fuel type

$E_{i,j}$ = emissions (g) for ship *i* and pollutant *j*
P_{ME_i} = main engine power (kW) for ship *i*
$LF_{ME_{j,k,l,m}}$ = main engine load factor for ship *i* at time *t*, defined by the equation below
$EF_{ME}{}_{l,m}$ = main engine emission factor (g/kWh) for pollutant *j*, engine type *k*, engine tier *l*, and fuel type *m*
$D_{AE_{p,i,t}}$ = auxiliary engine power demand (kW) in phase *p* for ship *i* at time *t*
$AF_{AE_{j,k,l,m}}$ = auxiliary engine emission factor (g/kWh) for pollutant *j*, engine type *k*, engine tier *l*, and fuel type *m*
$D_{BO_{p,i,t}}$ = boiler power demand (kW) in phase *p* for ship *i* at time *t*
$EF_{BO_{j,m}}$ = boiler emission factor (g/kWh) for pollutant *j* and fuel type *m*

Load Factor

$$LF_{i,t} = \left(\frac{SOG_t * SAF_{i,t}}{V_{max}}\right)^3 * HFF_i * DAF_i$$

i	=	ship
t	=	time (operating hour, h)
$LF_{i,t}$	=	main engine load factor for ship *i* at time *t*
SOG_t	=	vessel speed over ground at time *t*
$SAF_{i,t}$	=	speed adjustment factor for ship *i* at time *t*
V_{max}	=	maximum ship speed
HFF_i	=	hull fouling factor for ship *i*
W_t	=	weather factor at time *t*
DAF_i	=	draught adjustment factor for ship *I (a factor of 0.98 is used for cruise vessels)*

Hull fouling factor

As a ship travels, biological growth accumulates on its hull in a process known as hull fouling. Because hull fouling reduces the smoothness of the hull, it increases the friction between the ship and the surrounding water, causing an increase in the ship's instantaneous power demand. The formula for fouling is:

$$HFF = 1.2 + \left[0.04 * \left\{\left(\frac{k_2}{L}\right)^{\frac{1}{3}} - \left(\frac{k_1}{L}\right)^{\frac{1}{3}}\right\}\right] * \frac{1}{0.018 * L^{-\left(\frac{1}{3}\right)}}$$

k1 = *initial roughness of a new ship (120 µm)*
k2 = *final hull roughness depending on ship's age, (from table below), and number of years after drydocking (assuming 5-yearly dry docking from the date of delivery, and a 30µm annual increase in hull roughness due to biofouling).*
L = *length between the perpendiculars (LBP)*

Age of ship	AHR
0 – 1 year	120 µm
2 – 5 years	150 µm
6 – 10 years	200 µm
11 – 15 years	300 µm
16 – 20 years	400 µm
> 20 years	500 µm

Sulphur Content

Closely related to air emissions is the fuel that is used on cruise vessels. In January 2020, new limits on sulphur content in fuel oil used on ships came into force. Known as 'IMO 2020', the rule limits the sulphur in the fuel oil used on board ships operating outside designated emission control areas to 0.50% m/m (mass by mass). In designated emission control areas, the limits were already stricter (0.10%). This new limit was made compulsory following an amendment to Annex VI of MARPOL. Ships can achieve this limit using several methods:

- Use a compliant fuel oil with sulphur content that is less than 0.5%,
- If the 0.5% threshold is exceeded (in the fuel), then use a system such as an EGCS to reduce the SO_X,
- Use an alternative fuel, such as LNG or methanol,
- Use onshore power supply when at berth.

It is worth noting that the decision to cut the global limit for sulphur was made in 2008 and confirmed again in October 2016, and come into force in 2020[116].This suggest that a lead-time of 12 years from when the decision was made to when the changes came into force. This lead time excludes any preparatory work.

In addition to the fuel that is used, the age of the vessel also plays a role. Newer vessels, built post 1 January 2016, have more stringent NOx limits for vessels operating in NOx Emissions Control Area (NECA)[117].

Technological response

The most prevalent technological response is in the form of exhaust gas cleaning systems (EGCS), often called scrubbers. EGCS are the primary air pollution mitigation measure that is used by the cruise industry. Scrubbers involve spraying exhaust gas with water to dissolve sulphur oxides (SO_X). Most scrubbers operate by washing the exhaust gas with alkaline water, thereby generating an acidic washwater containing elevated concentrations of particulates, nitrogen, hydrocarbons, and metals. There are three types of scrubbers – open-loop, closed-loop or hybrids[118].

- Open-loop scrubber systems use sea water as scrubbing water, using its natural alkalinity and buffering capacity to neutralise the acidity of the washwater. Water is pumped from the sea into the scrubber, then discharged back into the sea. In some cases, there is a cleaning unit to remove particulate matter (retained as sludge) prior to discharge.
- Closed-loop systems use an onboard water supply (usually freshwater) which is used in the scrubber then recirculated and reused multiple times. Alkaline substances are added to the water to buffer against the acidic washes. The recirculating water needs to be gradually exchanged with clean water, and the dirty water is removed from the system at a low but relatively constant rate. The removed water is then treated and can either be discharged at sea or held in a storage tank for later disposal either at sea or on land.
- A hybrid system usually incorporates both open and closed-loop systems.

EGCSs are designed to remove 98% of sulphur and over 50% of particulate matter, with a 12% reduction in nitrogen oxides (NO_x). Approximately 60% of the CLIA member fleet utilise EGCS to comply with international and national regulations[119].

While EGCSs reduce the sulphur content of emissions, they do not remove all pollutants from exhaust gases. While the pollutants are captured on the vessels and not released via air emissions, the pollutants are often released into the marine environment.

Hazard assessments generally find that there could be risks from scrubber discharges (washwater) based on comparisons of discharge quality to environmental standards (see Appendix 10 for regulations associated with washwater). The presence of metals and/or PAHs (polycyclic aromatic hydrocarbon) in the discharges increases environmental risks. Hazard assessment identified that the magnitude of the risks is dependent on the locations of discharges and the dilution rates, and that risks could be highest for coastal areas and ports. Most risk studies considering dilution predicted that contaminant concentrations would be orders of magnitude below water quality standards. Those studies that reported low risk assessed either moving vessels (in shipping lanes), assumed complete mixing of discharges within an estuary, or considered the discharge from a single vessel only. The high background concentrations of some contaminants in some locations also influenced the conclusions of one study that scrubbers had little effect on contaminant concentrations. Several studies suggested that there was increased potential for adverse effects within ports, especially when there

[116] (International Maritime Organisation, 2019)
[117] The tiers are: Tier 0: before 1/01/2000; Tier 1: After 1/1/2000; Tier 3: After 1/1/2011; Tier 3: After 1/1/2016.
[118] (NIWA Taihoro Nukurangi, 2020)
[119] (Cruise Lines International Association, 2023)

were multiple vessels, though only two studies adequately assessed this – and their conclusions differed. One study, assuming discharges from multiple vessels, found that increases in metals and PAHs would be low, whereas the other concluded that PAH concentrations would increase substantially. Regardless, discharging washwater should be carefully managed and regulated.

Appendix 9: Shore Power

Onshore Power Systems (OPS) provide electricity to plugged-in ships berthed in port. Certain types of vessels have power demands whilse at berth. Cruise ships and containerships with refrigerated cargo are examples of such vessels. Cruise ships are connected to shore power and can then turn off their auxiliary engines, which are used to generate power needed for accommodation and entertainment functions as well as other electrical needs for crew and passengers. It is estimated that switching to shore power could reduce emissions by up to 98% but such a decrease is subject to the mix of energy sources used in generating the required electricity. It must be noted that connecting to shore power only reduces emissions if the sources are renewable.

Every CLIA-member ship currently under construction through to 2028, except expedition vessels, is scheduled to have shore power capabilities. Currently, approximately 120 ships (46% of the fleet and 52% of global PAX capacity[120]) can connect to shore power where it is available. In addition, 30% of CLIA-member ships are scheduled to be retrofitted to connect to shore power. The cost to retrofit a ship is influenced by the size of the ship as well as the exiting on-board infrastructure. The key cost items are:

- Transformer
- Electrical distribution system
- Switchboard and control panel
- Cable reel system (also possible on the quay, depending on design).

The cost associated with ship modifications vary between US$300,000 to $1-2m. There are significant cost differences between a retrofit and a new-build and a retrofit can be double the cost associated with a new build[121].

The availability of port-side infrastructure is still limited. Fewer than 2% of the world's cruise ports[122] have shore power but ports are making the necessary investments. Over the next year or so, around 3% of cruise ports will offer shore power. In terms of actual count, there are:

- 34 cruise ports globally that have at least one berth with onshore power,
- 24 additional ports that have secured funding, and
- 16 ports that are planning to invest in shore power.

Investment in shore power infrastructure is relatively slow and there appears to be a natural inertia to getting the scale needed to trigger investment. The uptake of shore power on ships requires costly retrofitting, which only makes economic sense for a shipowner if a sufficient number of visited ports provide shore power, which in turn requires costly investment and is only profitable once a reliable number of ships are able to use (and pay for) the facilities[123].

A shore power study was carried out in the United Kingdom which reported significant barriers to the implementation of shore power[124]. The major barriers appear to be:

- capital costs – shore power projects around the world are undertaken with significant public funding and investment.
- high costs involved with regards to the local distribution network
    - providing additional transmission capacity,
    - building new substations and

[120] (Cruise Lines International Association, 2024)
[121] (World Port Sustainability Programme, 2024)
[122] (Cruise Lines International Association, 2023)
[123] (Merkel, Nyberg, Ek, & Sjostrand, 2023)
[124] (British Ports Association, 2020)

- network reinforcements.

Significant capital costs as a barrier are not exclusive to UK ports and is highlighted elsewhere in the world[125]

Another barrier to shore power is the price of electricity compared to marine diesel – although this varies depending on location. For shore power to be competitive and viable, ports must be confident that electricity will be able to compete against marine fuel and any future potential alternatives. Additionally, ports will usually add their own margins to electricity to recover capital costs. Importantly, this cost will be borne by cruise lines and therefore electricity must be able to compete with marine fuels; otherwise, cruise lines may choose not to use shore power (unless mandated).

A lack of consistent demand was also cited as a prohibitive barrier for the provision of shore power. Cruise ships and container ships form the main segment. There is limited data on the number of other vessels (non-cruise or non-container ships) with shore power connections, so the potential demand is unknown. Furthermore, at some ports, cruise ships are not required to plug in which defeats the purpose of investing in shore power to reduce emissions. This is the case for New York's Brooklyn cruise terminal in which uptake of shore power by compatible cruise ships is inconsistent[126]. The price, compared to marine fuels, was among one of the reasons Cruise Lines were choosing not to plug in.

International literature highlights that while there are potential gains in emissions associated with shore power, the short-term outlook for electrification is somewhat muted. Capital costs and a lack of scale appear to be inhibitors.

[125] (Advisian, 2017; United States Environmental Protection Agency, 2022)
[126] (Collins, 2019)

Appendix 10: Waste

Cruise ships provide amenities to their passengers that are often compared to those offered by luxury hotels. The accommodation and entertainment function generates water demand and consequently wastewater. The quantity of these waste streams is dependent on the size of the ship, number of passengers and crew, and consumption of resources. Water is an important resource and is used throughout the cruise ship, and wastewater is classified into:

- **Human-generated wastewater, such as black water (sewage water):** Sewage falls under MARPOL Annex IV (MARPOL Practical Guide, 2015) and is defined as drainage and other wastes from any form of toilets, urinals etc. It is generally referred to as black water.
- **Operational-generated wastewater, such as oily bilge water, and oily residue (sludge)**: Bilge water is a mixture of sea and fresh water, oily fluids, lubricants and grease, cleaning fluids and other waste that accumulates in the lowest part of a vessel (to the bilge wells) from a variety of sources including engines (and other parts of the propulsion system), piping, and other mechanical and operational sources found throughout the machinery spaces of the vessel (EPA, 2011). Oily residue (sludge) is usually generated in a fuel or lube oil purifier, which centrifuges the fuel to separate liquid and solid impurities, to prevent damage to engine components, reduce wear and improve fuel combustion. Oily waste is regulated under Annex I of MARPOL (Table 2)[127] .
- **Grey water**: Water associated dishwashers, showers, laundry, bath, and washbasin drains.

Cruise ships generate large volumes of wastewater black water and grey water, and combined these are more voluminous than operational-generated wastewater (oily bilge water). The discharge of black water is regulated under MARPOL 73/78 Annex IV[128]. These regulations specify the conditions under which wastewater can be discharged, how it should be treated as well as the holding conditions, equipment and control systems. The matters outlined in the required sewage prevention certification to be dealt with by national shipping administrations are also outlined.

The most recent amendments entered operation in January 2013, suggesting that they have been in operation for more than a decade. According to the MARPOL Practical Guide:

- the discharge of sewage into the sea is prohibited, except when:
    - the ship has in operation an approved sewage treatment plant or
    - when the ship is discharging comminuted[129] and disinfected sewage using an approved system at a distance greater than three nautical miles from the nearest land.
    - Sewage which is not comminuted or disinfected must be discharged at a distance of more than 12 nautical miles from the nearest land.

Historically, cargo and cruise ships were fitted with Type II Marine Sanitation Devices (MSD). With these systems, sewage is treated using biological action and chlorination. Some cruise ships do not treat their sewage biologically but instead use maceration and chlorination. The treatment system typically includes aerobic biological treatment to remove biochemical oxygen demand (BOD) and some nutrients, clarification and filtration to remove solids, and final chlorine disinfection to destroy pathogens. The system also may include screening to remove grit and debris.

A more recent approach to treating **black water** to improve environmental performance has seen cruise lines testing and installing wastewater purification systems that utilise advanced technologies. Advanced Wastewater Treatment Systems (AWTS) are designed to meet or surpass higher standards for wastewater. Generally, AWTS use enhanced aerobic digestion with physical filtration. In some instances, black and

[127] (MARPOL Practical Guide, 2015).
[128] Regulation for the prevention of Pollution by Sewerage from ships.
[129] Comminuted means: reduced to minute particles or fragments.

greywater can be treated together. Compared to MSDs, advanced wastewater treatment systems provide higher levels of biological treatment, solids removal, and disinfection. AWTS generally provide improved screening, biological treatment, solids separation (using filtration or flotation), and disinfection (using ultraviolet light) as compared to traditional Type II MSDs[130]. According to CLIA, 80% of the member fleet is served by AWTS and all new ships on order are specified to have these systems[131].

With reference to **bilge water**, this oily wastewater is either retained in a holding tank and disposed at an onshore port reception facility or treated onboard using an oily water separator and discharged overboard in accordance with regulations. The discharge of sewage and bilge water is regulated by MARPOL[132] Annex I prior to discharge. Before any discharging, the oily water must be processed using specified oil filtering equipment that meets strict requirements, specifically the oil content does not exceed 15 parts per million. MARPOL also requires strict record keeping associated with any discharge.

There are currently no international requirements dealing with the discharge of grey water. However, there may be local standards governing the discharge of grey water.

The cumulative impact to water quality from wastewater, greywater and bilge water discharge (treated) in areas of concentrated cruise ship operations is a cause for concern. Furthermore, if cruise ships do not adhere to international and national regulations, there is potential for waste discharges to contaminate and adversely impact marine environments. The relative concentration of cruise ships in specific locations is a contributing factor and associated with the cumulative impacts.

Other Waste

Cruise vessels also generate other waste that is managed under MARPOL. These are grouped into the following categories[133]:

1. Plastics. Garbage that consists of or includes plastic in any form, plastic garbage bags and incinerator ashes from plastic products – discharge at sea is prohibited.
2. Food wastes. Food wastes may be discharged at sea under specific circumstances/requirements (comminuted/ground and >12nm and en route and as far as practicable).
3. Domestic wastes. Garbage generated mainly in the accommodation spaces on board the ship (e.g. drinking bottles, papers, cardboard etc). – discharge at sea is prohibited.
4. Cooking Oil. Edible oil or animal fat used for the preparation or cooking of food – discharge at sea is prohibited.
5. Incinerator ashes. Ash and clinkers resulting from shipboard incinerators used for the incineration of garbage– discharge at sea is prohibited.
6. Operational wastes. Solid wastes (including slurries) that are collected on board during normal maintenance or operations of a ship or used for cargo stowage and handling. Operational wastes exclude grey water, bilge water, or other similar discharges – discharge at sea is prohibited.

Arguably, the plastics and solid waste streams are important. These are both managed by strict regulation, and disposal at sea is prohibited. The solid waste stream generated by cruise ships includes:

- rubbish,
- plastic,

[130] (Environmental Protection Agency (US), 2008; Lloret, Carreño, Carić, San, & Fleming, 2021).
[131] (Cruise Lines International Association, 2023)
[132] The International Convention for the Prevention of Pollution from Ships
[133] Some of the MARPOL categories are not relevant to cruise vessels. These include disposing animal carcasses and the residue associated with cleaning cargo holds.

- glass,
- sludge and
- food waste.

Solid waste can be either non-hazardous or hazardous waste. Hazardous waste such as batteries, fluorescent light bulbs, and medical waste require careful handling and disposal. As mentioned, these wastes must not be discharged at sea. Ultimately, the discharge of garbage to port reception facilities should be given primary consideration – this approach is seen as the primary means of discharge for all garbage[134]. Improper disposal or incineration of this waste can harm the marine environment.

Furthermore, if passengers throw rubbish overboard or items are blown overboard, there is potential for plastics and other solid waste materials to be introduced into the marine environment, known as marine debris. Marine debris can accumulate on beaches and coastal areas, on the surface of water, and on the seafloor.

With reference to washwater (from EGCS, scrubbers), the IMO sets the guidelines and criteria around the quality of the washwater discharges (IMO Secretariat 2015). When in ports, harbours, or estuaries (but not in other coastal or marine waters), continuous monitoring is required for:

- pH to ensure that it is no less than 6.5 as measured at the overboard discharge, or achieve a minimum pH 6.5 at 4 m from the discharge point when the ship is stationary,
- PAHs (polycyclic aromatic hydrocarbons). The maximum continuous PAH concentration in the washwater should not be greater than 50 µg/L PAHphe (phenanthrene equivalence) above the inlet water PAH concentration as measured after water treatment but before any dilution.
- Continuous turbidity should be less than 25 FNU (formazin nephlometric units) or NTU (nephlometric turbidity units) above the inlet water turbidity – the measure is based on a 15-minute rolling average.
- Nitrate discharges should be prevented when concentrations are beyond 60 mg/L (normalised for washwater discharge rate of 45 tons/MWh).
- Washwater residues (e.g., solids produced after treatment through settling) should not be discharged to sea or incinerated on board and should be disposed of onshore at suitable facilities.

The Cruise sector has a range of initiatives aimed at continuously improving its sustainability. These are described in the Cruise Industry's Sustainability Guide[135]. According to industry sources[136], cruise ships reuse almost 100 percent of waste generated on board through recycling, donating and converting waste into energy. On average the industry recycles more than 80,000 tons of plastic, aluminium and glass every year. Cruise lines are also trying to reduce the amount of plastic brought on board through sourcing and minimising single-use products such as straws, water bottles and unnecessary packaging materials.

Ensuring compliance with MARPOL Annex V is essential, but direct enforcements while at sea is difficult. Governments are encouraged to:

- consider punitive measures (consistent with international law),
- remove any disincentives,
- create incentives and initiatives to facilitate more effective compliance, and
- develop voluntary measures within the regulated community when developing programmes and domestic legislation to ensure compliance with the Annex.

[134] (Marine Environment Protection Committee, 2017)
[135] Link to the Guide: Cruise Industry Sustainability Guide Released - New Zealand Cruise Association
[136] (New Zealand Cruise Association, 2018).

The 2017 Guidelines for the implementation of MARPOL Annex V provide detailed guidance regarding regulation and ensuring compliance. A crucial component is the reporting system, which consists of a logbook or record books that are integrated into the ship's official reports. The waste management reporting system may also include reports of garbage discharges. Particular attention should be given to the reporting of:

- any discharge in special areas or Arctic waters,
- discharge at port reception facilities, and
- discharge of garbage into the sea.

Reports should include the date, time, location by latitude and longitude or name of port, type of garbage and estimated amount of garbage discharged.

In addition to managing the discharges, the guidance indicates that another way to manage waste is to minimise how much waste (e.g., packaging) is taken onboard and install garbage management, handling and processing equipment. Simultaneously, governments are encouraged to consider the economic and financial effects of local regulations on cruise line's ability to implement waste management processes. Governments are also encouraged to work with the MARPOL organisation to develop port reception areas to simplify the transfer of waste for ships.

Appendix 11: Marine Environment

Marine environments are vulnerable to risks posed by cruise ships including ship collisions (strikes), noise pollution, light pollution, introduction of invasive species, anti-fouling chemicals and oil spills. Cruise ships can collide with marine animals, such as whales, dolphins, and sea turtles, causing injury or death (Lloret, Carreño, Carić, San, & Fleming, 2021; Cawthron Institute, 2019). As cruise ships increase in size and their numbers rise, the likelihood of collisions also increases. Cruise ships also generate underwater noise from ship engines and propellers which can disrupt marine life, particularly marine mammals that rely on sound for communication and navigation such as dolphins. Underwater noise pollution can prevent marine animals from detecting and reacting to threats and therefore increase the likelihood of ship strikes.

At nighttime cruise ships generate artificial light, which can have negative effects on marine life. The bright lights from cruise ships can disrupt the natural behaviour of sea creatures, interfere with their navigation, and disturb ecosystems that rely on natural light cycles. Permanent 'moonlight' created by cruise ships can cause localised problems with migrations of zooplankton, cephalopods, fish and potentially other marine species, putting them at risk of intensive and frequent predation[137]. Furthermore, illuminated cruise ships can disorient birds, resulting in collisions[138].

Maritime vessels, including cruise ships, have been linked to the transfer of species from one part of the world to another. An implication of this is the introduction of species (and diseases) in new regions where they were not previously endemic. The transfer of species can occur via ballast water. Ballast water (water held in ballast tanks) is used to provide stability and manoeuvrability during a voyage and can contain wastewaters, oil, microplastics, invasive species and other particle matters[139]. Ships take on ballast water in one location and discharge it in another, potentially introducing invasive species to new environments.

Another way the transfer of invasive species can occur is through hull fouling – a significant environmental concern. Ships carry fouling organisms from one region to another, facilitating the spread across different marine environments. These organisms can survive long voyages and quickly colonise new areas. The introduction of invasive species can lead to the decline or extinction of native species by competing for food, habitat, and other resources.

Cruise ships, like other marine vessels, require antifouling measures to prevent the accumulation of marine organisms such as barnacles, algae, and mussels on their hulls. Regular hull cleaning and the application of antifouling coatings minimises the environmental impact by reducing the release of biocides into the water. However, antifouling coatings are one of the most serious threats to the marine environment (Lloret, Carreño, Carić, San, & Fleming, 2021). Following the ban of antifouling coatings containing tributyltin in 2008 by the IMO, new copper-based compounds have been introduced. Despite the ban on tributyltin, some areas continue to report high concentrations and significant biological impacts, which raises concerns about the effectiveness of current legislation and practices (Cari´c et al., 2016 as cited in Lloret et al., 2021). The latest sustainability report produced by CLIA states member cruise lines have long been committed to using advanced green paints and varnishes, and silicon-based anti-fouling coatings.[140]

Spills of oil or fuel can have devastating effects on marine and coastal environments, causing long-term damage to ecosystems. Oil spills by cruise ships can occur through discharges of inadequately treated bilge water due to faulty or malfunctioning oily water separators, human error or deliberate bypass[141]. Another

[137] (Longcore and Rich, 2004 as cited in Lloret et al., 2021)
[138] (Lloret, Carreño, Carić, San, & Fleming, 2021; Cawthron Institute, 2019)
[139] (Lloret, Carreño, Carić, San, & Fleming, 2021)
[140] (Cruise Lines International Association, 2023)
[141] (Environmental Protection Agency (US), 2008)

potential cause of oil spills is cruise ships accidents[142]. Table 5-2 illustrates the impact on the marine environment of different oil types.

Table 5-2: Description of oil types and the interaction when released into the marine environment

Oil Type	Removal and response	Environmental Impact
Very light oils (jet fuels and petrol/gasoline)	Highly volatile (they will evaporate within 1-2 days). It is rarely possible to clean up the oil from such spills.	Highly toxic Can cause severe impacts on shoreline resources.
Light oils (diesel, no 2 fuel oil, light crudes)	Moderately volatile, but will leave a residue after a few days. Clean-can be very effective for these spills.	Moderately toxic Has the potential to create long term contamination of shoreline resources.
Medium oils (most crude oils)	Some oil (about a third) will evaporate in 24 hours. Clean-up is most effective if conducted quickly.	Less toxic Oil contamination of shoreline can be severe and long term, and can have significant impacts to waterfowl and fur-bearing mammals.
Heavy oils (heavy crude oils, No 6 fuel oil, bunker C fuel	Little or no oil will evaporate. Clean-up is difficult.	Less toxic Heavy contamination of shoreline resources is likely, with severe impacts to waterfowl and fur-bearing mammals through coating and ingestion.
(Environmental Protection Agency (US), 2008)		

Despite the MARPOL regulations and the prohibited nature of waste discharges, intentional and unintended discharges do occur. No formal records or timeseries analysis of discharges are available because events tend to be recorded (or enforced) by different countries. Sources, such as cruisejunkie.com collate data about MARPOL violations and fines using a range of sources, such as maritime authority data as well as media articles. This source is however 'unofficial' so caution is needed when using this data. But, in the absence of other sources, we use this data.

For the period between 2000 and 2019, a total of 128 events where non-compliance with MARPOL is identified and prosecuted are recorded. The records were reviewed and grouped into:

- Air pollution, mostly related to non-low sulphur fuel issues,
- Water pollution, including discharges of grey and black water,
- Marine environment, including mammal strikes and groundings,
- Waste management, covering garbage disposal, and
- Oil Spill, including oil discharges associated with bilge water, fuel spills and so forth.

The average annual number of events for the above categories is:

- Air pollution 2.1
- Water pollution 2.9
- Marine environment 0.3
- Waste management 0.4
- Oil Spill 1.2.

While there are limitations around the data used, it appears that the annual incidences are relatively minor at a global scale. Nevertheless, the local effects of these events should not be minimised. In some instances, the

[142] (Lloret, Carreño, Carić, San, & Fleming, 2021)

cruise lines faced large fines – in one instance a cruise line was fined US$20m[143] for violating its probation and a US$40m for environmental offences (including discharging plastics). Other fines include US$80,000 for not using low sulphur fuel in protected fiords.

[143] The currency is not stated, and it is assumed to be in United States Dollars.

Appendix 12: Social and cultural effects

Social Effects

The social effects of the cruise sector are both positive and negative with the scale of effects associated with the size of cruise vessels visiting locations as well as the frequency (number of visits) and concentration (visits at the same time). The social effects are largely associated with:

- Pressure on infrastructure and public services/amenities,
- Effects on community identity and social dynamics,
- Health effects, and
- Visual amenity.

Crucially, the interplay and tension between the economic effects of cruise (i.e., additional spending and employment) form part of the social effects. The distribution of the economic effects influences the social effects.

Pressure on Infrastructure and Public Services/Amenities

The arrival of cruise ships can place significant strain on the infrastructure of port cities, leading to increased traffic and pollution. Overcrowding occurs when the infrastructure or amenities reach or exceed their capacity. Crowding gives rise to adverse effects that can undermine and dilute the quality of life for residents. The level of strain on port cities is influenced by a range of factors including:

- ship size,
- number of ships received (total per year)
- concentration of ships (number of ships at any one time),
- size of the port city/town (and dispersal),
- location of port,
- port amenities, and
- the level of public infrastructure provided.

Currently (2023) approximately 28% of the CLIA member cruise fleet are ships with lower berths of 3,000 or greater. By 2028 this is projected to increase to 30% of the fleet (Cruise Lines International Association, 2024). Larger vessels mean that more passengers arrive and depart at one time, concentrating visitor movements.

The strain on port cities can be exacerbated by the number of port calls. Cruise ship activity is highly concentrated in the Caribbean, Mediterranean and Europe. As mentioned earlier, the Caribbean, Bahamas, Bermuda, and Mediterranean are key destinations, and vessels are concentrated in visitor hotspots during the visitor season. The seasonal nature of cruising means that during the cruise period, a constant stream of vessels arrives and departs. This means that residents in those port cities do not get any relief from receiving cruise ships or passengers.

The size of port and visitor infrastructure play a key role in managing visitors and mitigating the effects on residents. In smaller port cities or communities, the scale of cruise passengers can dwarf local communities. When this happens, residents are inconvenienced by congestion and local amenities and public services can be overrun. The questions of who pays for the infrastructure to deal with visitor numbers and who benefits from historic investments are important. Increasing needs to invest in infrastructure can lead to cost increases that fall to residents (e.g., increases in council rates) leading to social resentment. This is often the case if residents feel that they are not benefitting economically from the cruise sector. However, other factors, such as perceptions around the environmental effects of cruises also influence local views regarding the cruise

sector. Overall, the cruise sector impacts community cohesion because people have different views about the sector's relative value of their communities.

Overcrowding is related to infrastructure capacity. The degree to which overcrowding occurs, or is perceived, is linked to infrastructure. A concern around overcrowding and overtourism is the potential effect on social dynamics and local identities.

The overcrowding challenge is acute in some European locations. Crucially, the overcrowding issue is often related to overall tourism and is not solely attributable to cruise activities. However, in some remote locations in Alaska and some fiord locations, the scale of cruise passengers relative to the local communities is substantial. Expressing cruise passenger numbers relative to population offers a way to compare passenger intensity across locations (see Table 5-3).

Table 5-3: Cruise Congestion Ratios

Port City	Port calls	Annual PAX	Resident pop'n	Ratio (ann pax/pop)	Average per call	Vessels in port (peak)
Barcelona, Spain	807	3,600,000	1,600,000	2.25	4,461	5
Juneau, Alaska	694	1,600,000	32,000	50.00	2,305	5
Sitka, Alaska	400	560,000	8,500	65.88	1,400	5
Ketchikan, Alaska	600	1,200,000	8,200	146.34	2,000	7
Skagway, Alaska	500	100,000	1,200	83.33	2,000	5
Santorini, Greece	500	1,300,000	15,000	86.67	2,600	8
Dubrovnik, Croatia	400	549,000	42,000	13.07	1,373	4
Reykjavik, Iceland	256	200,000	135,000	1.48	781	4
San Juan, Puerto Rico	500	2,000,000	323,000	6.19	4,000	6

Source: Various reports and websites.

A selection of international cruise destinations is used to illustrate overcrowding and wider relationships. Barcelona is a global tourism destination with total annual visitors of more than 12.2m in 2023[144] - still below pre-COVID levels (14.6m). In contrast, cruise passengers account for around a third of visitors. Despite being only a share of total visitor numbers, cruise vessels are seen as a significant source of overcrowding. Expressing PAX relative to local population returns a ratio of 2.25 passengers per head of population. Compared to other locations, this rate is not as extreme. The relatively low rate suggests that the wider context and total tourism landscape sets the context for how the local communities view the cruise sector. Barcelona is facing tourism related problems and pressures, including:

- Housing shortage and cost increases associated with short-term visitor accommodation (AirBnB),
- Pressures on cultural heritage,
- Concentration of tourists at key locations and an uneven distribution of visitors across the city,
- Environmental pressures.

Overcrowding is also evident in smaller port towns. The overcrowding is a function of the small receiving communities as well as the size of cruise vessels. Locations, such as Juneau, Sitka and Ketchican as well as Skagway in Alaska, all have small communities that are dwarfed by the number of passengers associated with cruise vessels. The per capita ratio for these communities ranges between 50 and 146. The concentration is

[144] (Barcelona City Council, 2023)

compounded by a high degree of concentration with instances where multiple vessels are in port at a time. The peak number of vessels in these ports is between 5 and 7 – with the average size of the vessels being between 1,400 and 2,300. The number of people visiting these locations is therefore upwards of 8,000 during peak periods.

Compared to the local population, this increase is significant – Skagway in Alaska has a population of just under 1,200 and visitors can be around 10,000 during the peak. Similar patterns are also observed around some of New Zealand's small ports, such as Akaroa, and are explored elsewhere in the report (see section 2.5).

Many of the communities that are experiencing pressures from cruise activity are responding using different pathways and approaches to manage the adverse effects. Common approaches include:

- Protect cultural heritage
    - Dubrovnik's Old City is a UNESCO site and faced unsustainable tourism pressures. A memorandum of understanding was signed between the City of Dubrovnik and CLIA to work together, through responsible tourism management, to establish Dubrovnik as a model of sustainable tourism in the Adriatic region and beyond[145].
    - Another example relates to Venice. Pending UNESCO's review of Venice and risk of being placed on the agency list of world heritage in danger sites, the Italian government approved urgent measure to protect Venice which entered into effect September 2021 (Figueroa, 2021). These included a declaration of some of its waterways as a national monument, effectively banning cruise ships and other large vessels (>25,000 gross tons) from the Venice Lagoon. The ban on cruise ships will work to reduce the volume of tourists visiting Venice, manage pollution and safeguard the foundations of the city.
- Capacity limits
    - The City of Amsterdam is set to reduce the number of cruise ships that moor at the Passengers Terminal Amsterdam (PTA) by half in 2026 (City of Amsterdam, 2024). By 2027 cruise ships will be required to use shore power with an aim for the PTA to move from its current location in 2035. The cap on cruise ships and ultimate departure of the PTA will reduce pollutant emissions and tourists crowding contributing to a more liveable, clean and sustainable city.
    - Isafjordur is the third-largest cruise ship port in Iceland. The municipality set a passenger limit of 255,000 for the year. The limit is to maintain the visitor experience and is based on available infrastructure capacity. The capacity limit can be increased if the tourism industry enhances capacity by providing more buses, improving services, and providing more amenities (e.g., public rest rooms).
- Bans:
    - In Norway greenhouse gas emitting vessels will be prohibited from sailing into Norway's World Heritage Fjords from 2026[146]. While emissions are not expected to decrease in the short term, the proposed ban aims to stimulate technological development and industry transformation towards a low carbon future. Adopted unanimously by the Norwegian Parliament and publicly consulted, the regulation related to the ban is currently being developed to assist the transition to zero-emission ships in Norway.
    - In Norway, only cruise ships powered by alternative fuels will be allowed to enter fjords. This measure is seen as limiting the total number of cruise vessels that can enter the fjords.
- Time-based restrictions:
    - In Juneau, cruise ships with +250 passengers would be banned from docking on Saturdays. The ban also extends to 4 July, Independence Day, when a parade takes place in the town

[145] (Puljić, Šegota, & Knežević, 2019)
[146] (New Zealand Foreign Affairs and Trade, 2024)

centre. The ban is in addition to capacity limits which set a hard maximum for different days of the week. A daily limit of 16,000 cruise passengers applies to Sundays through Fridays, and 12,000 applies on Saturdays.

While the social effects and implications for residents appear to be a factor in the management approaches, wider environmental effects were also integrated into the decision-making around how cruise impacts are being managed. Despite bans and restrictions being enforced across the many locations with cruise vessels, the economic role and contribution of the cruise sector are acknowledged by residents. The emphasis of the management and mitigation approaches appears to be on managing the adverse effects in a way that maintains and enhances other, non-economic, values.

Effects on Community Identify and Social Dynamics

The issue of overcrowding or 'people pollution' is highlighted as the number and size of cruise ships increases (Klein, 2011). Cruise visits are often presented as a way to 'sell the local culture', but the exchange is two-way with increased exposure to other cultures and new behaviours, customs and consumption patterns. These exposures can influence younger generations to adopt values and lifestyles that are inconsistent with those of the local communities. These differing views can then lead to conflicts between generations.

Visitors might not understand or know local cultural values and norms. Such cultural differences can generate tensions especially if visitors are perceived as disrespectful of local values and traditions. When these differences boil over into clashes, existing social dynamics are disrupted, and resentment is fostered. The resentment can be directed at the cruise sector and visitors, as well as other parts of the local community.

Using local cultures to attract visitor spending can be interpreted as commercialising culture. The decisions about such an approach must be taken by residents, but, over time, the practice can lead to a loss of cultural authenticity. When this happens aspects of the local culture are seen as entertainment or displays, and the inherent values are diminished. The local identity is eroded, and the cultural performances are then changed in response to visitor demands and preferences. Community identities are then devalued to suit the 'market preferences' instead of valuing the culture. Over time, the community's sense of collective identity, customs, and traditions is eroded.

Where towns have high visitor numbers, the local mix of economic centres can change to reflect the opportunities associated with the cruise sector. Such a restructuring can displace economic activities (local businesses) that service residents. Similarly, the local public spaces and amenities can be redeveloped in response to the visitor Dollar – the demands and importance of residents' needs are then downgraded with a shift in priorities. Traditional community activities and social priorities are displaced, reducing participation levels. Over an extended period, reduced participation can lead to activities ceasing due to low involvement.

In some locations, cruise activities are highly seasonal. During the peak seasons, high tourist numbers will mean that areas are busy, but a distinct quiet period is also evident (off season). These seasonal patterns can disrupt community rhythms and patterns that create a season of instability for residents. In turn, these disruptions can see residents avoiding their town's business areas or social amenities thereby further disrupting the social fabric.

In some instances, local communities respond to the disruptions and changes. Community mobilisation to mitigate the effects of the cruise sector and engage decision-makers and cruise lines can enhance a sense of community, leading to positive outcomes. Working together to generate better outcomes, support social bonds, and generate a renewed sense of collective pride and identity. Similarly, the risks to local cultures and

views are often used as a motivation to re-ignite local pride and culture and desires to maintain and protect, and grow local cultures.

Health Effects

Cruise ships travel fast and close to the coastline (when not at sea), meaning that air pollution and emissions are emitted close to coastal communities, contributing to air pollution. Additionally, cruise ship engines remain running while docked and add to micro-level (local airshed) air quality issues that present risks to passengers, crew and city residents (if not using shore power). Within academic literature, air pollution is closely associated with adverse health effects such as respiratory diseases. These effects are dependent on the type of pollutant, concentration, and length of exposure to it. Additionally, vulnerable groups including children, the elderly and those with respiratory and cardiovascular diseases may be more susceptible to the harmful effects of air pollution.

Components of cruise air pollution can have a detrimental effect on human health (Lloret, Carreño, Carić, San, & Fleming, 2021). Specifically, sulphur oxides (SO_X) are chemical compounds that can provoke cardiovascular and respiratory diseases and lead to premature deaths (Transport & Environment, 2023). Similarly, nitrogen oxides (NO_x) can lead to respiratory illnesses. The scale of health effects that can be attributed to the cruise sector is unknown because attributing health effects specifically to cruise ship emissions is complex. Nevertheless, air quality remains a cause for concern.

Again, communities are responding through legislation and other mechanisms to limit the adverse effects. The New South Wales Government introduced regulations for cruise ships to use low sulphur fuel whilst berthed at Sydney's White Bay Cruise Terminal due to health concerns of residents nearby (Douglas, Ellis, & Frost, 2018). Providing shore power to enable cruise ships to avoid running their engines to power accommodation and entertainment functions is another example of how communities are responding to the adverse effects – in this instance health and environmental effects.

Visual Amenity

Cruise ships can have both a positive and negative impact on visual amenity; however, this is subjective with diverging perspectives:

- On one hand, cruise ships can be viewed as engineering feats capable of generating crowds of people to watch as they sail into and out of ports (Douglas, Ellis, & Frost, 2018). Ports often advertise the arrival and departure of cruise ships, in particular megaships and well-known cruise ships like Queen Mary 2.
- Cruise ships are considered by some as eyesores – dominating waterfront landscapes and changing the visual character of coastal and harbour areas. Marketing of outstanding natural landscapes is often used by the cruise sector to promote destinations; however, visual pollution is incompatible with the experience and marketing of such destinations. Visual pollution can also impact manmade landscapes around cities and harbours.

The visual impacts go beyond the vessels alone and includes emissions. The visual impact of exhaust gasses from cruise ships contribute to visual pollution (as well as air pollution) – this is of particular significance for areas of outstanding natural landscapes such as fjords and pristine landscapes. The issue is compounded by

high concentrations of cruise ships as well as climatic conditions (e.g., inversion layers[147] and wind still days)[148]. Air pollution negatively impacts the aesthetic quality of natural landscapes.

Another example of visual pollution is sediment plumes created by cruise ships. Sediment plumes are more likely to occur in shallower waters as a result of thrust. On the 15th of December 2017, the Diamond Princess generated a plume of disturbed sediment while rotating in Tasmania's Wineglass Bay (Douglas, Ellis, & Frost, 2018). Access to Wineglass Bay for all cruise ships has since been restricted due to the visual dis-amenity (KPMG, 2022).

Adverse impacts to visual amenity caused by cruise ships have the potential to trigger a regulatory response but it is often part of the overall consideration given to all effects. However, literature suggests that the visual disamenity of natural landscapes is particularly powerful in influencing these restrictions or bans placed on cruise ships.

Other Effects and Uses

Cruise ships can transport a large number of people and the accommodation function includes food preparation. These functions are valuable and have been used in natural disasters and humanitarian crises. For short trips of less than 24 hours, a cruise ship can carry two to five times its design capacity, so a ship designed to carry 4,000 passengers could be used to evacuate 8,000 to 20,000 people. Examples of situations where cruise ships were used for non-cruise activities include:

- Cruise ships are used to evacuate citizens from natural disaster areas.
- In 2017, cruise ships were used to evacuate people after a major hurricane (Maria) struck Puerto Rico.
- Cruise ships are used to deliver water, fuel and medical supplies after hurricanes. Following Hurricane Irma, eleven ships were deployed to deliver supplies to the Caribbean. Cruise ships also join humanitarian relief efforts in response to the catastrophic damage caused by typhoons (e.g., Haiyan in the Philippines).
- Norwegian Cruise Lines worked with disaster relief groups and matched donations collected from cruise guests and staff.

Cruise ships are also used in war and conflict areas. In May 2022, MS Volendam was chartered and used as a refugee shelter for Ukrainian refugees for three months. Staff provided meals and services. Cruise ships can also be used as transport – a well-known incident is the 1982 requisitioning of the Queen Elisabeth II (QEII) to transport 3,000 troops to the South Atlantic to free the Falkland Islands from an Argentinian occupation.

Cultural Effects

The cultural impacts of the cruise tourism industry are largely region-specific, however, there are a range of general impacts on culture that can be considered. These are both positive and negative and the direction of the effect is associated with the scale of the cruise sector as well as the degree to which a community wishes to engage with cruise visitors in terms of the cultural offers. There are significant overlaps between the social and cultural effects of the cruise sector on local communities.

For many communities, there is a strong relationship between the location where they live and their cultural identity. The natural landscape is often a key factor in the creation of cultural identity.[149] Any adverse environmental effect is frequently interpreted as a cultural impact. Similarly, when visitors enjoy landscapes,

[147] (Parlimentary Commissioner for the Environment, 2003)
[148] (Norwegian Maritime Authority, 2017)
[149] (Tokolyova & Pondelikova, 2023)

then the cultural values are shared. However, when the landscapes, natural features or cultural performances are repeatedly besmirched and not respected, tensions can emerge.

The cultural effects are summarised under the following headings:

- Culturally important areas,
- Cultural identity and awareness,
- Influence and displace culture.

Culturally Important Areas

Tourism can involve visits to remote, fragile, or culturally significant areas. Areas of cultural significance could include customary fishing areas, UNECSO world heritage sites, harbours and rivers, and national parks. As cruise ships become larger and accommodate more passengers, the potential for negative impacts on culturally significant areas also increases. Negative impacts include damage to historic sites, people pollution, displacement of communities, cultural insensitivity, loss of authenticity and pollution of the surrounding environment[150].

In 2016, UNESCO warned Dubrovnik that its world heritage status was at risk and recommended they restrict visitor numbers inside the walls of the Old City[151]. Similarly, Vencie has experienced a range of adverse impacts of cruise ship tourism on its historic floating city, including erosion of the city's foundations caused by large cruise ships, collision with the historic city, pollution and the 'touristification' of the city and local identity[152]. The concentration of cruise ship passengers and cruise ships themselves generate adverse impacts for culturally significant areas which are often vulnerable to mass tourism.

There is an argument that cruise lines should take responsibility for educating passengers on the socio-cultural sites they are about to experience[153]. Ultimately, the management of cruise ship tourism is key to mitigating adverse impacts on culturally important areas. In most cases, this requires the local authorities and the cruise ship industry to work together to sustainably manage scheduling of cruise ships in ports, restrictions on capacity, educational campaigns as well as safety measures.

Cultural Identity and Awareness

Culture can be expressed through a variety of different mediums such as dance, song, food, clothing, language, beliefs, handicrafts and story. The arrival of cruise passengers provides an opportunity for communities to share and express their culture – raising cultural awareness. Some communities in Northern Canada have developed cultural programs for cruise ship passengers to experience Inuit culture, showcasing traditions, local foods and way of life[154]. The process of sharing cultural traditions with cruise ship passengers can reinforce a sense of pride and create opportunities for social interactions. For some regions, cruise tourism is a relatively untapped market for cultural experiences and has the potential to provide opportunities for improving cultural awareness as well as initiating positive interactions between local cultures and cruise passengers. The interactions provide an avenue to increase awareness of a community's heritage and generate funds that can be allocated towards actions to preserve and promote culture.

The demonstration or exhibition of culture for the pleasure of cruise tourists has the potential to adversely impact or erode cultural identity and associated traditions. Adverse impacts can include a sense of intrusion

[150] (Puljić, Šegota, & Knežević, 2019; Klein, 2011; Jeannotte M. S., 2021)
[151] (Rodrigo, 2024)
[152] (López, 2022)
[153] (Klein, 2011)
[154] (Jeannotte M. S., 2021)

and ignorance of what is culturally appropriate such as photography of local people and property[155]. Given the scale of impacts associated with mass tourism, particularly from cruise ships, local communities and their cultures are especially vulnerable to these large-scale tourism practices.

The literature highlights the importance of examining how rising demand for cultural tourism by cruise ship passengers can potentially lead to the commercialisation of culture (Niatu, 2007; Jeannotte M. S., 2021). Targeted onshore cruise ship tourism opportunities should remain an authentic experience while not eroding cultural identities and associated traditions.

Influences and Culture Consumption

Communities draw on the local culture to generate business activity (sales). However, this approach can see visitors fatigued by 'cultural experiences' that dilute the value to the visitor as well as the community. Commercialising, or commodifying culture occurs when it is adapted and changed to match the demand patterns of cruise passengers without the necessary sensitivity for cultural views and values, i.e., when it is sold to generate a short-term return. Over time, the traditional crafts and artworks are turned into mass-produced souvenirs that are designed to appeal to tourists, leading to a loss of quality and cultural meaning. This shift toward producing items for tourists rather than for cultural expression can erode the cultural significance of these crafts.

Natural and heritage sites, including UNESCO World Heritage sites are frequently adapted to cater to cruise tourists, with gift shops, cafes, and commercial activities developed around them. The emphasis on revenue generation can detract from the historical and cultural value of these sites, altering how they are perceived and experienced by both locals and tourists.

Similarly, the push to 'sell local culture' can displace local communities. Public spaces and culturally significant areas may be used in a way that excludes local communities from those areas. Such exclusion can lead to a sense of cultural displacement. Local communities can then feel resentment towards cruise passengers and may feel alienated from culturally significant locations. The resentment could stem from culturally important or sacred sites that become tourist (overused) attractions. When tourists visit culturally significant locations in large numbers, there is a risk that without an understanding of the significance, the local community could feel that the importance and significance of the sites are not acknowledged or respected.

[155] (Stewart, Dawson, and Johnston 2015 as cited in Jeannotte, 2021)

Appendix 13: Framework structure and descriptions

Economic	Vessel + Visitor spend ($)	Total spending
	Direct and Indirect impacts (GDP)	Direct impacts (Employment)
	Economic Impact (GDP - $)	Estimated total GDP impact (with consideration of modelling limitations)
	Distribution of port profits	Some of the fees paid by cruise lines to ports are paid to shareholders (local councils and others) in the form of dividends. These payments help to offset rates depending on port ownership models. These models vary around New Zealand, so some port's dividends are returned to shareholders. The effect is that a portion of cruise ship spending flows through the port companies to shareholders, thereby the financial effects are distributed.
	Levies	Transfers to local and central government to recover costs associated with delivering services to the cruise sector[1].
	Conferences	The cruise sector hosts an annual conference, with the venue moving around New Zealand. The size (delegates) is expected to remain in line with the cruise sector (vessels and passengers)
	Return Visits	Return visitors' spending is estimated at $130m (over multiple years, say 10 years) - $13m/per year. Return visitor spending growth is in line with passenger numbers.
	Leverage events (accommodation)	Adds to accommodation capacity which could attract large events to a city. None reported in 2023/24. This economic effect is an option value, and will only materialise if a large event takes place.
	Disruptions	The size of the disruption is related to the number of cruise ship arrivals, the size, and frequency. Disruptions may affect public transport services (ferries and busses) as well as normal business operations in port towns/locations[2].
	Infrastructure spending	Port infrastructure is expensive and is normally undertaken in a way to generate a commercial return. Infrastructure investment to support growth, rearrange delivery configurations, and the roll-out of new technologies (shore power and alternative fuels) will be needed in response to market pressures. The specific nature and cost of these investments is likely to vary significantly depending on the pressures.
	Business confidence effects	Tourism activities around New Zealand, including regional New Zealand, is subject to large variation and exposed to market forces that are beyond local roleplayers' ability to influence. Cruise ships can generate substantial local business activity and a strong/positive outlook for an upcoming season generally supports confidence in local economic conditions. Increased spending on port days (retail, hospitality) flows through the economy and influences investment intensions.

	Seasonal effects	Currently, cruise ships have a strong seasonal pattern, and this concentrates the effects (positive and negative). The way future growth is managed in terms of seasonal distribution could either alleviate or intensify its impacts. For example, if growth is distributed more evenly, then the negative effects (associated with concentration) will not necessarily see an increase. Similarly, if the positive effects rely on a degree of concentration and growth is accommodated via seasonal dispersal, then those positive effects would not increase. The summer cruise season runs from October to April. Winter cruising in July to September (discontinued from 2024/25) provides an ability to accommodate cruise visitors outside the peak periods. The seasonal patterns interact with other patterns, such as those seen in Dunedin/Port Chalmers where summer cruise passengers offset the loss of student spending over summer holiday period.
	Contribute to town centre performance and vibrancy (vs congestion)	Adding visitors to town centres and business locations can add vibrancy and generate a sense of excitement. Placemaking efforts around New Zealand are often designed to enhance and capture these features. However, the downside of too many visitors (cruise or local shoppers) is that disbenefits can arise. These are associated with congestion. On the other hand, increased foot traffic, pop-up markets, volunteers, a sense of safety, and street performances all enhance the city's atmosphere, attracting locals to the area to enjoy its lively energy. An estimated 230,000 to 240,000 port days are reported for Auckland during the 2022/23 season. It is acknowledged not all passengers go ashore during a port visit, but Heart of the City and Tātaki Auckland Unlimited both report increased foot traffic in areas such as Commercial Bay and downtown Auckland on days when there is a cruise ship in port (between 9am and 3pm).
Environmental	Emissions from voyages + shore excursions (CO_2-e) Present Value ($bn)	Vessel emissions are estimated at 904,780t $CO_{2\text{-e}}$. This includes domestic portion of cruise (between New Zealand ports), maneuvering and time in port, half of international leg, and shore excursions. In dollar terms this equates to $64.5m - $129.0m (using the 2024 shadow price of carbon).
	Emissions of tourist goods (embodied)	Emissions are embodied in imported and exported goods. Many of the conventional tourist goods purchased by cruise passengers are imported (with limited local value added). In contrast, other services are produced in New Zealand and have their own emissions. Some of these emissions are 'variable' and directly associated with delivering services to visitors, and others are 'fixed'. Variable emissions include activities such as preparing food (energy used during), and the energy used during the day-to-day operations of visitor attractions.
	Waste	Very little solid waste (food, plastics, pallets, etc.) comes off the ship as these are mostly discharged at homeports. Waste discharges from all ships (including cruise vessels) are regulated through international (MARPOL) and national (RMA) regulations. While there is a risk of accidental waste discharges, the risks are considered minor and consequences moderate. No incidences reported in 2023/24.
	Health effects (emissions related to cruise ships)	The health effects of emissions relate to how much emissions cruise ships contribute towards airsheds, and how much air pollution there is in those airshed as well as how much time people spend in those airshed (number of people exposed and duration of the exposure).

Biofouling	Biofouling relates to cost to manage and oversee the regulatory framework, ensure compliance as well as the direct costs associated with it (incurred by cruise lines). In addition, if an incursion occurs, then there are costs associated with the response (containment and/or eradication) as well as potential productivity losses, and changes in ecosystems values.
Visual amenity – diminish or enhance	Opinions are mixed as to whether cruise vessels enhance or detract from visual amenity. In Milford (and the Sounds) vessels are regarded by some stakeholders as 'visual pollution' while others are of the opinion that there are many other ships in there already, so there is very little additional impact from cruise vessels. In addition, there are ways to manage the visual impacts by restricting access times.
Water quality effects - waste discharges by cruise ships	Washwater associated with the EGCS (scrubbers) can legally be discharged while at sea. Regardless of its legal status, environmental impacts may still occur, and a higher concentration is likely to intensify the negative effects of these discharges. This is especially the case in environmentally sensitive locations. According to initial analysis (with caveats) performed by NIWA, concentrations of contaminants in marine water and benthic sediments are predicted to be very low in the four shipping lanes and low in Milford Sound. Increasing traffic can be expected to change the concentrations.
Effects on marine animals and seabirds (e.g., vessels strikes, behavior and migration shifts)	The risks associated with mammal strike and impacts on seabirds is related to the routes, number of sailing and time of year. There are no clear records of mammal strikes in New Zealand (by cruise ships) in the past decade or so. However, cruise related tourism could increase the risks of such events. Hector's Dolphin in Akaroa Harbour is a key, at risk species. Bryde's whales in the Hauraki Gulf are also at risk. It is difficult to monitor site specific risks, e.g., Banks Peninsula – marine mammal sanctuary and significant natural landscapes. Investment by cruise lines to avoid/mitigate adverse effects and slow-steaming is an acknowledged way to minimise mammal fatalities.
Effects on the marine environment – seabed disturbance, water column effects	The adverse effects of anchoring and manoeuvring on the seabed is well established. In existing ports, the effects are normally managed and accepted but in other locations (e.g., the Subantarctic islands, Akaroa Harbour), these actions could generate adverse effects that needs to be managed. Examples of the existing management approaches include limiting anchoring and using thrusters in areas that are less than 'x-meters' in depth and limiting anchoring to the same locations. Cruise ship anchoring, and propulsion activities have potential for 'significant or unacceptable' adverse ecological effects in 'very high' ecological areas but considering the 'likelihood' suggests ecological risk were typically medium or low.
Oil spill, accident, or adverse event	As the number of vessel movements increase, so too does the risks of an accidental event (e.g., discharge or collision). However, over time as the fleet is renewed and as new navigational technologies are applied, the risks could in fact remain neutral relative to existing levels. None occurred during the 2023/24 season, but risks remain as highlighted by HMNZS Manawanui event in Samoa. Site specific mitigation measures include the installation of an oil spill kit at Te Anau (preparedness for the Sounds).

	Unsustainable consumption patterns (e.g., 'fast tourism')	The cruise itineraries are designed to capture a portion of spending on the vessel, but they also provide opportunity for onshore excursions and independent activity while in-port. The relatively short in-port time is seen by some as limiting the ability to provide a rich and diverse visitor experience. Restricted shore time could discourage providers to offer diverse and all-encompassing activities other than top-tier ones. Superficial engagement, reduced authenticity (especially in cultural and social experiences), could lead to decreased tourist experience/disappointment. In addition, the effects associated with fast tourism (consumer-based activities) could lead to environmental degradation.
Social	Perceptions	New Zealanders have favourable (positive) views about tourism in general. Recent perception surveys show that regional New Zealand (where surveys have been completed) hold positive views about the cruise sector. There are however locations where pressures and congestion have undermined local views about the cruise sector (e.g., Akaroa and Lyttelton). Affected communities appear to be somewhat divided with the negative views pushed via vocal groups. Surveys suggest that New Zealand communities by and large appear to remain welcoming of tourism. Communities where cruise tourism is a fledgling industry, are more positive about the cruise sector. Where transport or other issues have been addressed, more positive views of cruise passengers are evident.
	Destination management	The development opportunities provided by the cruise sector is acknowledged across New Zealand, with several Destination Management Plans (DMPs) explicitly reflecting those opportunities. The DMPs outline the growth ambitions as well as the steps to mitigate and manage adverse effects such as overcrowding effects. Some ports already actively manage the number of passengers arriving at once, e.g. limiting numbers/size of vessels.
	Concentration/congestion	As visitor numbers increase in a location, tensions between residents and visitors could reach a point where conflicts emerge. The specific points at which visitors are welcomed, tolerated or seen as a nuisance is subject to many factors. These are highly location specific and consequently putting a firm 'number' on these tipping points is not possible. Further, these tipping points change over time. Passenger per capita ratios are the highest in Picton, Paihia and Lyttleton. Dispersion aspect must also to be considered – e.g. passengers coming ashore at Lyttleton go on to Christchurch. The scale is different also. In overseas ports where overtourism has been highlighted, there are 6-8 ships in port compared to 2 in New Zealand (max and not all ports). This causes problems in small towns but can be managed. Not reported as an issue in 2023/24 – ports aware of the potential impacts and are managing these effects.
	Volunteers	Volunteers aid in managing and improving visitors' experience. Volunteers generate benefits that accrue to the individual, help in creating a positive experience for passengers and generates positive perceptions about New Zealand. Volunteers assist with meeting and greeting visitors, providing direction, sharing information and providing recommendations. The activity also generates a sense of purpose and pride, delivering social benefits.

Cultural	Exposure to regional New Zealand	As cruise ships travel around New Zealand, they stop at regional ports. Through shore excursions (pre-booked through the cruise ships, or independent travelling), as well as daytrips, the cruise visitors engage with locals and the wider locality, society and environment. Adding new ports to itineraries can further distribute the exposure, and effects across New Zealand.
	Protestors	Protestors have a right to express their views even if there are negative impacts on social cohesion. While transitions to clean(er) technology and options are underway, there appears to be a view that the transition is not fast enough. In some cases, intimidation and safety concerns are mounting, while some protests appear peaceful. There are safety concerns for volunteers and there are fears for passenger experience. These feelings could generate negative views about New Zealand, damaging New Zealand's reputation.
	Infrastructure and amenity constraints	The arrival of cruise ships, and the influx of passengers can increase pressure on local infrastructure and amenities (i.e., concentration effects). Destination management is important for optimising the net effects, but this element is about the increase in pressures (not the response such as new public toilets). The pressure is a function of the number of passengers and the time spent locally. The International Visitor Levy, introduced in 2019, was established to address potential pressures on infrastructure and amenity from international visitors.
	Social cohesion – enhance or diminish	Cruise tourism generates a diverse range of community views and perceptions. Views can be polarised but it is how communities manage the interaction (not diverse views) that can cause issues with social cohesion. The effects vary depending on the location and is a function of the town/locations existing views about tourism, and how reliant the city/location is on tourism activity. The more important tourism is to the local economy, the more favourable the community tends to be about the cruise sector.
	Cultural considerations (Opportunities)	Cruise visitors present opportunities and a market to showcase New Zealand's unique heritage and culture. There are increased opportunities for locals to share cultural knowledge, customs, and experiences with tourists. Local residents volunteer on cruise days; kapa haka groups from local schools/culture groups welcome ships; locals host 'walking tours' around town e.g. Napier. Opportunities are more prevalent in smaller communities or where cruise tourism recently started, e.g. Picton, Timaru, New Plymouth. In other ports, local iwi are involved (e.g. powhiri for ships coming to New Zealand for the first time). Residents become unofficial ambassadors.
	Cultural considerations (Risks)	The risks associated with the cultural considerations relate to visitors not adhering to expected norms and/or disrespecting cultural customs. At the same time, the commodification of local culture is a risk.
	Generate opportunities for the Māori tourism economy	The Māori tourism economy is seen as a growth option with significant potential. This includes enhancing opportunities for cultural tourism associated with onshore excursions. However, care must be taken to ensure cultural experiences offered are authentic and accurate.
	Exposure of local artisans to international market.	The cruise visitors provide demand (spending) that local artisans can target with their work. The demand encourages production of handicrafts, traditional art, and locally sourced products, helping to preserve and promote cultural heritage. Examples of this include pop-up markets on cruise days, local galleries near cruise terminals and cruise movement routes.

	Development of new tourist attractions	Cruise tourism provides a large market opportunity ($-terms) and incentivises the development of shore excursion products. As the demand from shore excursions increases with the rise in cruise arrivals, locals are motivated to develop new tourist attraction and RTOs pointed out local start-ups providing shore excursions, showcasing local culture and attractions.

Appendix 14: Scores (raw)

		P1 Base outlook			P2 Technology shifts to green tech (vessels)			P3 Shore power			P4 Focus on boutique cruising			P5 Fleet changes towards mega ships			P6 Maritime disaster			P7 Bio-security event		
		P1-Sc 1	P1-Sc 2	P1-Sc 3	P2-Sc 1	P2-Sc 2	P2-Sc 3	P3-Sc 1	P3-Sc 2	P3-Sc 3	P4-Sc 1	P4-Sc 2	P4-Sc 3	P5-Sc 1	P5-Sc 2	P5-Sc 3	P6-Sc 1	P6-Sc 2	P6-Sc 3	P7-Sc 1	P7-Sc 2	P7-Sc 3
		Sc 1	Sc 2	Sc 3	Sc 1	Sc 2	Sc 3	Sc 1	Sc 2	Sc 3	Sc 1	Sc 2	Sc 3	Sc 1	Sc 2	Sc 3	Sc 1	Sc 2	Sc 3	Sc 1	Sc 2	Sc 3
Economic	Vessel + Visitor spend ($)	4	6	9	4	6	9	4	6	9	4	6	9	4	7	9.5	4	5	8	4	5	8
	Direct and Indirect impacts (GDP)	4	6	9	4	6	9	4	6	9	4	7	9	4	7	9.5	4	6	8	4	6	8
	Direct impacts (Employment)	4	6	9	4	6	9	4	6	9	4	6	9	4	7	9.5	4	5	8	4	5	8
	Economic Impact (GDP - $)	4	6	9	4	6	9	4	6	9	4	7	9	4	7	9.5	4	6	8	4	6	8
	Distribution of port profits	4	7	7	4	7	7	4	7	7	4	6	8	4	5	7	4	6	6	4	7	7
	Levies	4	7	7	4	7	7	4	7	7	4	6	7	6	6	7	5	6	6	5	5	5
	Conferences	5	6	6	5	6	6	5	6	6	5	6	6	6	6	6	5	5	5	5	5	5
	Return Visits	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Leverage events (accommodation)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Disruption	5	4	4	5	4	4	5	4	4	5	4	4	5	5	3	5	4	4	5	4	4
	Infrastructure spending	5	5	5	5	5	4	5	4.5	4.5	5	5	5	5	5	5	5	5	5	5	5	5
	Affect business confidence	4	5	6	5	5	6	4	5	6	4	6	6	4	6	7	5	5	6	5	5	5
	Seasonal effects	5	4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4	4
	Contribute to town centre performance and vibrancy (vs congestion)	4	6	6	4	6	6	4	6	6	4	6	6	4	6	6	5	5	5	5	6	6
Environmental	Emissions from voyages + shore excursions (CO_2-e) Present Value ($bn)	4	3	2	4	5	5	4	4	3	4	3	3	4	3	3	4	3	2	4	3	2
	Emissions of tourist goods (embodied)	4	3	2	4	3	2	4	3	3	4	3	3	4	3	3	4	3	2	4	3	2
	Waste	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Health effects (emissions related to cruise ships)	4	4	3	5	5	5	4	4	4	4	4	4	4	4	3	4	4	3	4	4	3
	Biofouling	4	3	3	4	3	3	4	3	3	4	3	2	4	3	3	4	3	3	4	3	3
	Visual amenity – diminish or enhance	4	4	3	5	5	5	4	4	4	4	4	3	4	4	3	4	3	2	4	3	3
	Water quality effects - waste discharges by cruise ships	4	4	4	5	5	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4
	Effects on marine animals and seabirds (e.g., vessels strikes, behavior and migration shifts)	4	4	3	4	4	3	4	4	4	4	4	3	4	4	3	4	3	2	4	4	3
	Effects on the marine environment – seabed disturbance, water column effects	4	4	3	4	4	3	4	4	4	4	4	4	4	4	3	4	4	2	4	4	3
	Oil spill, accident, or adverse event	4	4	3	4	4	4	4	4	3	4	4	3	4	4	3	3	3	2	4	4	3
	Unsustainable consumption patterns (e.g., 'fast tourism')	5	5	5	5	5	5	5	5	5	5	6	6	5	5	4	5	5	5	5	5	5
Social	Perceptions	8	8	8	8	8	8	8	8	7	8	8	8	8	8	7	7	7	6	8	8	7
	Destination management	6	8	9	6	8	9	6	8	9	6	7	8	6	6	7	6	6	6	6	8	9
	Concentration/congestion	5	4	4	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
	Volunteers	5	6	7	5	6	7	5	6.5	7	5	6	7	5	6	6	5	5	6	5	6	7
	Exposure to regional NZ	6	7	8	6	7	8	6	7	8	6	7	9	6	7	7	5	6	6	5	7	8
	Protestors	4	4	3	4	5	5	4	4	3	4	4	3	4	3	2	3	3	2	4	4	3
	Infrastructure and amenity constraints	5	4	3	5	4	3	5	4	3	5	4	3	5	4	3	5	4	3	5	4	3
	Social cohesion – enhance or diminish	6	6	5	6	6	5	6	6	5	6	6	5	6	5	4	6	5	5	6	6	5
Cultural	Cultural considerations (Opportunities)	5	7	8	5	7	8	5	7	8	5	7	8	5	7	7	6	5	6	5	8	8
	Cultural considerations (Risks)	6	5	4	6	5	5	6	5	4	6	6	5	6	5	4	5	5	4	6	5	4
	Generate opportunities for the Māori tourism economy	5	5	6	5	5	6	5	5	6	5	5	6	5	5	5	5	5	5	5	5	5
	Exposure of local artisans to international market.	5	6	7	5	6	7	5	6	7	5	6	7	5	6	7	5	5	6	5	6	7
	Development of new tourist attractions	5	6	7	5	6	7	5	6	7	5	6	7	5	6	7	5	5	6	5	6	7

Appendix 15: Summary of Main Costs and Benefits (by pathway and benefits)

		Gross benefit		Main costs
$'bn	30 year @ 5%	New Spending to Economy	Other benefits	Externalities and resources used
Base	Scenario 1	6.6	0.4	4.3
	Scenario 2	17.1	0.9	10.2
	Scenario 3	21.4	1.2	17.1
Green Tech	Scenario 1	6.6	0.4	3.6
	Scenario 2	17.1	0.9	9.1
	Scenario 3	21.4	1.2	15.8
Shore Power	Scenario 1	6.6	0.4	3.9
	Scenario 2	17.1	0.9	9.6
	Scenario 3	21.4	1.2	16.4
Small Ships	Scenario 1	6.6	0.4	4.3
	Scenario 2	17.2	1.0	10.3
	Scenario 3	21.7	1.2	17.3
Large ships	Scenario 1	6.6	0.4	4.3
	Scenario 2	17.2	1.0	10.3
	Scenario 3	21.6	1.2	17.2