Draft sector guidance
Marine transportation and cruise lines

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Open for consultation and feedback

SICS® industry:
Transportation - Marine transport (TR-MT)
Transportation - Cruise lines (TR-CL)

Taskforce on Nature-related Financial Disclosures

Contents

Draft for consultation

This sector guidance is a draft for consultation with market participants and other interested stakeholders. The Taskforce welcomes feedback provided via the TNFD website by 4 April 2025.

Feedback will be reviewed by the Taskforce and final sector guidance issued by the TNFD in June 2025.

1. Introduction

1.1. The purpose of this guidance

In September 2023, the TNFD published its recommendations for disclosure of nature-related issues and supporting implementation guidance. This document provides sector-specific additional guidance for the marine transportation and cruise lines sector, covering:

- The assessment of nature-related issues using the TNFD's LEAP approach (Section 2); and
- The disclosure of sector-specific metrics in line with the TNFD's recommended approach to metrics (Section 3).

The TNFD's Guidance on the identification and assessment of nature-related issues: The LEAP approach is designed as an iterative process – across business locations and business lines – in line with established risk management processes and corporate reporting cycles. Organisations may choose to start with a narrow scope for a LEAP assessment and gradually expand the scope of the assessment as they gain experience and insight.

The TNFD recognises that there can be significant differences across sectors for corporates applying the LEAP approach. It has published this additional guidance with significant input from a range of knowledge partners and market participants, to help marine transportation and cruise line sector organisations apply the LEAP approach to their context. The overall structure of the LEAP approach is set out in Figure 1. This guidance follows that structure and Table 1 sets out the elements of LEAP for which this document provides additional guidance.

The Taskforce also recognises that investors and other stakeholders require quantitative information to compare performance and nature-related issues within sectors. To facilitate that sector-level analysis, this guidance also includes:

- Guidance on the application of the core global disclosure indicators and metrics to the marine transportation and cruise lines sector (Section 3.1); and
- Core and additional sector disclosure indicators and metrics (Sections 3.2 and 3.3).

Figure 2 provides an overview of the TNFD disclosure measurement architecture and where indicators and metrics are listed in the TNFD recommendations and relevant sector guidance.

Figure 1: The TNFD approach for identification and assessment of nature-related issues – LEAP

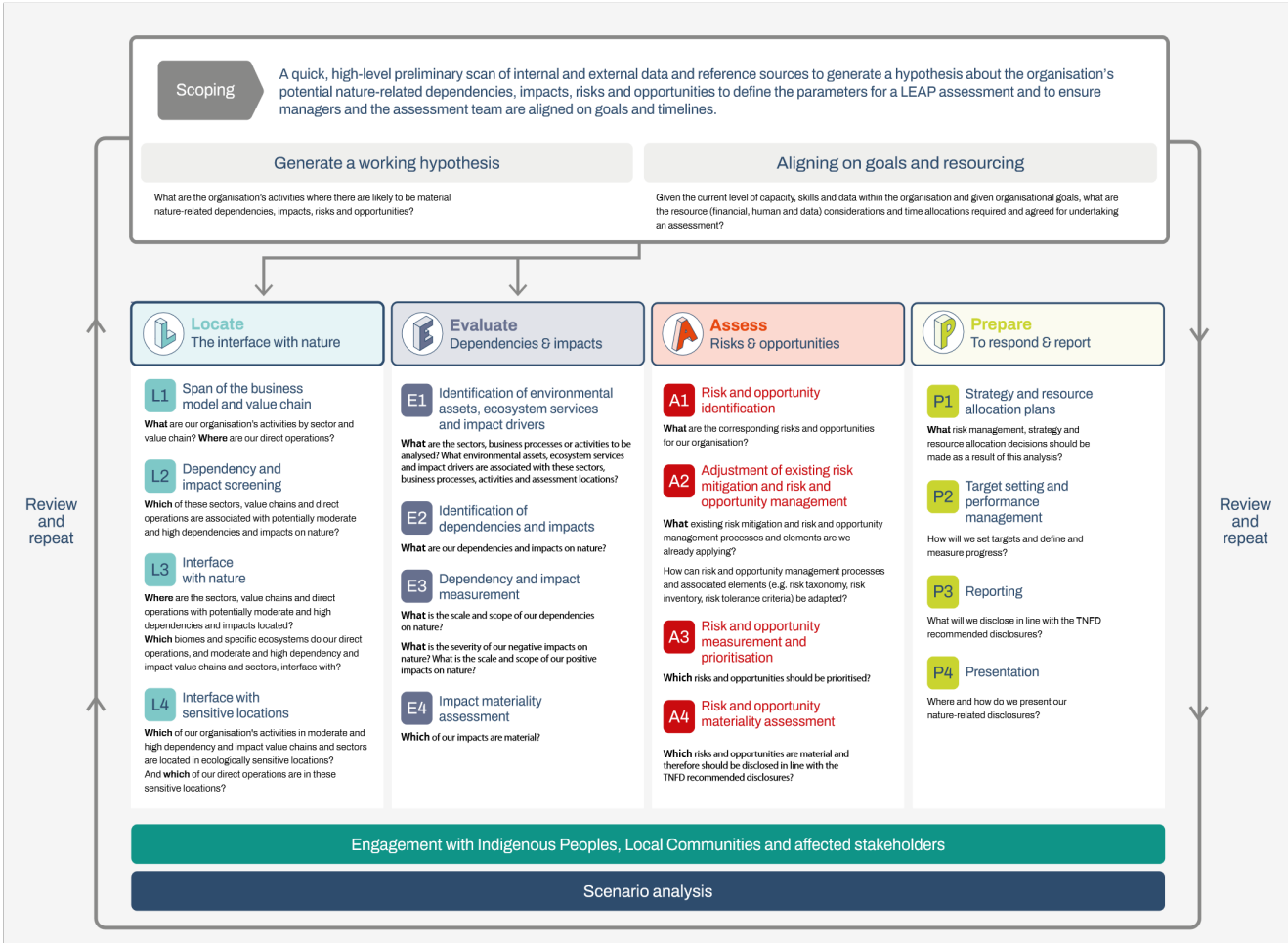
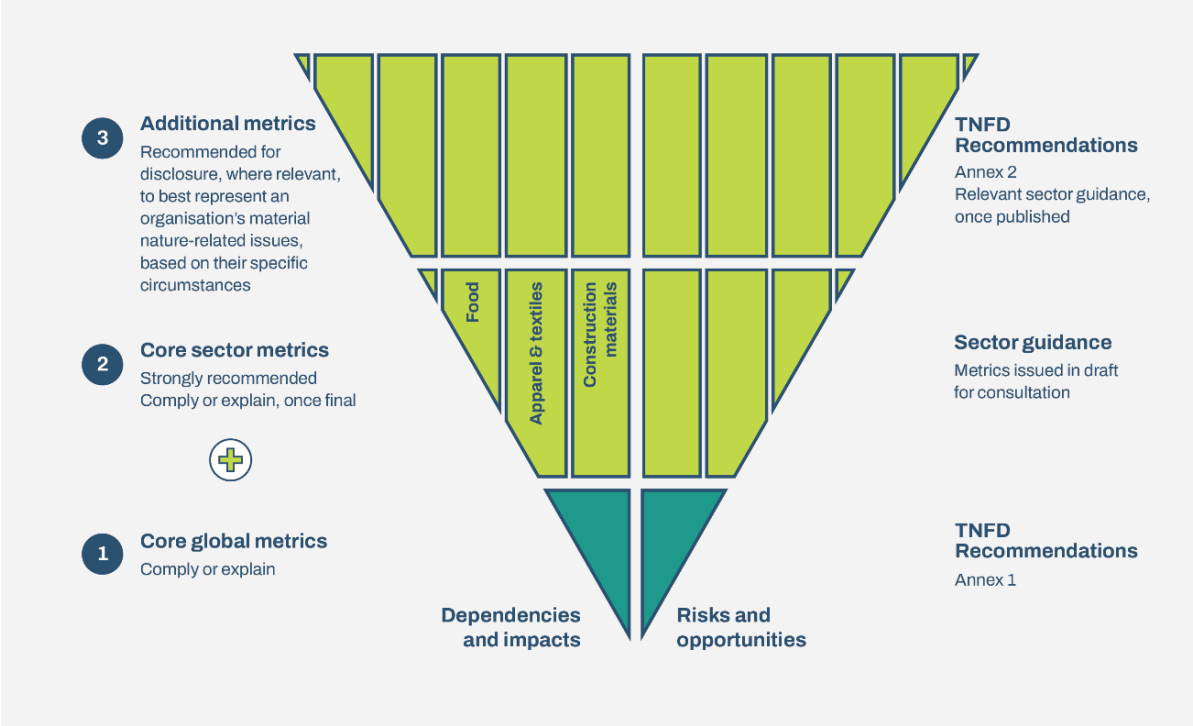


Figure 2: TNFD disclosure metrics architecture signposted to metrics lists



The guidance in Section 3 on the application of the TNFD core global metrics for this sector, as well as the core and additional sector metrics outlined, expand on the disclosure indicators and metrics outlined in Annexes 1 and 2 of the TNFD recommendations. The TNFD has incorporated and sought to build on existing industry standards and disclosure metrics wherever possible to leverage current data collection and reporting practices and minimise additional assessment and reporting costs.

1.2. Audience for this guidance

This guidance aims to support organisations with business models or value chain(s) in the Sustainable Industry Classification System® (SICS®) Marine Transportation and Cruise Lines industries (Box 1).[1] These are referred to as 'marine transportation sector and cruise lines sector organisations' in this guidance. The guidance does not cover river-way freight, only ocean freight shipping services.

Box 1: SICS® industries in the scope of this guidance document

Marine Transportation (TR-MT)
Cruise Lines (TR-CL)

[1] SASB (2018) SASB's Sustainable Industry Classification System (SICS).

This guidance is a supplement to the TNFD's Guidance on the identification and assessment of nature-related issues: The LEAP approach and should be read in conjunction with that guidance. Organisations in the marine transportation and cruise lines sectors may also find it helpful to refer to the TNFD biome guidance and Guidance on engagement with Indigenous Peoples, Local Communities and affected stakeholders.

The examples provided in this guidance for the marine transportation and cruise lines sector are intended to be illustrative. They are not exhaustive, universally applicable or recommended by the TNFD as examples of measures for all organisations within the industry. Each company's context, location and nature-related interactions are unique. The TNFD encourages all organisations to consult additional relevant sources, including scientific references and relevant industry standards or best practice guides, and conduct thorough assessments to identify and assess nature-related dependencies, impacts, risks and opportunities specific to their operations and value chains. This guidance aims to support, not replace, a tailored assessment, which will be necessary for each organisation.

Table 1: Areas of LEAP with additional guidance for the marine transportation and cruise lines sector in this guidance document

Scoping	✓						
L1	✓	E1	✓	A1	✓	P1	✓
L2	✓	E2	✓	A2		P2	✓
L3	✓	E3	✓	A3		P3	
L4	✓	E4		A4		P4	

2. Sector-specific LEAP assessment guidance

2.1. Scoping a LEAP assessment

Working hypothesis generation:

What are the organisation's activities where there are likely to be material nature-related dependencies, impacts, risks and opportunities?

In scoping their LEAP assessment, marine transportation and cruise line sector organisations can leverage fleet and vessel data already assembled for compliance with International Maritime Organization (IMO) regulations[2], including the:

- International Convention for the Prevention of Pollution from Ships (MARPOL) annexes I-VI;[3]
- Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships,[4]
- Ballast Water Management Convention;[5] and,
- International Convention on the Control of Harmful Anti-fouling Systems on Ships.[6]

While these data sets mainly cover pollution-related impacts, the scale of the data is often at fleet level and can provide a useful starting point for locating and beginning to evaluate an organisation's direct operational interface with nature. This will cover all ships in a fleet and therefore a large part of the direct operation of an organisation. A LEAP assessment team can start by repurposing these data sets for analysis in the Locate, Evaluate and Assess phases of the LEAP approach.

Additional data sets will be needed for a LEAP assessment. An organisation may consider starting by sampling a segment of the business, for example based on vessel class, which is linked to the primary type of cargo and therefore the risk of spillage. It may also base the sample on other relevant vessel features, such as vessel size and age, as size is linked to key issues such as risk of marine mammal strikes and vessel age to issues such as risk of spillage. An organisation may also consider sampling ships most likely to be associated with

[2] IMO – the International Maritime Organization – is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. A list of IMO regulations can be found here.

[3] IMO (1973) International Convention for the Prevention of Pollution from Ships.

[4] IMO (2009) The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.

[5] IMO (2004) International Convention for the Control and Management of Ships' Ballast Water and Sediments.

[6] IMO (2001) International Convention on the Control of Harmful Anti-fouling Systems on Ships.

high Underwater Radiated Noise (URN)[7] levels. Most of the URN emitted from ships comes from propeller cavitation[8] and therefore a LEAP assessment team may consider including ships in the scoping with propeller blade design features most likely to cause propeller cavitation.[9] These sampling strategies constitute ways of getting started, but an entire fleet approach is needed for a comprehensive LEAP assessment.

Table 2: Eight main vessel classes and associated primary cargo[10]

Vessel class	Container ships	Bulk carriers	Tanker ships	Ro-Ro ships	LNG/LPG carriers	Reefer ships	General cargo ships	Cruise ships
Description	Designed to carry standardised containers for efficient loading and unloading	Transport unpackaged bulk goods, such as raw materials	Specialised in carrying liquid cargo, including oil and chemicals	Roll-on/roll-off ships for vehicles that can be driven on and off the ship	Built to carry liquefied natural gas (LNG) or liquefied petroleum gas (LPG)	Equipped with refrigeration to transport perishable goods	Versatile vessels that transport various types of loose or packed cargo	Built to provide passengers with a holiday, including accommodation and entertainment
Primary cargo	Consumer goods, electronics, etc.	Coal, grains, ores	Crude oil, petroleum, chemicals	Cars, trucks, heavy machinery	Natural gas, petroleum gas	Fruits, vegetables, frozen goods	Packaged goods, machinery, timber	Cruise tourists, catering etc.

Goals and resourcing alignment:

Given the current level of capacity, skills and data within the organisation and given organisational goals, what are the resource (financial, human and data) considerations and time allocations required and agreed for undertaking an assessment?

For the marine transportation and cruise lines sectors, many of the most significant nature-related dependencies, impacts, risks and opportunities are likely to occur in direct vessel/cruise ship operations, downstream at tourist destinations in the case of cruise ships and during vessel end-of-life for all types of ships. The Taskforce therefore recommends that organisations may consider making these parts of the business a priority for the LEAP assessment. Some of the impacts such as noise pollution are generated during direct ship operation, with impact drivers linked to ship design features such as engine, propellers and hull shape. Therefore, the assessments of direct operations and downstream value chain(s) will require an understanding of parts of the upstream design and retrofit of key ship features.

[7] IMO (2023) Underwater Radiated Noise (URN) level refers to noise from any ship in decibels as sound pressure.

[8] Nelson, R. (2023) Why all the Concern about Underwater Ship Noise.

[9] Duowei, L. et al. (2024) An ensemble method for investigating maritime casualties resulting in pollution occurrence: Data augmentation and feature analysis.

[10] Windward (2024) Vessel Class - What is a Vessel Class?

Upstream: Steel and fuel are two key upstream inputs associated with nature-related dependencies and impacts for the marine transportation and cruise lines sectors. Steel makes up 75% to 85% of a ship by weight.[11] The IMO target to reduce CO_2 emissions across international shipping by at least 40% by 2030 compared to 2008 emission levels requires a shift in the type of fuel sourced upstream.[12] Alternative fuels include first generation biofuels (including lipids, such as vegetable oil and residual oils and biogas from biological wastes), biomass-based fuels (including cellulosic biomass) and electro-fuels (including electricity and captured carbon dioxide). Biofuels and biomass-based fuels drive impacts on nature through extensive land use demands.[13] Organisations where operations are most directly involved in the upstream portion of the value chain(s) may therefore consider focusing initially on their use of fossil-based fuels, and biofuels and biomass-based fuels.

Direct operations: Organisations may want to start by including the oldest vessels and cruise ships in the fleet in the LEAP assessment, as well as vessels designed to transport oils and hazardous substances. In addition, organisations may sample the parts of the fleet that have shipping or cruise routes in areas of heightened risk of crossing the migratory routes of marine mammals due to the potential risk of collisions, habitat fragmentation and interference with acoustic-based mammal navigation and survival systems. Organisations may leverage mammal migratory route data such as the World Shipping Council's (WSC) Whale Chart[14] and WWF's mapping of blue corridors for whales.[15] The Whale Chart is a mapping of all mandatory and voluntary governmental measures to reduce harm to whales from vessels.

Downstream: Vessels and cruise ships comprise an array of hazardous materials, such as asbestos, polychlorinated biphenyls (PCBs) and waste oils. These can leak into soils and the ocean realm during downstream decommissions or recycling if these are not properly managed. Organisations may start by sampling the ships in the fleet that will reach end-of-life within a short time horizon. Cruise line organisations may include cruise destinations as additional downstream elements in a LEAP assessment, including but not limited to beaches, islands, hotels, restaurants and ground logistics, whether these are owned by the cruise organisation or integrated into the cruise operating model via contractual relationships.

Where activities across the value chain overlap with other sectors, organisations are recommended to refer to the relevant TNFD sector guidance, where available. For example, for upstream and direct operations, organisations may consult guidance on oil and gas and on metals and mining, while cruise line organisations may also consult TNFD sector

[11] SSI (2023) Green steel and shipping – exploring the material flow of steel and potential for green steel in the shipping sector.

[12] IMO (2023) IMO Strategy on Reduction of GHG Emissions from Ships.

[13] Phillips, J. et al. (2024) Fuelling nature – how e-fuels can mitigate biodiversity risk in EU aviation and maritime policy.

[14] The World Shipping Council Whale Chart is a mapping of all mandatory and voluntary governmental measures to reduce harm to whales from vessels.

[15] Johnson, C. M. et al. (2022) Protecting Blue Corridors – Challenges and solutions for migratory whales navigating national and international seas.

guidance for food and agriculture. Across upstream, direct and downstream, organisations may consult TNFD sector guidance on chemicals.

2.2. Locate the organisation's interface with nature

This section provides additional guidance to help marine transportation and cruise line organisations with the Locate phase of the LEAP approach.

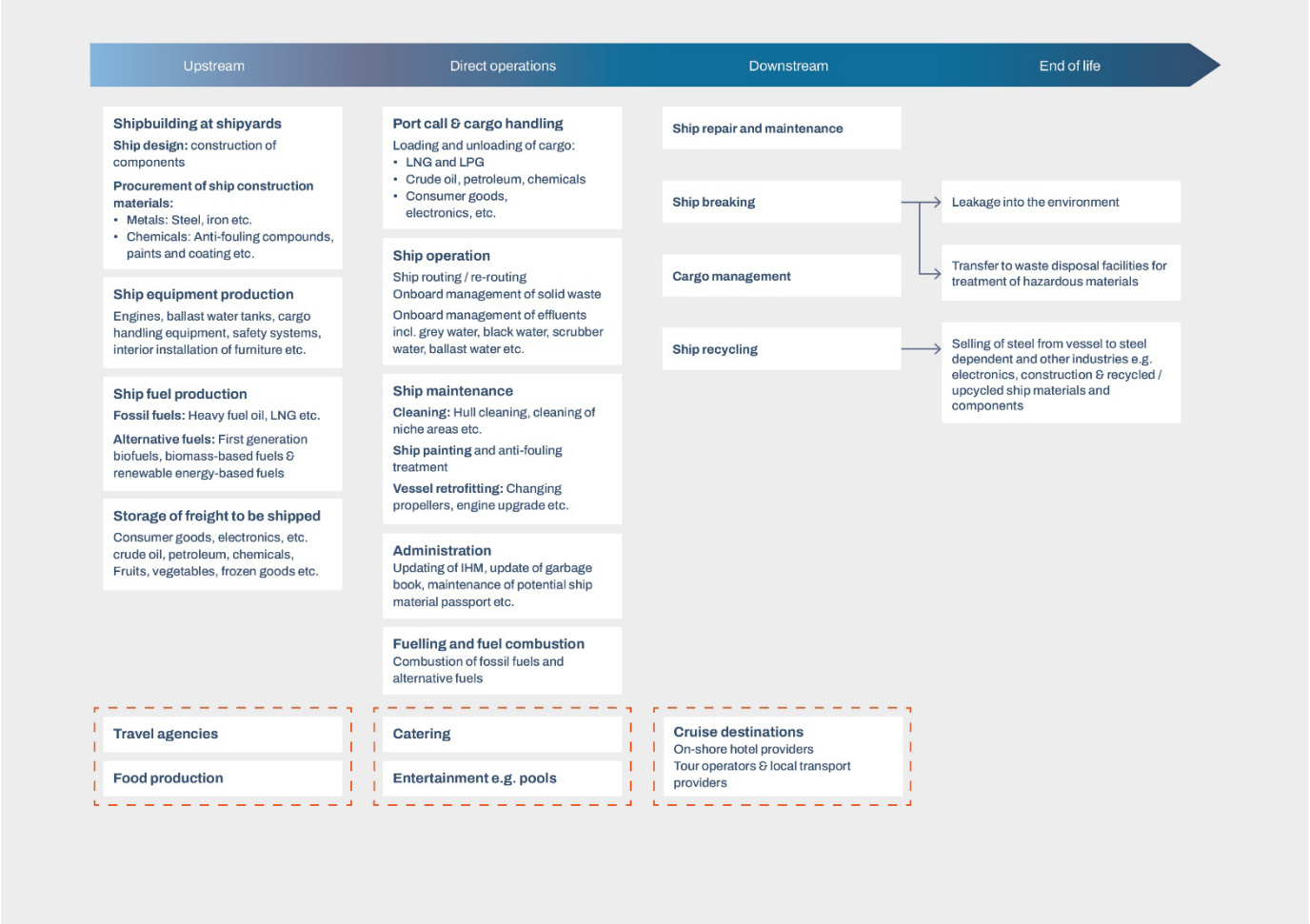
L1: Span of the business model and value chain

Guiding questions:

What are our organisation's activities by sector, value chain and geography?

Figure 3 presents an illustrative value chain from beginning to end-of-life for marine transportation vessels and cruise ships. The boxes indicated with a red line are specific additional elements of the cruise lines sector value chain.

Figure 3: Marine transportation and cruise lines value chains



The Taskforce recommends that organisations also include the two SICS® industries of Metals and Mining and Oil and Gas in their upstream supply chain maps to account for metals included in ship building materials and oil and gas used as ship fuel. For cruise line

organisations, the upstream value chain map should include the SICS® industries of Agricultural Products, Meat, Poultry and Dairy, Processed Foods, and for direct operations, Food Retailers and Restaurants, referring to the TNFD's relevant guidance. Cruise line organisations should also include the SICS® industries of Engineering and Construction Services, and Real Estate for downstream cruise tourist infrastructure at destinations.

Where are our direct operations?

Marine transportation and cruise line organisations should be able to delineate clearly the locations of their shipping and cruise routes using Autonomous Information System (AIS) data and identify their length of stay in ports and activities in ports via port calls.

L2: Dependency and impact screening

Guiding question:

Which of these sectors, value chains and direct operations are associated with potentially moderate and high dependencies and impacts on nature?

Tables 3 and 4 present ecosystem services and impact drivers that may be relevant to the marine transportation sector. Tables 5 and 6 highlight these for cruise line organisations.

Table 3: Materiality ratings of ecosystem services the marine transportation sector typically depends on

Ecosystem services functionality		Upstream		Direct operations			Downstream
		Building of ships and boats	Warehousing and storage	Sea and coastal transport	Cargo handling	Service activities incidental to water transportation	Onward transport (inland water transport)
Provisioning services	Biomass provisioning	N/A	N/A	N/A	N/A	N/A	N/A
	Genetic material	N/A	N/A	N/A	N/A	N/A	N/A
	Water supply	L	VL	L	VL	L	L
	Other provisioning services – Animal-based energy	N/A	N/A	N/A	N/A	ND	N/A
Regulating & maintenance services	Solid waste remediation	ND	ND	ND	ND	ND	ND
	Soil and sediment retention	M	M	L	L	L	M
	Water purification	N/A	ND	M	ND	ND	M
	Soil quality regulation	N/A	N/A	N/A	N/A	N/A	N/A
	Other regulating and maintenance services – Dilution by atmosphere and ecosystems	L	N/A	VL	N/A	N/A	VL
	Biological control	N/A	VL	VL	VL	VL	VL
	Air filtration	VL	VL	VL	VL	VL	VL

Ecosystem services functionality		Upstream		Direct operations			Downstream
		Building of ships and boats	Warehousing and storage	Sea and coastal transport	Cargo handling	Service activities incidental to water transportation	Onward transport (inland water transport)
Regulating & maintenance services	Flood mitigation	M	VL	H	VL	VL	M
	Global climate regulation	VL	VL	M	VL	VL	M
	Nursery population and habitat maintenance	N/A	N/A	N/A	N/A	N/A	N/A
	Noise attenuation	VL	ND	N/A	VL	VL	N/A
	Other regulating and maintenance services – Mediation of sensory impacts (other than noise)	N/A	N/A	N/A	N/A	N/A	N/A
	Local (micro and meso) climate regulation	L	L	L	L	L	L
	Pollination	N/A	N/A	N/A	N/A	N/A	N/A
	Storm mitigation	M	L	H	L	M	M
	Water flow regulation	M	VL	M	VL	M	M
	Rainfall pattern regulation	N/A	VL	M	VL	VL	VH

Ecosystem services functionality		Upstream		Direct operations			Downstream
		Building of ships and boats	Warehousing and storage	Sea and coastal transport	Cargo handling	Service activities incidental to water transportation	Onward transport (inland water transport)
Cultural services	Recreational related services	N/A	ND	VH	ND	N/A	VH
	Visual amenity services	N/A	ND	VH	ND	ND	VH
	Education, scientific and research services	N/A	ND	N/A	ND	ND	N/A
	Spiritual, artistic and symbolic services	N/A	ND	N/A	ND	ND	ND

N/A = Non-applicable, ND = No data

Notes: Materiality ratings for dependencies refer to the importance of the contribution an ecosystem service makes to the production process. The ecosystem service classification used by ENCORE, one of the sources of this table, differs from the classification used in the TNFD guidance, which is based on the UN SEEA. A crosswalk is available from UN SEEA.

Source: ENCORE Partners (Global Canopy, UNEP FI, and UNEP-WCMC) (2024). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. Cambridge, UK: the ENCORE Partners. DOI: https://doi.org/10.34892/dz3x-y059.

Table 4: Materiality ratings for impact drivers typically relevant for the marine transportation sector

Drivers of nature change	Impact drivers	Upstream		Direct operations			Downstream
		Building ships and boats	Warehousing and storage	Sea and coastal water transportation	Cargo handling	Service activities incidental to water transportation	Onward transport (inland water transport)
Land, freshwater and ocean use change	Land ecosystem use	ND	L	N/A	L	L	N/A
	Freshwater ecosystem use	N/A	N/A	ND	VL	VL	M
	Ocean system use	N/A	N/A	M	VL	M	N/A
Climate change	Greenhouse gas (GHG) emissions	L	M	H	M	M	VH
Pollution/ pollution removal	Non-GHG air pollutants	L	L	H	L	L	VH
Resource use/ replenishment	Water use	L	L	L	L	L	L
	Other biotic resource use (e.g. fish, timber)	N/A	N/A	N/A	N/A	N/A	N/A
	Other abiotic resource use	N/A	N/A	N/A	N/A	N/A	N/A
Invasive alien species	Introduction of invasive species	ND	VL	VH	H	N/A	M

N/A = Non-applicable, ND = No data

Source: ENCORE Partners (Global Canopy, UNEP FI, and UNEP-WCMC) (2024). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. Cambridge, UK: the ENCORE Partners. DOI: https://doi.org/10.34892/dz3x-y059.

Table 5: Materiality ratings for ecosystem services the cruise line organisations typically depend on

Ecosystem services functionality		Upstream		Direct operations			Downstream
		Building of ships and boats	Warehousing and storage	Sea and coastal transport	Cargo handling	Service activities incidental to water transportation	Tour operator activities
Provisioning services	Biomass provisioning	N/A	N/A	N/A	N/A	N/A	N/A
	Genetic material	N/A	N/A	N/A	N/A	N/A	N/A
	Water supply	L	VL	L	VL	L	VL
	Other provisioning services	N/A	N/A	N/A	N/A	ND	M
Regulating & maintenance services	Solid waste remediation	ND	ND	ND	ND	ND	ND
	Soil and sediment retention	M	M	L	L	L	M
	Water purification	N/A	ND	M	ND	ND	M
	Soil quality regulation	N/A	N/A	N/A	N/A	N/A	N/A
	Other regulating and maintenance services – Dilution by atmosphere and ecosystems	L	N/A	VL	N/A	N/A	ND
	Biological control	N/A	VL	VL	VL	VL	M
	Air filtration	VL	VL	VL	VL	VL	H
	Flood control	M	VL	H	VL	VL	VL

Ecosystem services functionality		Upstream		Direct operations			Downstream
		Building of ships and boats	Warehousing and storage	Sea and coastal transport	Cargo handling	Service activities incidental to water transportation	Tour operator activities
Regulating & maintenance services	Global climate regulation	VL	VL	M	VL	VL	M
	Nursery population and habitat maintenance	N/A	N/A	N/A	N/A	N/A	N/A
	Noise attenuation	VL	ND	N/A	VL	VL	VL
	Other regulating and maintenance services – Mediation of sensory impacts (other than noise)	N/A	N/A	N/A	N/A	N/A	VL
	Local (micro and meso) climate regulation	L	L	L	L	L	L
	Pollination	N/A	N/A	N/A	N/A	N/A	N/A
	Storm mitigation	M	L	H	L	M	L
	Water flow regulation	M	VL	M	VL	M	VL
	Rainfall pattern regulation	N/A	VL	M	VL	VL	M
Cultural services	Recreational-related services	N/A	ND	VH	ND	N/A	VH
	Visual amenity services	N/A	ND	VH	ND	ND	VH
	Education, scientific and research services	N/A	ND	N/A	ND	ND	VH
	Spiritual, artistic and symbolic services	N/A	ND	N/A	ND	ND	VH

N/A = Non-applicable, ND = No data

Notes: Materiality ratings for dependencies refer to the importance of the contribution an ecosystem service makes to the production process. The ecosystem service classification used by ENCORE, one of the sources of this table, differs from the classification used in the TNFD guidance, which is based on the UN SEEA. A crosswalk is available from UN SEEA.

Source: ENCORE Partners (Global Canopy, UNEP FI, and UNEP-WCMC) (2024). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. Cambridge, UK: the ENCORE Partners. DOI: https://doi.org/10.34892/dz3x-y059.

Table 6: Materiality ratings for impact drivers typically relevant for the cruise lines sector

Drivers of nature change	Impact drivers	Upstream		Direct operations			Downstream
		Building ships and boats	Warehousing and storage	Sea and coastal water transportation	Cargo handling	Service activities incidental to water transportation	Tour operator activities
Land, freshwater and ocean use change	Land ecosystem use	ND	L	N/A	L	L	L
	Freshwater ecosystem use	N/A	N/A	ND	VL	VL	VL
	Ocean ecosystem use	N/A	N/A	M	VL	M	M
Climate change	Greenhouse gas (GHG) emissions	L	M	H	M	M	M
Pollution/ pollution removal	Non-GHG air pollutants	L	L	H	L	L	L
	Disturbances (e.g. noise, light)	H	VL	VH	VL	VL	M
	Emissions of toxic soil and water pollutants	H	VL	L	L	L	VL
	Emissions of nutrient soil and water pollutants	N/A	N/A	L	VL	M	N/A
	Solid waste	L	L	M	L	L	L
Resource use/ replenishment	Water use	L	L	L	L	L	L
	Other biotic resource extraction (e.g. fish, timber)	N/A	N/A	N/A	N/A	N/A	N/A
	Other abiotic resource extraction	N/A	N/A	N/A	N/A	N/A	N/A
Invasive alien species	Introduction of invasive species	ND	VL	VH	H	N/A	M

N/A = Non-applicable, ND = No data

Source: ENCORE Partners (Global Canopy, UNEP FI, and UNEP-WCMC) (2024). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. Cambridge, UK: the ENCORE Partners. DOI: https://doi.org/10.34892/dz3x-y059.

An organisation using the ENCORE ratings to inform prioritisation should consider their applicability to the site in question, bearing in mind that ENCORE ratings refer to global sector averages.

The materiality ratings provided in Tables 3 to 6 only include direct operations. For cruise line sector organisations, the downstream part of the value chain includes impact drivers and dependencies associated with cruise destinations. Key downstream impact drivers include land conversion due to the use and/or development of coastal and marine tourism infrastructure and water use for hotels, pools and artificial lakes. Cruise tourist activities in ports, port areas, beaches or on tours further inland also drives pollution via plastic packaging, plastic bottles, food waste, use of transport, etc. Cruise lines have material dependencies on ecosystem services downstream as 80% of the value of travel and tourism goods and services is estimated to be highly dependent on nature.[16] For cruise lines, this includes ecosystem services in the terrestrial and ocean realms, such as biomass provisioning that supports marine wildlife, an important part of marine tourist activities such as diving and snorkelling, and on land, ecosystem services that support onshore tour experiences in different types of landscapes.

Given the low degree of granularity for these screening tools, marine transport organisations may choose other prioritisation criteria, reflecting the specificities of their locations and activities.

[16] WTTC (2022) Nature positive Travel & Tourism – Travelling in Harmony with Nature.

L3: Interface with nature

Guiding questions:

Where are the sectors, value chains and direct operations with potentially moderate and high dependencies and impacts located? Which biomes and specific ecosystems do our direct operations, and moderate and high dependency and impact value chains and sectors, interface with?

As a general guide and starting point for the assessment, marine transportation and cruise line organisations typically interface with the following biomes in their direct operations and upstream and downstream value chains:

- Marine shelf (M1)
- Open ocean waters (M2)
- Deep sea floors (M3)
- Artificial marine systems (M4)
- Rivers and streams (F1)
- Lakes (F2)
- Shoreline systems (MT1)
- Maritime vegetation (MT2)
- Artificial shorelines (MT3)
- Coastal inlets and lagoons (FM1)
- Brackish tidal biome (MFT1)
- Vegetated wetlands (TF1)
- Tropical and sub-tropical forests (T1)
- Deserts and semi-deserts (T5)
- Polar/alpine (T6)

More specifically, different types of marine transportation and cruise line organisations often have strong interfaces with the biomes listed in Table 7, which is organised by type of activity. In addition, cruise line organisations should also consult the TNFD agriculture and food guidance to identify upstream biome interfaces associated with the sourcing of food for use in direct or downstream cruise line operations. These additional biome interfaces are noted under ’cruise line destinations’ in Table 7.

Table 7: Biomes that are typically relevant to different types of marine transportation and cruise line organisations

Activity	Biomes
Deep sea shipping	M1, M2, M3, M4, MT1, MT2, MT3, FM1, MFT1
Coastal shipping	M1, M4, MT1, MT2, MT3, FM1, MFT1
River-way shipping	F1, F2, TF1, MFT1
Loading/unloading at port	M4, MT3
Ship-breaking/end-of-life	MT1
Cruise line destinations	MT1, MT2, MT3, MFT1, FM1, TF1, F1, F2, T1, T5, T6

An organisation should refer to the TNFD guidance on biomes for further information when analysing its interfaces with biomes. The chapter on the marine shelf biome may be of particular interest as an example from the ocean realm.

L4: Interface with sensitive locations

Guiding questions:

Which of our organisation's activities in moderate and high dependency and impact value chains and sectors are located in ecologically sensitive locations? And which of our direct operations are in these sensitive locations?

Marine transportation and cruise line organisations can refer to the relevant TNFD guidance on biomes for further details on what are considered sensitive locations in each relevant biome, where available.

When considering sensitive locations such as Marine Protected Areas (MPAs), there are multiple definitions of MPAs that need to be considered, including those of the International Union for the Conservation of Nature (IUCN), the OSPAR Convention and the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (the BBNJ Agreement).[17] Other types of marine sensitive locations to consider include Particularly Sensitive Sea Areas (PSSAs), Special Areas under MARPOL and Important Marine Mammal Areas (IMMAs). Useful datasets for MPAs under these definitions are the:

- Resource Watch Marine Protected Areas dataset;
- OSPAR MPA database;
- IMMA e-atlas; and,
- IMMAS searchable database.

In assessing whether activities are geographically located in sensitive locations, the Taskforce recommends that marine transportation and cruise line organisations should identify whether:

- Shipping routes are crossing marine mammal migratory routes. For this identification, marine transportation and cruise line organisations can overlay shipping routes with marine mammal migratory route data by leveraging datasets such as the Whale Chart[18] by the World Shipping Council or other mappings of migratory routes (see Figure 4).[19]
- The organisation is using sensitive marine areas for navigation, including areas newly opened by the effects of climate change, such as the Arctic waters. This is especially relevant for cruise line organisations, which tend to spend prolonged periods cruising

[17] UN (2023) Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdictions.

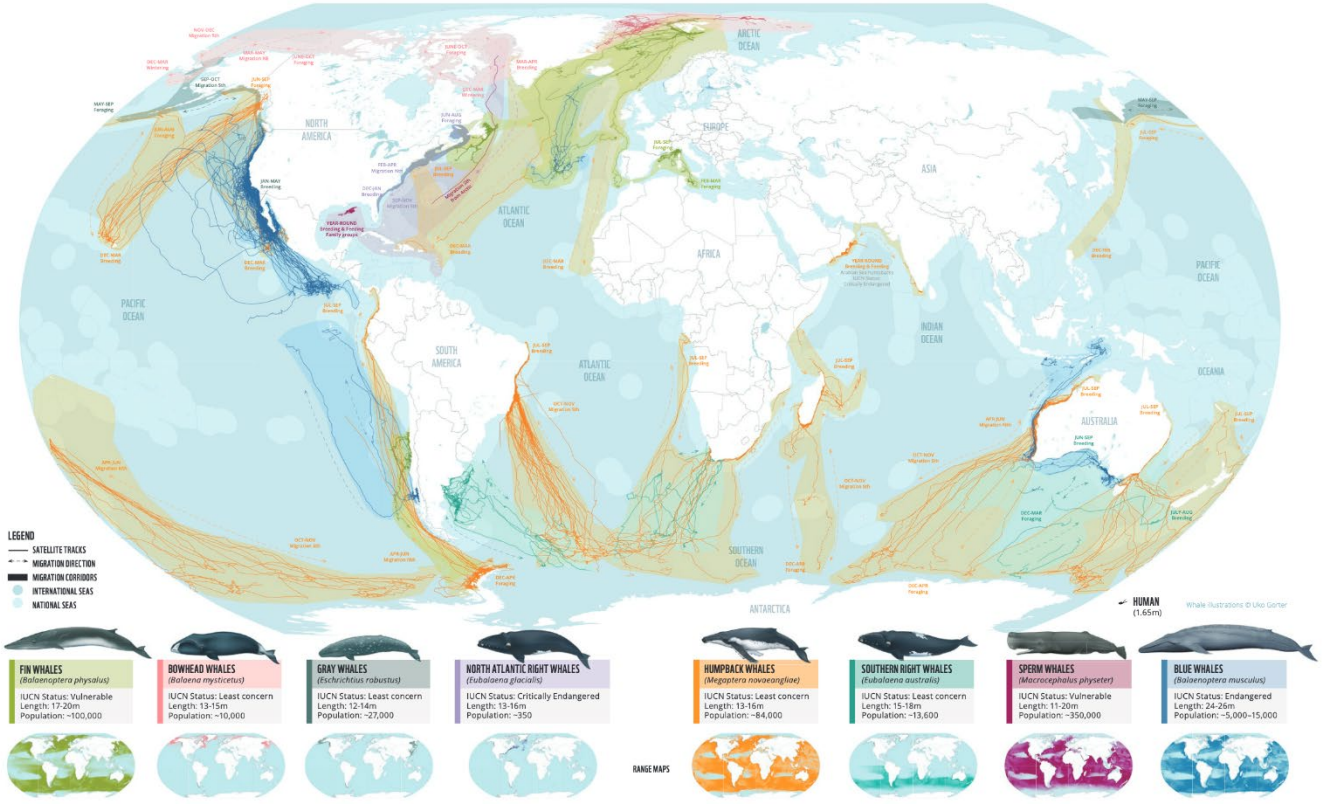
[18] The Whale Chart developed by the World Shipping Council is a mapping of all mandatory and voluntary governmental measures to reduce harm to whales from vessels.

[19] WWF (2024) Arctic Blue Corridors.

in areas away from established shipping routes and in comparatively less trafficked areas that serve as critical habitats for Arctic marine mammals.[20]

- The organisation interfaces with sensitive ecosystems, including seagrass and coral reef habitats, by anchoring large cruise ships, for example. Direct contact between the anchor and benthic habitats, together with the swinging motion produced by dragging the anchor chain over the bottom, can cause significant structural damage to seagrass and reef ecosystems.[21]
- Cruise destinations interface with coastal marine ecosystems such as, but not limited to, mangrove forests, seagrass beds, coral reefs and/or nesting sites for wildlife such as endangered marine turtles.

Figure 4: Whale superhighways



Source: Johnson, C. M. (2022) Protecting Blue Corridors – Challenges and solutions for migratory whales navigating national and international seas. World Wildlife Fund, UC Santa Cruz, Oregon State University, University of Southampton.

[20] Mannherz, F. et al. (2024) Could Arctic Ports be Part of the Solution?

[21] Small, M. and Oxenford, H. A. (2022) Impacts of cruise ship anchoring during COVID-19: Management failures and lessons learnt.

List of data sets and tools

Table 8: Additional tools for maritime transportation and cruise line sector organisations in the Locate phase of the LEAP

Tool name	Description (relevance to sector)
Marine Protected Atlas	The Marine Protected Area (MPA) dataset contains officially designated parks, reserves and other formal conservation areas around the world that have a substantial maritime component.
OSPAR	This database holds spatial and non-spatial data that OSPAR Contracting Parties have reported on MPAs that have been nominated to the OSPAR MPA network.
Whale Safe	Whale Safe is a technology-based mapping and analysis tool displaying whale and ship data, designed to prevent fatal ship collisions with whales.
Particular Sensitive Sea Areas (PSSAs)	List of IMO designated PSSAs.
WSC Global Whale Chart	The WSC Whale Chart is a global mapping of all mandatory and voluntary government measures to reduce harm to whales from vessels.

2.3. Evaluate dependencies and impacts on nature

This section provides additional guidance to help marine transportation and cruise line organisations with the Evaluate phase of the LEAP approach.

E1: Identification of environmental assets, ecosystem services and impact drivers

Guiding questions:

What are the sectors, business processes or activities to be analysed?

What environmental assets, ecosystem services and impact drivers are associated with these sectors, business processes, activities and assessment locations?

Guidance for components E1 and E2 is provided together under E2.

E2: Identification of dependencies and impacts

Guiding question:

What are our dependencies and impacts on nature?

Dependencies on nature

Table 9 offers further explanation of the dependencies identified in L2 to help organisations connect their business model to specific dependencies.

Table 9: Examples of dependency pathways for the marine transportation and cruise lines sector

Ecosystem service	Business activity linked to dependencies	Illustrative example
Flood mitigation	Enables ship navigation routes.	Flood tides cause the depth of water in waterways and ports to vary significantly, making it difficult for ships to enter and leave ports.
Storm mitigation	Enables routing and port calls while avoiding cargo loss, vessel damages and vessel sinking. Enables vessel route planning and predictability to avoid rerouting and longer voyage times. Cruise lines depend on predictable weather conditions to deliver on the cruise itinerary and to provide a comfortable journey to cruise tourists.	Increasing frequency of storms leads to vessel congestion due to port closing. Lower ability of nature to offer storm mitigation services can cause damage to cruise tourism infrastructure along coastlines. Beach resorts depend on storm mitigation as frequent storms cause loss of sand from beaches due to erosion.
Water flow regulation	Routings for shortest vessel travel time are dependent on sufficient water flow from canal watersheds to major waterways.	Lower capacity in the Suez Canal adds at least 3,000 nautical miles (over 5,500km) and 10 days sailing time, rerouting via the Cape of Good Hope. Restrictions on number of ship passages in the Panama Canal also lead to rerouting.
Water supply	Ships are dependent on water provisioning to secure navigable waterways. Cruise lines depend on access to water for tourists onshore at hotel accommodation.	It requires 200 million litres of fresh water for each ship to be able to pass through the Panama Canal.[22] Lower functioning of ecosystem services render such waterways only navigable with a reduced ship weight and a limited number of ships. Direct water use by hotels and resorts for showers, toilets, laundry, swimming pools, cooling and irrigation amounts to an average consumption rate of 84-2,000 litres per tourist per day. Irrigated gardens and swimming pools account for the largest direct consumption. If water for food supply at hotels is added, the consumption rate can

[22] Kaufman, D. (2023) Climate change could cut off the Panama Canal.

		increase to 5,000 litres per tourist per day.[23]
Rainfall pattern regulation	Ships and cruise lines depend on rainfall for access to waterways.	Vegetation in biomes such as tropical and sub-tropical forests maintain rainfall patterns through evapotranspiration. This ensures sufficient water levels to avoid prolonged drought that restricts access to waterways.
Water purification	Improvements in ocean water quality reduce the presence of algal blooms. Algal blooms increase microfouling/biofouling on the hull and niche areas of vessels. This can have negative effects on vessels, such as increased fuel consumption and damage to equipment.	Algae vessel accumulation increases fuel consumption by up to 15% and reduces sailing speed on average by 20%.[24]
Global climate regulation	Marine transportation and cruise line organisations depend on global climate regulation to predict transport time, plan fuel consumption and for the safety of transport. All are dependent on the predictability of weather patterns and extreme weather events. Organisations depend on global climate regulation to limit ocean warming. Higher temperatures accelerate the metabolism and reproductive rates of biofouling organisms, leading to increased settlement and colonisation on submerged surfaces. This results in accelerated fouling dynamics, where fouling organisms establish and grow at a faster pace.[25]	The alteration in weather is starting to necessitate alteration of shipping routes. More frequent storms affect journey times and cargo losses. Organisations need to keep the hull and niche areas of vessels clean of biofouling, as it leads to corrosion and increased water resistance and fuel consumption.[26]
Cultural services (applicable to cruise lines only)	Cruise lines depend on the ability of marine ecosystems, such as coral reefs and mangroves, to deliver recreational and visual amenity services to attract cruise tourists.	Marine ecosystems with high chemical concentrations generate eutrophication and ocean acidification, which in turn bleaches coral reefs and affects the abundance of tourist friendly species. This leads to fewer cruise destinations and higher traffic concentration in specific areas.

Marine transportation and cruise lines sector organisations have significant impacts on nature, including carbon emissions; air, water, solid waste and noise pollution (see Figure

[23] Crockett, M. (2020) How tourism determines Water Availability.

[24] Edmiston, A. C. et al. (2021) Impacts of a temperate to tropical voyage on the microalgal hull fouling community of an a typically operated vessel.

[25] EFC (2023) Marine Fouling, Antifouling and Climate Change: Unravelling the Complex Relationship.

[26] Kiil, A. S. et al. (2021) Biofouling of Vessels – a Challenge to the Ship Industry and the Environment.

5); habitat degradation and fragmentation; and direct impacts on marine mammals and other sea life.

Table 10 provides illustrative impact pathways for impact drivers linked to typical business activities of marine transportation and cruise line organisations, as well as to vessel and cruise ship features. For each impact pathway, guidance is provided to help organisations identify the impacts associated with their particular business models.[27]

[27] Climate change is not included as an impact driver in Table 8 but is relevant to consider. The Taskforce encourages organisations to use the International Sustainability Standards Board (ISSB) IFRS S2 Climate-related Disclosures standard for their greenhouse gas (GHG) emissions measurement, which requires using the GHG Protocol Corporate Standard.

Table 10: Examples of impact pathways for the marine transportation and cruise lines sectors

Driver of nature change	Impact driver	Business activity/vessel features linked to impact	Description of the impact driver	Environmental assets, ecosystem services and species impacts	Guidance to identify impacts
Land/ freshwater/ ocean-use change	Ocean ecosystem use	Routing Routing as it relates to congestion Vessel speed Anchoring	Some of the busiest shipping routes overlap with whale habitats[28] and marine mammal migratory routes leading to collisions, which can cause damage to vessels and injury and/or death of marine mammals. Larger marine mammals are most at risk because they spend much time near the surface. Anchoring of high-tonnage ships causes seabed damage	**Environmental assets:**[29] Seabed, aquatic resources. **Ecosystem services:** Global climate regulation[30] Biomass provisioning **Species impacts:** Change in species population size Habitat fragmentation Species extinction risk[31]	Identify migratory routes that overlap with vessel shipping routes to evaluate risk of interfering with migratory connectivity in the ocean. Leverage AI driven whale tracking systems such as Whale Safe or datasets such as the MiCO database for migratory route identification. After identification of high overlap routes, corporations can focus on the largest vessels or cruise ships with the highest average travel speed, as vessel size and speed are the two factors contributing most to the severity of injuries if a collision occurs.[32] Vessels with speeds of 14 knots or higher have more than a 60% possibility of being lethal to whales.[33]

[28] Minton, G. et al. (2021) Shipping and Cetaceans – a review of impacts and mitigation options for policymakers and other stakeholders.

[29] Ocean based environmental assets adapted from UN SEEA found here.

[30] Whales are efficient at capturing and storing atmospheric carbon directly in their large bodies. One whale can capture an average of 33 tons of carbon dioxide over its lifespan. See NOAA (2024) Whales and Carbon Sequestration: Can Whales Store Carbon?

[31] Six out of the 13 great whale species are classified as Endangered or Vulnerable. See WWF (2022) Protecting Blue Corridors.

[32] CWF (2024) Measuring the Risk of Vessel Strike to Large Whales in the Gulf of St. Lawrence.

[33] Parrot, L. et al. (2016) Slow Down and Save Whales.

			by displacement of sediment and burial of benthic species.		The physical footprint of anchoring is linked to that of bottom travelling, the most widespread human impact on the marine shelf.[34]
Land/ freshwater/ ocean-use change	Land ecosystem use Ocean ecosystem use	**Cruise lines only:** Construction of onshore tourist infrastructure Design and management of contracts with destination tour operators and hotel suppliers. Dredging to enable tourist infrastructure development.	Development of cruise line private destination hotels, beach resorts, water parks or use of local infrastructure managed via contractual relationships can contribute to land conversion through the siting and design of resorts, development of marinas, artificial lakes etc. Dredging is linked to conversion of benthic habitats and coral reefs.	**Environmental assets:** Land, terrestrial ecosystems, marine and freshwater ecosystems. **Ecosystem services:** Noise attenuation Local (micro and meso) climate regulation Water provisioning Soil and sediment retention Flood and storm mitigation **Species impacts:** Changes to ecosystem extent and structure Species extinction risk	Identify hotel suppliers, tour operators and cruise line private destinations that are sited in areas with high numbers of endemic and endangered species. Identify existing resorts or resorts to be developed in areas with mangroves, seagrass beds and coral reefs, which are at risk of conversion during the siting phase. Identify resorts operating in areas interfacing with sea turtle nesting beaches.
Pollution/ pollution removal	All pollutants	Operation of onboard machinery, propeller	A cargo vessel emits around 190 decibels.[36] The noise frequencies of ships overlap with those used by	**Environmental assets:** Seawater, aquatic resources, seabed.	Identify species interfacing with shipping route(s) that have a fundamental dependence on sound to feed, find mates, detect predators, navigate and survive.[39]

[34] Watson, S. J. et al. (2022) The Footprint of Ship Anchoring on the Seafloor.

[36] Nelson, R. (2023) Why all the Concern About Underwater Ship Noise?

[39] NRDC (n.d.) Sonic Sea – Impacts of Noise on Marine Mammals.

		cavitation, hull form and wake flow.[35] Transport of Hazardous and Noxious Substances (HNS) and oils either in bulk or package form. Loading and offloading of cargo. Vessel coating Vessel anti-fouling treatment	marine mammals such as whales, dolphins, seals, sea lions and sea cows to function, which are frequencies from a few hertz to greater than 100 kHz, depending on the species.[37] More than 2,000 types of Hazardous and Noxious Substances (HNS) are regularly transported by sea and more than 200 million tonnes of chemicals traded annually by tankers. Top HNS shipped by sea include sulphuric acid, hydrochloric acid, sodium hydroxide, phosphoric acid, nitric acid, LPG/LNG, ammonia, benzene, xylene and phenol.[38]	**Ecosystem services:** Global climate regulation Local (micro and meso) climate regulation Noise attenuation **Species impacts:** Change in species population size Species extinction risk Decrease in number of seabirds due to oil spills Degradation of ecosystem condition: Lower PH, higher chemical concentration and/or oil concentration in coastal ecosystems	Identify vessel or cruise ship Under Water Radiated Noise (URN) levels via direct acoustic measurement or modelled approaches.[40] Identify oil and HNS entering the ocean as a result of accidents such as vessel sinking, grounding, collisions and via permitted and illegal discharges.[41] Identify whether paint and anti-fouling treatment contains plastic-based binders and heavy metals. Based on averages, it is reasonable to estimate that 6-7% of marine coatings are leaked during the lifetime of a vessel.[42]

[35] IMO (2023) Revised Guidelines for the Reduction of Underwater Radiated Noise from Shipping to Address Adverse Impacts on Marine Life.

[37] Clear Seas (n.d.) Underwater Noise and Marine Mammals.

[38] IMO (n.d.) The HNS Convention – Why it is needed: Compensation for damage caused by hazardous and noxious substances transported by sea.

[40] IMO (2023) Revised Guidelines for the Reduction of Underwater Radiated Noise from Shipping to Address Adverse Impacts on Marine Life.

[41] Llabrés, P. I. (2023) The state of shipping and oceans report: Understanding the impact of global shipping on climate, the ocean and human health.

[42] GESAMP (2022) Planning of GESAMP Activities: Sea-based Sources of Marine Litter.

Pollution/pollution removal	Pollution – effluents	Use of Exhaust Gas Cleaning Systems (EGCS) on vessels. Use of onboard sanitation.[43] Use of onboard sinks, baths, showers, washing machines and ships' kitchens.	Vessels and cruise ships remove sulphur oxides from the ship's engine exhaust using cleaning systems, which result in scrubber wash-water effluent. This is either released into the marine environment or handed in to port facilities. Use of toilets and urinals on cruise lines generate black water and use of sinks etc. onboard result in grey water effluents. Each week, a large cruise ship generates on average 794,000 litres of black water.[44]	**Environmental assets:** Seawater, aquatic resources, seabed. **Ecosystem services:** Global climate regulation Local (micro and meso) climate regulation Other regulating and maintenance services Degradation of ecosystem condition: Lower PH, eutrophication, increased salinity, chemical contaminants, micro plastic concentration, pathogenic bacteria integration into the marine food chains.[45] Species impacts[46] • Decrease in species population size.	Identify vessels or cruise lines in the fleet using EGCS and identify EGCS discharge practices to identify those not discharging at port facilities. Identify vessels or cruise lines at risk of not following legal guidance, for example the Ballast Water Management Convention (BWMC) and MARPOL Annex IV for ballast water and black water. Identify vessel and cruise ship ballast water approaches to identify vessels engaged in Ballast Water Exchange. Identify vessels and cruise ships with and without on-board wastewater treatment systems to identify those with below 100% treatment.

[43] Llabrés, P. I. (2023). The State of Shipping and Oceans. Understanding the impact of global shipping on climate, the ocean and human health.

[44] Chris, F. (2023) Where does the cruise ship sewage go?

[45] Bobbe, S. (2019) All You Need to Know About Greywater Discharge from Ships.

				• Change of benthic habitat structure.[47]	
Pollution/pollution removal	Pollution – Waste	Cargo container handling, stacking and stowage. Manage vessel garbage record book and turn waste into port facilities. Use of plastic packaging for transported cargo and for catering to cruise tourists' consumption, e.g. bottles.	Containers lost at sea sink to the ocean bed and remain there for centuries, causing consistent environmental harm. On average, 140,808m^3 of waste is produced annually by a medium-sized cruise ship. A high amount of the waste volume (90%) is discharged at sea.[48]	**Environmental assets:** Seawater, aquatic resources, seabed. **Ecosystem services:** Biomass provisioning Dilution of waste and pollution Other regulating and maintenance services Degradation of ecosystem condition **Species impacts:** Decrease in marine mammal population size due to entanglement and trapping of species in lost containers	Identify larger vessels travelling on routes with high storm frequency. Frequency of container collapse is higher on larger vessels.[49] Identify cruise ships recording high sea disposal waste volumes. Identify cruise ships without plastic waste management plans and targets for waste and plastic sorting.

[47] Lyons, K. & Menezes, D. O. E. (2020) The Impacts of Shipping on Benthic Habitats.

[48] Kotrikla, A. M. et al. (2021) Waste generation and management onboard a cruise ship: A case study.

[49] Pathak, K. et al. (2024) High waves, high claims: New study on container losses.

Pollution/pollution removal	Pollution – hazardous materials	Ship breaking Ship decommissioning Ship recycling at ship end-of-life	Vessels comprise of an array of hazardous materials, such as PCB, waste oils, asbestos and more. Around two thirds of the world's ships are demolished by beaching[50]. It is a practice where the ship is taken onto sandy beaches or shallow water for dismantling. Ships are broken directly on the beach without containment and when hulls of ships are cut, they release organic pollutants, heavy metals and oils.	**Environmental assets:** Seawater, Aquatic resources, shorelines, beaches, land. **Ecosystem services:** Global climate regulation Local (micro and meso) climate regulation Hazardous materials and pollutants released impacts biomass provisioning. Water provisioning impacted by on-land shipyards or beaching if pollutants and hazardous materials leaks into the environment. Nursery population and habitat maintenance services. **Species impacts:** Hazardous materials and pollutants released in the ship breaking process impact coastal fish abundance.	Identify existence/no existence of vessel material passport. Identify existence/no existence of Inventory of Hazardous Materials (IHM).[51]

[50] MEANAGREENMAURA (2020) The 4th Shipping Market from Beaching to Green Ship Recycling.

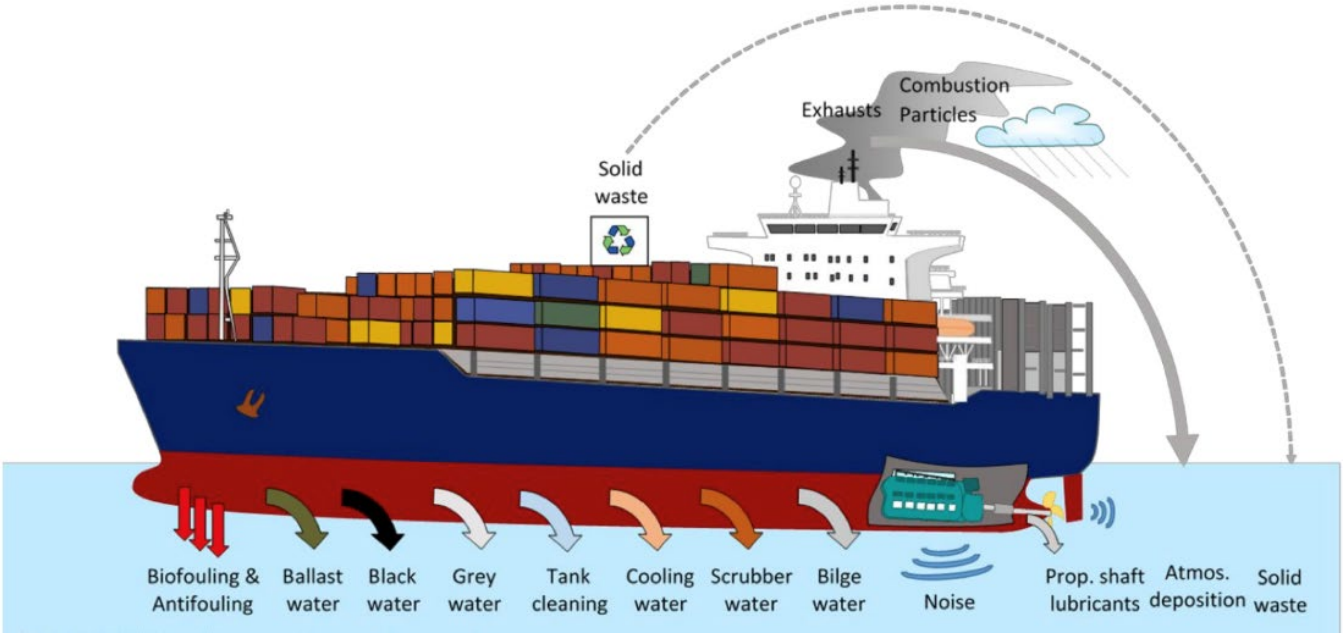
[51] IMO (2009) Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.

				Increase in species extinction risk.	
Invasive alien species introduction/removal	Introduction of invasive alien species	Ballast water tank filling, emptying and cleaning. Cleaning of the ship hull and niche areas.[52]	A multitude of marine species, carried either in ships' ballast water or on ships' hulls, may survive to establish a reproductive population in the host environment, becoming invasive, out-competing native species. This can happen both by species in ballast water and as accumulated on the ship hull and in niche areas.	**Environmental assets:** Seawater and aquatic resources. **Ecosystem services:** Biomass provisioning Genetic material services. Biological control services. Invasive species can introduce new deceases. **Species impacts:** Species extinction risk Reduction in native species abundance Degradation of ecosystem condition	Identify main ports of risk for invasive species and use eDNA of ballast water and biofouling to detect potential vessels with highest risk of causing invasive species impacts. Apply the IMO biofouling rating scale.[53]

[52] IMO (2023) Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species.

[53] IMO (2023) Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species.

Figure 5: Types of pollution linked to vessel features



Source: SHEBA project (2018) Sustainable Shipping and Environment of the Baltic Sea Region. Sustainable Shipping and Environment of the Baltic Sea Region.

E3: Dependency and impact measurement

Guiding questions:

What is the scale and scope of our dependencies on nature?

What is the severity of our negative impacts on nature? What is the scale and scope of our positive impacts on nature?

This section provides additional guidance on measurement of three impact drivers that are typically relevant to marine transportation and cruise line organisations and may be useful to consider as they are associated with less mature measurement practices in this sector.

Habitat fragmentation and collisions via ship interaction with migratory routes: The location of shipping routes has significant consequences for large, highly mobile, surface-active marine megafauna, particularly the great whales.

To measure an organisation's impacts on habitat fragmentation and wildlife collisions, an organisation can:

- Assess if and how its shipping routes intersect with marine mammal migratory routes. Marine mammals are particularly vulnerable to such impacts due to their surface-active behaviours such as breathing or basking, large body sizes and long-range ocean movements;[54]
- Capture distances travelled or time spent in areas that intersect with these migratory routes;
- Leverage Automatic Identification System (AIS) data in combination with data on migratory routes such as data from WWF[55] and databases on migratory connectivity such as MiCO; and
- Identify vessels in the fleet travelling at a speed of 14 knots or higher in these zones. Collisions between vessels and whales at speeds of 14 knots or higher have a more than 60% possibility of being fatal. This probability rises to 90% if the speed is equal to or higher than 19 knots.[56]

Noise impacts: To measure underwater radiated noise (URN) level, marine transportation and cruise line organisations may find it helpful to use the following standards, guidelines and recommendations:

[54] Pirotta, V. et al. (2018) Consequences of Global Shipping Traffic for Marine Giants.

[55] WWF (2022) Protecting Blue Corridors.

[56] European MSP Platform (n.d.) Maritime transport & marine protection and restoration.

- International Organization for Standardisation (ISO) standard 17208-1:2016 on quantification and procedures for the description and measurement of underwater sound from ships;[57]
- IMO guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life;[58] and
- Recommendations released by the International Association of Classification Societies (IACS) on the measurement of underwater radiated noise (REC176).[59]

Noise can be classified both as a pollutant and a disturbance. In the TNFD's sector-specific metrics, noise is classified as a pollutant, but organisations should follow the classification guidance of the relevant jurisdiction.

Plastic and other types of solid waste: The plastic footprint of marine transportation and cruise lines sector organisations is the quantity of plastic on board the vessels or aggregate at fleet level. Measurement of the quantity of microplastic leakage from ropes, paint and anti-fouling treatment is challenging for organisations to capture accurately. This will require identification of whether paint and anti-fouling treatment contains plastic-based binders. Best practices are yet to emerge, even though research suggests that 6% to 7% of marine coatings are leaked during the lifetime of a vessel.[60]

A cruise ship with 6,000 people on board can generate around 24 tonnes of wet waste (food waste and bio sludge from wastewater treatment plants) and 14 tonnes of dry waste per day (solid burnable waste, plastic, glass, tins and cans). Cruise lines are characterised by a medium to high risk of plastic leakage into the environment. For cruise ships, packaging represents a high share of the total plastic.[61] The plastic products most at risk of leakage, and therefore a place to start for cruise line organisations, include water bottles, disposable toiletries, plastic bags and liners, food packaging and plastic cups.[62]

E4: Impact materiality assessment

Guiding question:

Which of our impacts are material?

[57] ISO (2016) Underwater Acoustics – Quantities and procedures for description and measurement of underwater sound from ships.

[58] IMO (2023) Revised Guidelines for the Reduction on Underwater Radiated noise from Shipping to Address Adverse Impacts on Marine Life.

[59] IACS (2023) Rec 176 Measurement of Underwater Radiated Noise.

[60] GESAMP (2022) Planning of GESAMP Activities: Sea-based Sources of Marine Litter.

[61] Paiano, A. et al. (2020) Managing sustainable practices in cruise tourism: the assessment of carbon footprint and waste of water and beverage packaging.

[62] UNEP (2021) Rethinking Single-use Plastic Products in Travel and Tourism.

As for all components, refer to the Guidance on the identification and assessment of nature-related issues: The LEAP approach.

List of data sets and tools

Table 11: Additional tools for marine transportation and cruise line sector organisations in the Evaluate phase of the LEAP

Tool name	Description (relevance to sector)
Marine Protected Atlas	The Marine Protected Area (MPA) dataset contains officially designated parks, reserves and other formal conservation areas around the world that have a substantial maritime component.
Whale Safe	Whale Safe is a technology-based mapping and analysis tool displaying whale and ship data, designed to prevent fatal ship collisions with whales.

2.4. Assess nature-related risks and opportunities

This section provides additional guidance to help marine transportation and cruise line organisations with the Assess phase of the LEAP approach.

A1: Risk and opportunity identification

Guiding question:

What are the corresponding risks and opportunities for our organisation?

As governments, civil society and financial institutions increasingly recognise the scale of the impacts on nature of marine transportation and cruise line organisations, a growing set of policy, reputational and market risks and opportunities are emerging for organisations in these sectors.

Table 12 provides examples of nature-related risks and opportunities for an organisation that may arise from dependencies and impacts on nature identified in the Evaluate phase.

Table 12: Illustrative nature-related risks for marine transportation and cruise line organisations

Risk category	Risk type	Illustrative example of risks and opportunities	Impact driver/ecosystem service associated
Physical	**Acute**	**Risk**: Decrease in flood mitigation services increases the need for acute ship rerouting and longer waiting times to enter ports, driving up costs due to longer travel times.	Flood mitigation
	Chronic	**Risk**: Breakdown of water flow regulation services to waterways, such as the Panama Canal, leads to permanent rerouting and longer ship routes, which in turn increase operational costs.	Water flow regulation

		Risk: Decrease in storm mitigation services results in higher frequency and severity of storms, leading to an increase in accidents, container losses and vessel damages, increasing financial losses and repair costs.	Storm mitigation
		Risk: Higher ocean temperatures accelerate the metabolism and reproductive rates of biofouling organisms, leading to increased settlement and colonisation on submerged surfaces. This increases the costs of cleaning and maintenance and pushes up fuel consumption.	Global climate regulation
		Risk: Inability of marine ecosystems, such as coral reefs and mangroves, to deliver recreational and visual amenity services to attract cruise tourists impacts turnover and growth of cruise line organisations.	Cultural services
Transition	**Regulatory**	**Risk:** Temporary or permanent closing of cruise destinations to allow for clean up or permanent closure of destinations to enable ecosystems to regenerate.	Extent of land/ freshwater/ocean-use change/ pollutants released/recovered
		Risk: Failure to comply with laws and regulations during transit through marine protected areas (which will likely increase as a result of the Kunming-Montreal Global Biodiversity Framework Target 3 “30x30”) could result in increased fines and other sanctions, and reputational damage to companies.	Extent of land/ freshwater/ocean-use change
		Risk: Increase in regulatory speed limits in or close to marine mammal migratory zones with increased fines for non-compliance.	Extent of land/ freshwater/ocean-use change
		Risk: Introduction of regulatory noise pollution limits and increase in costs of fines for exceeding regulatory limits for underwater radiated noise.	Pollutants released /recovered
		Risk: Increase in fines due to emissions or spills to the ocean realm of oils and HNS.	Pollutants released /recovered
		Risk: Increase in fines for release of 1) black water; 2) scrubber water from EGSC systems and bleed-off water from EGR systems; 3) grey water; 4) bilge water; and fine increases due to increase in non-release zones.	Pollutants released /recovered
		Risk: Increased fines for plastic litter leakages into the ocean environment from cruise ships increase operating costs.	Pollutants released /recovered
		Risk: Costs of change to vessel anti-fouling system due to regulatory tightening to include ban on nature harmful Antifouling Paint Particles (APPs).	Pollutants released /recovered
		Risk: Increased requirements for waste sorting and recycling increase costs of fines for non-compliance.	Pollutants released /recovered
		Risk: Introduction or tightening of air emission regulatory targets drive up costs to enter ports of high emission vessels.	Non-GHG air pollutants

		Risk: Enlargement of low vessel speed zones due to no-disturbance requirements of migratory routes increase travel time impacting revenue.	Collisions with marine animals
		Risk: Introduction of liability for solid waste and pollution from ship recycling and ship decommissioning.	Pollutants released /recovered
		Risk: Introduction or increase of tourist taxation at destinations increase cruise operating costs.	Pollutants released /recovered
		Risk: Increased legal liability measure for the introduction of invasive alien species by vessels and cruise lines.	Invasive alien species

Table 13: Illustrative nature-related opportunities for marine transportation and cruise line organisations

Opportunity category	Opportunity type	Illustrative example of opportunities
Sustainability performance	Ecosystem protection, restoration regeneration	**Opportunity:** Investment in restoration and conservation of ocean ecosystems, such as mangroves and coral reefs, increases attractiveness of cruise offerings to tourists, increasing growth and turnover.
Business performance	Resource efficiency	**Opportunity:** Slow steaming to reduce risk of collisions, reduce underwater radiated noise, reduce air emissions and reduce fuel costs.
	Resource efficiency	**Opportunity**: Waste-to-energy systems converting waste on board into synthesis gas that the ship can directly use as energy, reducing waste and reducing energy costs.
		Opportunity: Installation of In Transit Cleaning of Hull to minimise biofouling and reduce downtime at drydocking yard.
		Opportunity: Vessel retrofit measures to decrease water resistance and increase energy efficiency reduce emissions to air and reduce fuel consumption costs.
		Opportunity: Savings of operational costs for fuel and reduced fees at ports with air quality targets.
	Resource efficiency /Reputational capital	**Opportunity:** Adoption of plastic recycling technologies and management practices on cruise ships lower costs of plastic procurement and improve brand image.
	Reputational capital	**Opportunity:** Real-time information on movement of whales and other migratory mammals to avoid collisions and thereby increase brand reputation.
		Opportunity: On-board wastewater treatment and water recycling systems increase green profile of ship, making it more attractive to environmentally conscious segment of cruise tourists.
		Opportunity: Deployment of new ship engines or retrofitted engines (e.g. engine insulation) minimises underwater noise impacts and increases brand reputation.
	Markets	**Opportunity:** Employment of alternative fuels opens market to clients with company environmental and CO_2 emission standards for transport of cargo and for new segments of cruise line tourists.
		Opportunity: Increased traceability of steel used in the ship structures documented via the material passport increases shipyards' willingness to pay due to increases in demand for zero emission steel.
		Opportunity: Improved reputation and income from steel recycling and upcycling at the end of vessel life.
		Opportunity: Reduction in port fees for low-noise ships.

A2: Adjustment of existing risk mitigation and risk and opportunity management

Guiding questions:

What existing risk mitigation and risks and opportunity management processes and elements are we already applying?

How can risk and opportunity management processes and associated elements (e.g. risk taxonomy, risk inventory, risk appetite) be adapted?

As for all components, refer to the Guidance on the identification and assessment of nature-related issues: The LEAP approach.

A3: Risk and opportunity measurement and prioritisation

Guiding question:

Which risks and opportunities should be prioritised?

As for all components, refer to the Guidance on the identification and assessment of nature-related issues: The LEAP approach.

A4: Risk and opportunity materiality assessment

Guiding question:

Which risks and opportunities are material and therefore should be disclosed in line with the TNFD recommended disclosures?

As for all components, refer to the Guidance on the identification and assessment of nature-related issues: The LEAP approach.

2.5. Prepare to respond and report

This section provides additional guidance to help marine transportation and cruise line organisations with the Prepare phase of the LEAP approach.

The Kunming-Montreal Global Biodiversity Framework (GBF) aims to "halt and reverse biodiversity loss" by 2030, envisioning "a world living in harmony with nature" by 2050. Achieving this implies a transition which will require significant business changes across sectors. The TNFD has published draft guidance to help organisations develop and disclose nature transition plans. These plans provide a structured way to manage responses and contributions to this transition, starting with key priorities and expanding over time as understanding improves, such as through a LEAP assessment. The LEAP Prepare phase provides initial guidance for addressing dependencies, impacts, risks, and opportunities, laying the groundwork for a nature transition plan.

P1: Strategy and resource allocation plans

Guiding question:

What risk management, strategy and resource allocation decisions should be made as a result of this analysis?

Table 14 provides examples of risk and impact mitigation measures marine transportation and cruise line organisations may want to consider. Further mitigation measures can be found in sector guidance or standards including IMO Guidelines for the Reduction of Underwater Radiated Noise from Shipping to Address Adverse Impacts on Marine Life and Guidelines and Guidance Documents Related to the Implementation of the International Convention for the Control and management of Ships' Ballast Water and Sediments. A number of the response measures are already covered by IMO or jurisdictional specific regulations.

The list in Table 14 is not intended to substitute but rather complement already existing regulatory mandated responses. All actions have been categorised by the corresponding impact driver and classified according to the Science Based Target Network's AR3T framework (Figure 3), based on the TNFD's interpretation of SBTN's AR3T framework, (pending alignment with future development of SBTN's Step 4 guidance): avoid and reduce negative impacts; restore and regenerate; transformation of business models, products, services, markets and investments; and contributing to needed systemic change inside and outside value chains.

Figure 6: SBTN's AR3T framework

Table 14: Illustrative priority and transformative actions for marine transportation and cruise line organisations

Driver of nature change	Value chain	Risks to be mitigated	Mitigation	SBTN action framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Extent of land/ freshwater/ocean-use change	**Shipping and cruise lines** Direct Offshore	Failure to comply with laws and regulations during transit through marine protected areas results in increased fines and other sanctions, and reputational damage to organisation.	Adaptation of shipping routes to avoid Particular Sensitive Sea Areas and MPAs.	X				
			Plan to practice slow steaming while travelling through an MPAs and Particular Sensitive Sea Areas.		X			
		Enlargement of low vessel speed zones due to no-disturbance requirements of migratory routes increases travel time, impacting revenue.	Implementation of slow steaming practices in areas overlapping with migratory zones.	X	X			
		Increase in regulatory speed limits in or close to marine mammal migratory zones increases fines for non-compliance.	Implementation of slow steaming practices in areas overlapping with migratory zones.	X	X			

		Increase in demand from financial market for data on collisions from investee companies. This in turn increases the risk of higher cost of capital because of lack of collision data.	Develop a collision management plan with clear technology road map for investments into data collection.	X	X			X
		Increase in monitoring of collision events by regulators, NGOs and citizen scientists leads to increasing risk of damage to brand value because of high collision numbers. Introduction of fines for ship collisions with marine mammals.	Design and roll-out of monitoring systems to collect proxy data on collisions, e.g. by using time spent in whale restricted zones. Use of sensor-enabled animal detection during navigation to avoid collisions through use of real-time data on mammal movements.	X	X			X
Extent of land/ freshwater/ocean-use change	**Cruise lines only** Direct Onshore	**Cruise lines only** Temporary or permanent closing of cruise destinations to allow for clean-up or permanent destination closing to enable ecosystems to regenerate.	**Cruise lines only** Set target for full coverage of cruise destinations operators by the Global Sustainable Tourism Council (GSTM) or another third-party sustainability certification.	X	X	X		
			Cruise lines only Design and implement a destination community engagement management plan.	X	X	X		X
			Cruise lines only Develop an investment plan and allocate financing to enhance conservation activities and management and governance of MPAs in the cruise line areas of operation.				X	

			Cruise lines only Cruise lines site and design hotels and/or ensure that hotel providers site and design hotels respecting the needs of nature.					X
			Cruise lines only Cruise lines plan itinerary to respect the needs of wildlife, such as sea turtle nesting periods.	X	X			
		Cruise lines only Inability of marine and coastal ecosystems to deliver recreational and visual amenity services to attract cruise tourists.	**Cruise lines only** Cruise lines engage in direct habitat restoration programmes in close collaboration with local communities and local authorities.			X	X	X
Pollution/pollution removal	Direct	Introduction of regulatory noise pollution limits increase costs of fines for exceeding regulatory limits of underwater radiated noise.	Set a time bound target for the reduction of Radiated Under Water Noise following IMO guidelines[63] at vessel/cruise ship level and at fleet level.		X			
			Invest in R&D to further innovation in silent ship features.	X	X			X
			Develop action plan at vessel/cruise ship and fleet level for vessel retrofits and new vessel/ship procurement to move towards silent voyages.	X	X			
		Increase in fines due to emissions or spills to the	Implement safeguards to prevent HNS and oil spills		X			

[63] IMO (2023) Revised Guidelines for the Reduction of Underwater Radiated Noise from Shipping to Address Adverse Impacts on Marine Life.

		ocean realm of oils and HNS.	(regulatory requirement).					
		Increased requirements for waste sorting and recycling increase costs of fines for non-compliance.	Develop a garbage management plan with written procedures for minimising, collecting, storing, processing and disposing of garbage (regulatory requirement).	X	X			
			Enhance the granularity of the vessel/cruise line garbage book to include data collection at ship level of waste types and percentages going to landfills versus recycling.	X	X			
			Invest in waste-to-energy systems on vessel/cruise line or invest in R&D towards that end.	X	X			X
		Increased fines for plastic litter leakage into the ocean and coastal environment by cruise lines.	Develop plastic management plan with clear plastic reduction targets to reduce plastic emitted from ship.	X	X			
		Increased fines for plastic litter leakage into the ocean and coastal environment by cruise lines.	Develop plan for zero-plastic cruise offerings with time bound targets.	X	X			X
Pollution/pollution removal Non-GHG air pollutants	Direct	Introduction or tightening of air emission regulatory targets drive up costs to enter ports of high emission vessels.	Retrofit engine or replace vessel to enable employment of alternative fuels.	X	X			

Pollution/pollution removal Wastewater discharged	Direct	Increased fines for release of 1) Black water; 2) scrubber water from EGSC systems and bleed-off water from EGR systems; 3) grey water; and 4) bilge water and due to increase in non-release zones.	Develop a sewage treatment plan including for disinfection system or holding tanks.	X	X			
			Adopt a closed loop scrubber approach.	X	X			
			Actively support the development of collaboration among governments, ship owners, operators and technology companies to develop green shipping corridors.					X
Pollution/pollution removal Pollution to the marine environment and to air	Direct	Costs of change to vessel anti-fouling system due to regulatory tightening, to include ban on Antifouling Paint Particles (APPs) that are harmful to nature.	Implementation of anti-fouling systems based on environmentally friendly paint with no nature negative impacts from antifouling paint particles.	X	X			
Pollution/pollution removal Waste generation and emissions	Direct and downstream	Introduction of liability for solid waste and pollution from ship recycling and ship decommissioning.	Develop and continuously update a cruise line and cargo ship material passport and Inventory of Hazardous Materials (IHM) to increase recyclability and circularity. (Covered by regulation except “continuously update”).	X	X			
			Ensure that the ship has an end-of-life plan to be recycled in accordance with the Hong Kong Convention (covered by regulation).	X	X			
Invasive Alien Species	Direct	Increased legal liability measure for the introduction of invasive alien species by vessels and cruise lines.	Develop a biofouling management plan following IMO guidelines for control and management of ships’ biofouling, including ensuring proactive hull cleaning or ultrasonic hull protection. Include timebound targets for increase in the % of the fleet covered.	X	X			

P2: Target setting and performance management

Guiding question:

How will we set targets and define and measure progress?

Section 3 includes metrics that organisations may find useful to define and measure progress. Organisations wishing to set targets may find it useful to follow the development of methods to set Science Based Targets for the ocean realm led by the Science Based Targets Network (SBTN).

P3: Reporting

Guiding question:

What will we disclose in line with the TNFD recommended disclosures?

As for all components, refer to the Guidance on the identification and assessment of nature-related issues: The LEAP approach.

P4: Presentation

Guiding question:

Where and how do we present our nature-related disclosures?

As for all components, refer to the Guidance on the identification and assessment of nature-related issues: The LEAP approach.

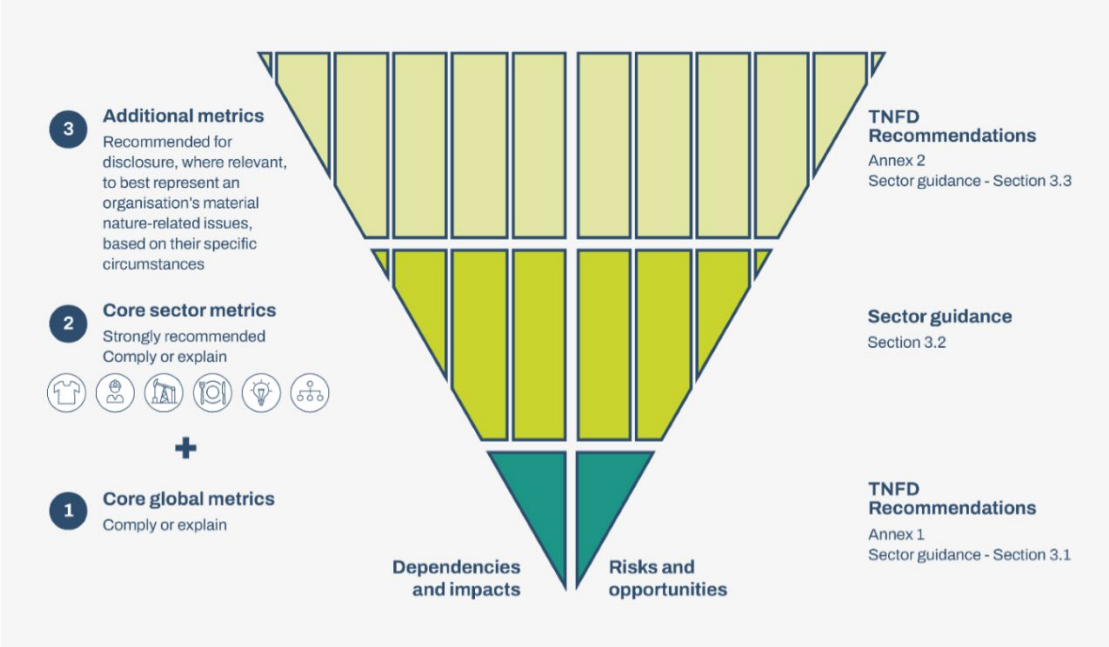
3. Sector-specific disclosure metrics and related guidance – Marine transportation and cruise lines

Sector-specific metrics form an important part of the TNFD's measurement architecture (see Figure 8). This reflects the diversity of business models across value chains and their interface with nature across and within sectors. Sector-specific metrics help financial institutions to compare organisations within the same sector, which often face similar nature-related issues.

This section provides the proposed TNFD sector-specific metrics for the marine transportation and cruise lines sector. It includes:

- Guidance on the application of the core global disclosure indicators and metrics to the marine transportation and cruise lines sector (Section 3.1); and
- Core and additional disclosure indicators and metrics for the marine transportation and cruise lines sector (Sections 3.2 and 3.3).

Figure 7: TNFD disclosure metrics architecture signposted to metrics lists



Where available, the TNFD's recommended metrics for disclosure draw from a range of existing standards and frameworks including the IFRS Sustainability Disclosure Standards, Sustainability Accounting Standards Board (SASB) Standards, GRI Standards, the CDP disclosure platform, the Kunming-Montreal Global Biodiversity Framework and other relevant UN frameworks, ESRS and others. A number of organisations, including standard-setting organisations, continue to work on identifying relevant sector-level assessment and reporting metrics. The Taskforce recommends that report preparers stay engaged with year-on-year progress on these developments and implement the latest definitions within their risk management processes and disclosures. The TNFD is working closely with standard-setting organisations and others and will periodically update this guidance on recommended sector metrics for disclosure in line with these ongoing initiatives.

Organisations in the marine transportation and cruise lines sector should refer to Annex 1 of the TNFD recommendations for further information on the core global disclosure metrics. As outlined in the TNFD recommendations, core global disclosure metrics should be reported on a comply or explain basis, with the exception of the placeholder metrics.

Where organisations are unable to report against any of the core global metrics, they should provide a short explanatory statement as to why they have not reported those metrics. An organisation should report on the core global disclosure metrics unless:

- It has not been identified as relevant and material to the organisation, e.g. not relevant to business activities or the location the organisation is operating in, or not found to be a material issue for the organisation; or

- It has been identified as relevant and material, but the organisation is unable to measure it due to limitations with methodologies, access to data or because the information is commercially sensitive. In this case, organisations should explain how they plan to address this in future reporting periods.

An organisation should report on the same basis for the core sector disclosure metrics outlined in Section 3.2.

Organisations are also encouraged to draw on the TNFD additional sector disclosure indicators and metrics outlined in Section 3.3 and any other relevant metrics to represent most accurately the organisation's nature-related dependencies, impacts, risks and opportunities.

4.1. Proposed guidance on the application of the core global disclosure metrics

This section provides guidance, where relevant, on how to apply the TNFD core global disclosure metrics in the marine transportation and cruise lines sector. If no further sector-specific guidance is provided, organisations should refer to the core global disclosure metrics.

As outlined above, core global disclosure metrics should be reported on a comply or explain basis following the guidance for the marine transportation and cruise lines sector where provided.

For the placeholder indicators on invasive alien species and the state of nature, the TNFD encourages organisations to consider and report against these indicators where possible, but these are not expected on a comply or explain basis. There are not yet widely accepted metrics for these indicators, but the Taskforce recognises their importance and will continue to work with knowledge partners to develop further guidance on these metrics.

Table 15: Proposed guidance on the application of the core global disclosure metrics

Metric no.	Core global indicator	Core global metric	Proposed guidance for this sector	Source
	GHG emissions	Refer to IFRS S2 Climate-related Disclosure Standard		
C1.0	Total spatial footprint	Total spatial footprint (km^2) (sum of): • Total surface area controlled/managed by the organisation, where the organisation has control (km^2); • Total disturbed area (km^2); and • Total rehabilitated/restored area (km^2).	**For maritime transportation and cruise line organisations:** In reporting this core global disclosure metric, an organisation should disclose: In reporting this core global disclosure metric, an organisation should include, cruise line and maritime transportation organisations should report: • the shipping distance travelled (km or nautical mile) and • the types of ecosystems the shipping routes cross. **For cruise line organisations only:** In reporting this core global disclosure metric, an organisation should include land owned, leased or managed via relations with hotel and resort providers.	TNFD
C1.1	Extent of land/ freshwater/ocean use change	Extent of land/freshwater/ ocean ecosystem use change (km^2) by:	In reporting this core global disclosure metric, cruise line and marine transportation organisations should report:	TNFD & adapted from TNFD; adapted from SASB TR-MT-160a.1 & TR-CL-160a.3

		• Type of ecosystem;[64] and • Type of business activity.	Km/nautical miles travelled and speed in marine protected areas and particular sensitive sea areas (PSSAs). Distance (km) and time spent through or near important migratory pathways.	
	Extent of land/ freshwater/ocean use change	Extent of land/freshwater/ ocean ecosystem conserved or restored (km^2), split into: • Voluntary; and • Required by statutes or regulations.	No further sector specific guidance; refer to the core global disclosure metric.	
	Extent of land/ freshwater/ocean use change	Extent of land/freshwater/ ocean ecosystem that is sustainably managed (km^2) by: • Type of ecosystem;[65] and • Type of business activity.	No further sector specific guidance; refer to the core global disclosure metric.	
C2.0	Pollutants released to soil split by type	Pollutants released to soil and water (tonnes) by type, referring to sector specific guidance on types of pollutants.	No further sector specific guidance; refer to the core global disclosure metric.	
C2.1	Wastewater discharged	Volume of water discharged (m^3), split into:	In reporting this core global disclosure metric an organisation should include (m^3): Untreated (black) water;	TNFD and Marpol Convention (1973)

[64] When disclosing on ecosystem types, refer to the International Union for Conservation of Nature Global Ecosystem Typology.

[65] When disclosing on ecosystem types, refer to the International Union for Conservation of Nature Global Ecosystem Typology.

		• Total; • Freshwater; and • Other.[66] Including: • Concentrations of key pollutants in the wastewater discharged, by type of pollutant, referring to sector specific guidance for types of pollutants; and • Temperature of water discharged, where relevant.	Discharge water from Exhaust Gas Cleaning Systems; Bleed-off water from Exhaust Gas Recirculation (EGR) systems; Treated (grey) water; and Bilge water.	
C2.2	Waste generation and disposal	Weight of hazardous and non-hazardous waste generated by type (tonnes), referring to sector specific guidance for types of waste. Weight of hazardous and non-hazardous waste (tonnes) disposed of, split into: • Waste incinerated (with and without energy recovery); • Waste sent to landfill; and • Other disposal methods. Weight of hazardous and non-hazardous waste (tonnes) diverted from landfill, split into waste: • Reused; • Recycled; and	In reporting this core global disclosure metric, an organisation should disclose waste (tonnes) disposed of, split into: • Permitted waste discharged at sea by type; • Waste discharged to reception facilities or other ships by type, referring to the requirements of the MARPOL Annex V Onboard Garbage Record Book.	Marpol appendix V (1973)

[66] Freshwater: (≤1,000 mg/L Total Dissolved Solids). Other: (>1,000 mg/L Total Dissolved Solids). Reference: GRI (2018) GRI 303-4 Water discharge.

		• Other recovery operations.		
C2.3	Plastic pollution	Plastic footprint as measured by total weight (tonnes) of plastics (polymers, durable goods and packaging) used or sold broken down into the raw material content.[67] For plastic packaging, percentage of plastics that is: • Reusable; • Compostable; • Technically recyclable; and • Recyclable in practice and at scale.	No further sector specific guidance; refer to the core global disclosure metric.	
C2.4	Non-GHG air pollutants	Non-GHG air pollutants (tonnes) by type: • Particulate matter ($PM_{2.5}$ and/or PM_{10}); • Nitrogen oxides (NO_2, NO and NO_3); • Volatile organic compounds • (VOC or NMVOC); • Sulphur oxides (SO_2, SO, SO_3, SO_x); and • Ammonia (NH_3).	Additional pollutants to report under this core global disclosure metric include: • Black carbon (BC).	SASB TR-MT-120a.1

[67] When disclosing on raw material content users should use: % of virgin fossil-fuel feedstock; % of post-consumer recycled feedstock; % of post-industrial recycled feedstock; % of virgin renewable feedstock.

C3.0	Water withdrawal and consumption from areas of water scarcity	Water withdrawal and consumption[68] (m^3) from areas of water scarcity, including identification of water source.[69]	No further sector specific guidance; refer to the core global disclosure metric.	
C3.1	Quantity of high-risk natural commodities sourced from land/ocean/ freshwater	Quantity of high-risk natural commodities[70] (tonnes) sourced from land/ocean/freshwater, split into types, including proportion of total natural commodities.	In reporting this core global disclosure metric, an organisation should include: • Fuel sourced split by fuel type, including biofuel/alternatives; and • Steel sourced.	TNFD
	Quantity of high-risk natural commodities sourced from land/ocean/ freshwater	Quantity of high-risk natural commodities[71] (tonnes) sourced under a sustainable management plan or certification programme, including proportion of total high-risk natural commodities.	In reporting this core global disclosure metric, an organisation should include: • Fuel sourced under a sustainable management plan or certification programme split by fuel type, including biofuel/alternatives. • Steel sourced under a sustainable management plan or certification programme.	TNFD
C4.0	Placeholder indicator: Measures against unintentional	Proportion of high-risk activities operated under appropriate measures to prevent unintentional introduction of IAS, or low-risk designed activities.	In reporting this core global placeholder metric, an organisation should disclose: • Proportion (%) of fleet implementing ballast water (1) exchange and (2) treatment; and	SASB TR-MT-160a.2; IMO (2023)

[68] Water consumption is equal to water withdrawal less water discharge. Reference: GRI (2018) GRI 303-5.

[69] Surface water; groundwater; seawater; produced water; third-party water. Reference: GRI (2018) GRI 303-3.

[70] Users should refer to the Science Based Targets Network (SBTN) High Impact Commodity List (HICL), species listed as vulnerable, endangered or critically endangered on the IUCN red list, and species listed in appendices I, II and III to CITES.

[71] Users should refer to the Science Based Targets Network (SBTN) High Impact Commodity List (HICL), species listed as vulnerable, endangered or critically endangered on the IUCN red list, and species listed in appendices I, II and III to CITES.

	introduction of invasive alien species (IAS)[72]		• Biofouling accumulation on vessels (% covered).[73]	
C5.0	Placeholder indicator: Ecosystem condition	For those organisations that choose to report on state of nature metrics, the TNFD encourages them to report the following indicators, and to refer to the TNFD additional guidance on measurement of the state of nature in Annex 2 of the LEAP approach: Level of ecosystem condition by type of ecosystem and business activity; Species extinction risk. There are a number of different measurement options for these indicators. The TNFD does not currently specify one metric as there is no single metric that will capture all relevant dimensions of changes to the state of nature and a consensus is still developing. The TNFD will continue to work with knowledge partners to increase alignment.	No further sector specific guidance; refer to the core global disclosure metric.	

[72] Due to the measurement of levels of invasive species for organisations being a developing area, the chosen indicator focuses on whether an appropriate management response is in place for the organisation. The additional sets of metrics contain measurement of the level of invasive species within an area. The TNFD intends to do further work with experts to define 'high-risk activities' and 'low-risk designed activities'.

[73] In disclosing this metric, organisations can leverage the IMO biofouling rating scale.

	Placeholder indicator: Species extinction risk	TNFD additional guidance on measurement of the state of nature in Annex 2 of the LEAP approach: • Level of ecosystem condition by type of ecosystem and business activity; • Species extinction risk. There are a number of different measurement options for these indicators. The TNFD does not currently specify one metric as there is no single metric that will capture all relevant dimensions of changes to the state of nature and a consensus is still developing. The TNFD will continue to work with knowledge partners to increase alignment.	No further sector specific guidance; refer to the core global disclosure metric.	

4.2. Proposed core sector disclosure indicators and metrics

The proposed TNFD core sector disclosure metrics for the marine transportation and cruise lines sector are outlined below. These metrics are recommended by the TNFD to be disclosed by all report preparers in the sector on a comply or explain basis.

Table 16: Proposed core sector disclosure indicators and metrics

Metric category	Metric subcategory	Metric No.	Indicator	Proposed core sector disclosure indicator or metric	Source
Response	Dependency, impact, risk and opportunity management: Changes to nature (dependency and impact): mitigation hierarchy steps	MT.C23.0	Pollutants avoided during downstream ship recycling or decommissioning	Proportion (%) of vessel recycling activities covered by documentation from the recycling facility that hazardous waste, as listed in annexes 1,2 and 3 of the Hong Kong Convention and generated as part of downstream ship recycling, is not released to soil, air or water.	Hong Kong Convention (2009)
Impact driver	Pollution/pollution removal	MT.C2.0	Noise pollution	The TNFD is especially seeking feedback on the design of the metric including whether it should be measured at average, highest and lowest speed levels. Ship underwater radiated noise level measured as Source Level or Radiated Noise Level (SL or RNL) in dB re 1 µPa @ 1m at average, highest and lowest voyage speed levels.	TNFD/ ISO 17208-1:2016/ISO 18405:2017
Impact driver	Pollution/pollution removal	MT.C2.1	Emissions to the ocean realm	Volume of emissions (m^3) to the ocean realm of harmful substances listed in MARPOL annexes I – III.	MARPOL (1973)

Impact driver	Pollution/pollution removal	MT.C2.3	Containers lost at sea	Weight (tonnes) of cargo and containers lost at sea, split into hazardous and non-hazardous cargo.	TNFD

4.3. Proposed additional sector disclosure indicators and metrics

The proposed TNFD additional sector disclosure metrics for the marine transportation and cruise lines sector are outlined below. The TNFD encourages all report preparers in the sector to draw on these and any other relevant metrics where relevant to best represent an organisation's material nature-related dependencies, impacts, risks and opportunities.

Table 17: Proposed additional sector disclosure indicators and metrics

Metric category	Metric subcategory	Metric No.	Indicator	Proposed core sector disclosure indicator or metric	Source
State of Nature	Ecosystem Condition	MT.A5.0	Chemical condition	• Change in pH (pH and % increase or decrease); • Eutrophication (ug/l); and • Volume of suspended matter (g/m³).	TNFD
State of Nature	Species Extinction Risk	MT.A5.3	Marine mammal species extinction risk	Number of marine mammal species the organisation interacts with via routing, defined as number of mammal species migratory routes that a ship crosses that are on the IUCN Red List of Threatened Species and classified globally as "Critically Endangered (Cr)" and "Endangered (En)".	TNFD

Impact driver	Land/freshwater/ocean-use change	MT.A1.0	Marine animal collisions	Vessel collisions with marine animals, including number of collisions, species and locations (gps co-ordinates).	TNFD
Impact driver	Land/freshwater/ocean-use change	MT.A1.1	Anchoring footprint	Number of total anchoring events by vessel and cruise line fleet.	TNFD
Impact driver	Pollution/pollution removal	MT.A2.0	Microplastics and heavy metals from antifouling agents	Weight (tonnes) of antifouling paint particles released from the fleet.	TNFD
Impact driver	Pollution/pollution removal	MT.A2.1	Releases to the environment	Number and aggregate volume (m^3) of spills and releases to the environment.[74]	MARPOL regulation on oil spills; SASB TR-MT-160a.3
Impact driver	Pollution/pollution removal	MT.A2.2	Pollutants generated through downstream ship recycling or decommissioning	Pollutants to land, air and water and waste generated as part of downstream vessel recycling or decommissioning, including the released hazardous materials listed in annexes 1, 2 and 3 of the Hong Kong Convention.	Adapted from Hong Kong Convention (2009)
Impact driver	Pollution/pollution removal	MT.A2.3	Fleet using alternative energy	Proportion (%) of fleet using alternative fuel energy by type (e.g. hydrogen ammonia, methanol or biofuels), including targets (%) for clean auxiliary power.	TNFD

[74] Refer to SASB TR-MT-160a.3. and MARPOL Annex I & 2 of a specification of spills.

Impact driver	Pollution/pollution removal	MT.A2.4	Shipping of fossil fuels and hazardous substances	**Shipping only** Proportion (%) of total fleet transporting: (1) fossil fuels and bunkering; and (2) hazardous substances.	TNFD

5. Glossary

Sector-specific concepts and definitions are defined in this section. The TNFD glossary will be updated to include these concepts once the marine transportation and cruise lines sector guidance is finalised, based on market consultation and feedback. Readers are recommended to visit the TNFD glossary for other terms used throughout the document.

Concept	Definitions
Antifouling Paint Particles (APPs)	Residues generated primarily during boat cleaning and repair in boatyards, marinas and fishing harbours. These residues have a heterogeneous composition due to the presence of pigments, solvents, metals, and organic and organometallic biocides in antifouling coatings. Source: Soroldoni, Sanye et al. (2020). Chemosphere.
Antifouling treatment/system	Anti-fouling system means a coating, paint, surface treatment, surface or device that is used on a ship to control or prevent attachment of unwanted organisms. Source: AFS Convention, Article 2(2) (2001)
Autonomous Information System (AIS)	Automatic identification system (AIS) transponders transmit a ship's position, identification number and accompanying details about the ship. AIS maritime transponders broadcast static, dynamic and voyage information. This information – destination, type of ship, International Maritime Organization (IMO) number, etc. – can be manually updated by a ship's crew, or viewed and stored digitally. Source: Windward (2024)
Ballast water	Ballast water means water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship. Source: BWM Convention, Art. 1.2 (IMO, 2004).
Bilge water	The water that collects in the bilges of a vessel which generally becomes foul and noxious. Bilge water also contains fluids from machinery spaces, internal drainage systems, sludge tanks and various other sources. This mixture is collected in the bilge water holding tank, which generally is maintained at an elevated temperature. Regardless of its source, bilge water must be treated to reduce the oil content to levels meeting international regulations for release into the environment. Source: Wartsila (2024)
Biofouling	Biofouling is the accumulation of aquatic organisms such as microorganisms, plants and animals on surfaces and structures immersed in or exposed to the aquatic environment. Biofouling can include pathogens.

	Source: Resolution MEPC.207(62)
Biofuel	'First-generation biofuels' to refer to fuels made from biogenic feedstocks using mature and commercialised technologies. Source: Phillips, J. et al. (2024). Cerulogy.
Biomass-based fuels	Biomass-based fuels are sometimes known as 'second-generation biofuels' ('2G biofuels'). They are produced from cellulosic and ligno-cellulosic feedstocks – for example, wood residues from forestry activities, crop residues like wheat straw, sawdust from wood mills, waste cardboard or purpose-grown perennial grasses. Source: Phillips, J. et al. (2024). Cerulogy.
Black carbon	Black carbon, commonly known as soot, is a component of fine particulate air pollution (PM2.5). It is formed by the incomplete combustion of wood and fossil fuels, a process which also creates carbon dioxide (CO_2), carbon monoxide and volatile organic compounds. Source: Climate and Clean Air Coalition
Black water	Any waste from toilets or urinals. Source: EPA
Bleed-off water	Water to be discharged directly or via a holding tank to the sea from an EGR water treatment system. Source: MEPC 73/19/Add.1
EGSC systems	Exhaust Gas Cleaning Systems (EGCS), or 'scrubbers' as they are commonly known, remove sulphur from the exhaust of marine engines or boilers. Source: International Chamber of Shipping
EGR	Exhaust Gas Recirculation is a method used in ship engines to reduce NOx emissions at the source. Recirculation of about 30% of the exhaust gas increases the heat capacity and lowers the oxygen content during combustion, which in turn reduces the flame peak temperature thereby minimizes NOx formation. Source: MEPC 73/19/Add.1
Electro-fuels	Electro-fuels are made using electricity to 'electrolyse' water into hydrogen and oxygen. Source: Phillips, J. et al. (2024). Cerulogy.
Grey water	Drainage from dishwater, galley sink, shower, laundry, bath and washbasin drains that does not include drainage from toilets, urinals, hospitals and animal spaces, as defined in regulation 1.3 of MARPOL Annex IV, nor drainage from cargo spaces. Source: IMO BWM.2/Circ.82
HNS pollution	Hazardous and Noxious Substances (HNS). Any substances, materials and articles carried on board a ship as cargo, referred to in (i) to (vii) below: (i) oils, carried in bulk, (ii) noxious liquid substances, carried in bulk (iii) dangerous liquid substances carried in bulk (iv)

	dangerous, hazardous and harmful substances (v) liquefied gases (vi) liquid substances carried in bulk (vii) solid bulk materials possessing chemical hazards (for the full definition, see IMO (2010) HNS Protocol). Source: IMO (2010) HNS Protocol article 1.5
Marine Protected Areas	A geographically defined marine area that is designated and managed to achieve specific long-term biological diversity conservation objectives and may allow, where appropriate, sustainable use provided it is consistent with the conservation objectives. Source: United Nations (2023)
Particularly Sensitive Sea Areas (PSSA)	An area that needs special protection through action by IMO because of its significance for recognised ecological or socio-economic or scientific reasons and which may be vulnerable to damage by international maritime activities. Source: IMO Resolution A.982 (24)
(Port) reception facilities	Any fixed, floating or mobile facility capable of receiving MARPOL wastes/residues from ships and fit for that purpose. Source: IMO MEPC.1/Circ.834/Rev.1 March, 2018
Special Areas	MARPOL defines certain sea areas as "special areas" in which, for technical reasons relating to their oceanographical and ecological condition and to their sea traffic, the adoption of special mandatory methods for the prevention of sea pollution is required. Under the Convention, these special areas are provided with a higher level of protection than other areas of the sea. Source: MARPOL (1973)
Speed restriction zones	Speed restriction zones mean an area of the ocean specified within which a vessel must not operate at a speed above a defined limit. These zones can either be designated by national regulation or by IMO and the speed restrictions can be either static or dynamic. Static speed limits remain unchanged across years and within a given year, whereas dynamic are seasonal specific speed limits. Organisations can leverage The Whale Chart to get an overview over national speed restriction zones. Source: Law Insider
Underwater Radiated Noise (URN)	Underwater radiated noise (URN) refers to noise from any ship at a point distance. Source: MEPC.1/Circ.906

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