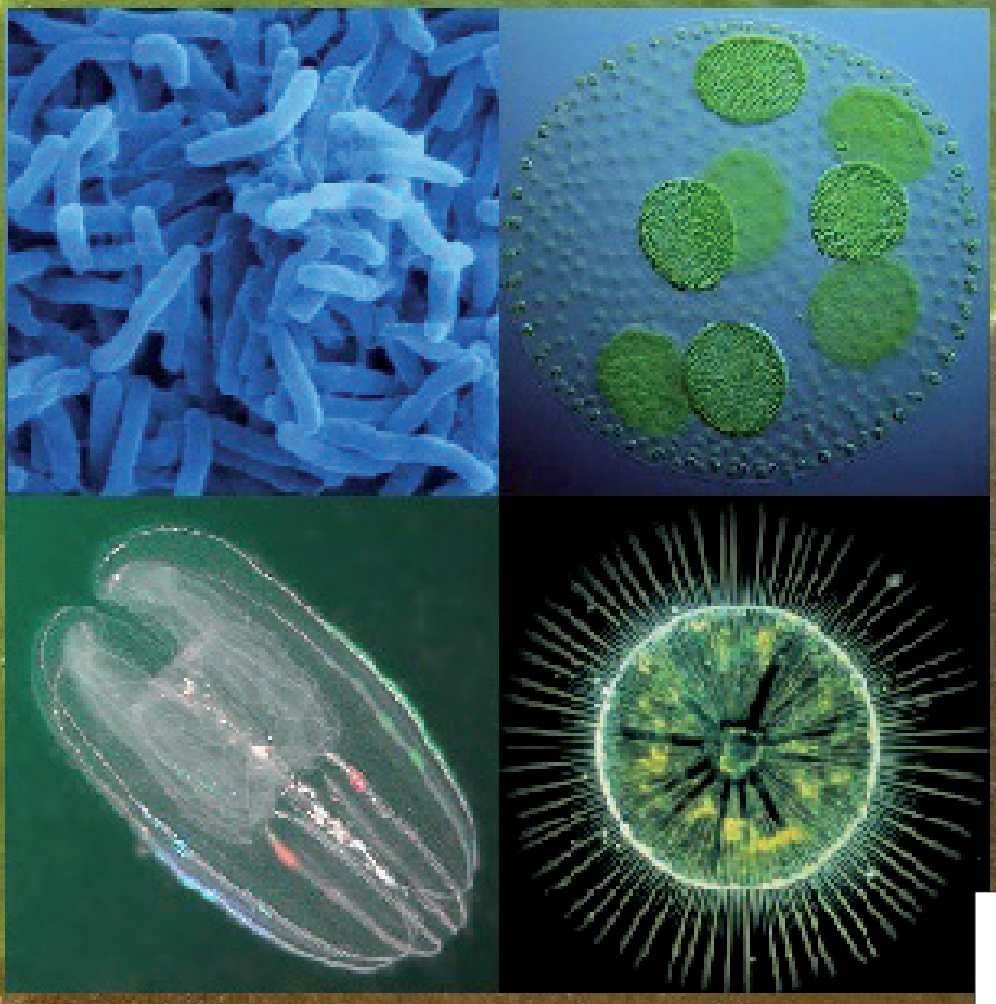
Risk assessment guide: introduction of non-indigenous species via ballast water



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Ministère de l'Écologie, du Développement durable et de l'Énergie

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Risk assessment guide: introduction of non-indigenous species via ballast water

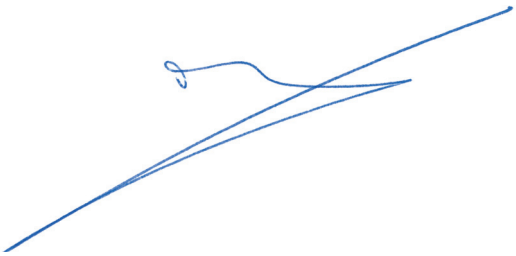
Summary

Introduction

Maritime transport has undergone many changes since the 19th century. One of these changes has been the replacement of solid ballast with water. In other words, separate tanks located in the hull of the ship are filled with water to act as ballast. This water, which contains a wide variety of life forms, may then be discharged at the next port of call, releasing any organisms that have survived the voyage. Depending on operating conditions, additional water may be taken on board at different locations. As such, the water contained in a ballast tank may come from multiple sources.

As was the case with solid ballast (which contained numerous invasive terrestrial species), the use of ballast water has proven disastrous for the marine environment. Ballast water may contain a wide variety of organisms such as viruses, bacteria, microscopic plankton, and even fish measuring up to 12 cm in length. The bottoms of these tanks and the layers of sediment on their walls are generally colonised by other organisms. Although the prevailing conditions within these tanks, and in the environments in which the ballast water is taken on board or discharged, are unfavourable to many species, many have nevertheless demonstrated an ability to survive in these conditions.

Director of Maritim Affairs
Régine BREHIER



1 - General introduction

1.1 - Non-indigenous species: definitions

Non-indigenous species may generally be introduced into a new environment in one of three ways. The first is through «intentional introduction». The second and third methods involve «unintentional introduction», involving either «escaped species», i.e. species that are imported intentionally but are not deliberately introduced into the natural environment, or «clandestine species», i.e. species that are transported unintentionally[1].

The primary introduction vectors, i.e. between source region and target region, may differ from the dissemination vectors within the target region. These vectors, when coupled with environmental factors, often explain the dissemination and subsequent invasion of non-indigenous species within a target region. In mainland France and Europe, the main introduction and dissemination vectors are maritime transport and aquaculture[2].

The term «non-indigenous species» refers to species, subspecies or lower taxa transported by human activity outside their natural and potential area of distribution and dispersion[3]. This introduction causes a geographical discontinuity between the species' natural area of distribution and the new area. This definition includes any parts, gametes or propagules of such species that may survive and ultimately reproduce.

For the purposes of this guide, the term «non-indigenous species» covers all animal and plant species at all stages of their life cycle, and includes all environmental statuses associated with such species, as described in Table 1.

[1]BOUDOURESQUE C-F, 2008.
[2]QUEMMERAIS F. et al., OSPAR, Quality Status Report, 2010.
[3]ICES, 2005.

Table 1 : Definition of environmental statuses of non-indigenous species and likely impact levels.

Environmental statuses of non-indigenous species	English term(s)	Synonym(s)	Meanings (level of biological pressure = biopollution)	Likely impact level
Introduite	*Introduced*	*non native, alien, non indigenous, allochtonous, exotic*	Species (including all parts, gametes or propagules of such species that may survive and ultimately reproduce) transported and disseminated, whether intentionally or accidentally, by a human vector into a habitat located outside its area of natural distribution. This also includes genetically modified organisms (e.g. polyploids) and any hybrids with indigenous populations. Secondary introductions (following the first introduction) may occur via human or natural vectors, to sites outside (new introduction) or within (translocation) its current area of distribution.	None, for as long as the species is not established (cannot be predicted at this stage)
Occasionnelle	*Casuals*	*persisting after cultivation, occasional escapes, «adventive», occasional*	The organism reproduces in its new region, but the population is still not large enough to guarantee long-term establishment.	None to low, for as long as the species is not established (difficult to predict at this stage)
Établie	*Established*	*naturalized*[4]	The organism reproduces independently and regularly in its new region, and the population is sufficiently large to achieve medium-term to long-term establishment.	Low to significant, for as long as a species does not become invasive (cannot be predicted in the short or longer term)
Invasive	*Invasive*	*spreading*	Established species, with a population and/or area of distribution in the new region that increases significantly and rapidly. The intensity of this phenomenon may vary over time, or even stagnate or regress in the medium to long term. Certain recurring large-scale plankton blooms may also fall within this invasive category.	High, becoming increasingly irreversible
Ingénieurs	*Engineering*		At the final stage of proliferation, some species may become engineers or even architects[5], i.e. species that modify ecosystem functions (at the level of species, habitats or even the flow of materials between these components).	Very high and generally irreversible

Biological pressure: biological pressure indicators reflect the pressure exerted by human activities on the environment, including natural resources. There are two types of pressure, indirect and direct. These indicators reflect the intensity of emissions or resource usage, trends in these intensities, and changes over a given period.

[4]*The term «naturalised» is ambiguous in the sense that it is unclear whether the species remains alien or not. An alien species that has been established for several centuries is effectively naturalised and is included in specific inventories with no additional information. There is an ongoing scientific debate over the terms «naturalised» and «established». An «established» species reproduces in a given environment but is still considered alien. The term «integrated», which is sometimes used to refer to an established introduced species, does not have any specific ecological meaning, since an established species is, by definition, integrated into the ecosystem and forms part of its dynamic. (in Guérin et al., 2012)*

[5]*CROOKS J-A, 2002, 2009.*

Biological pollution or biopollution : the effects/impacts of a non-indigenous species, generally invasive, to such an extent that these cause significant changes to the environment at one or more levels: individual level (e.g. parasites and pathogens), population level (e.g. hybridisations, predation), habitat level (e.g. change of abiotic structure or characteristic communities), or ecosystem level (e.g. changes to material flows, especially at trophic level).

In terms of the harm caused and recommended responses, biopollution can have negative consequences for the environment, the economy and/or human and animal health. Current knowledge on this subject is limited, however, and this concept therefore remains vague and qualitative in nature.

For certain types of consequence, it is often difficult to qualify, quantify and prioritise the changes caused, and therefore to define a threshold above which an impact may be considered negative, significant or major. Nevertheless, this impact may result in significant harm, for example causing substantial economic losses (mass mortality events in aquaculture), ecological losses (disappearance of an endemic or heritage species/habitat), or health impacts (disease or mortality caused by toxic species/strains).

These terms do not cover impacts and harm due to more general ecosystem malfunctions (subject to other types of pressure) which, for example, can lead to the proliferation of native species. Here, these terms are reserved for this specific type of biological pressure. Nevertheless, an ecosystemic approach involves understanding, monitoring and managing all types of biological malfunction, whether these are connected with a specific type of pressure or more global changes.

Recently, proposals have been published to introduce classification and standardisation systems relating to the assessment of biopollution and the associated harm.

Vectors and pathways: a vector is the physical process and mode of transport by which species are carried from one geographical area to another (e.g. ballast water, fouling organisms on the hulls of ships, transfer of shellfish species, etc.). A pathway is the geographical route via which a species is transported from one geographical area to another, by one or more vector(s). Where a new species is introduced, it is therefore carried via one or more pathway(s) from its region of origin to the new region in which it is observed, and via one or more vector(s) (natural, human, deliberate or accidental). A given species may have been transported on a given pathway or pathways by more than one vector (either observed or suspected). In order to understand how introduced species have arrived in a given natural environment, it is therefore essential to know both the vectors and the pathways associated with these vectors.

The mode of transport by which species is carried outside its area of natural distribution may therefore be referred to as the introduction vector and pathway. The species that is transported to and released in this new environment then becomes a non-indigenous species. If the species is released within its own area of distribution (including an invasive, non-indigenous species that has extended its new area of distribution), this is known as a translocation vector and pathway. In either case, the frequency (number of times that the species is released within a given period of time) and intensity (number of individuals of a given species released in a given geographical area) of these flows define the propagule pressure associated with a vector, for a given species, in a given geographical area.

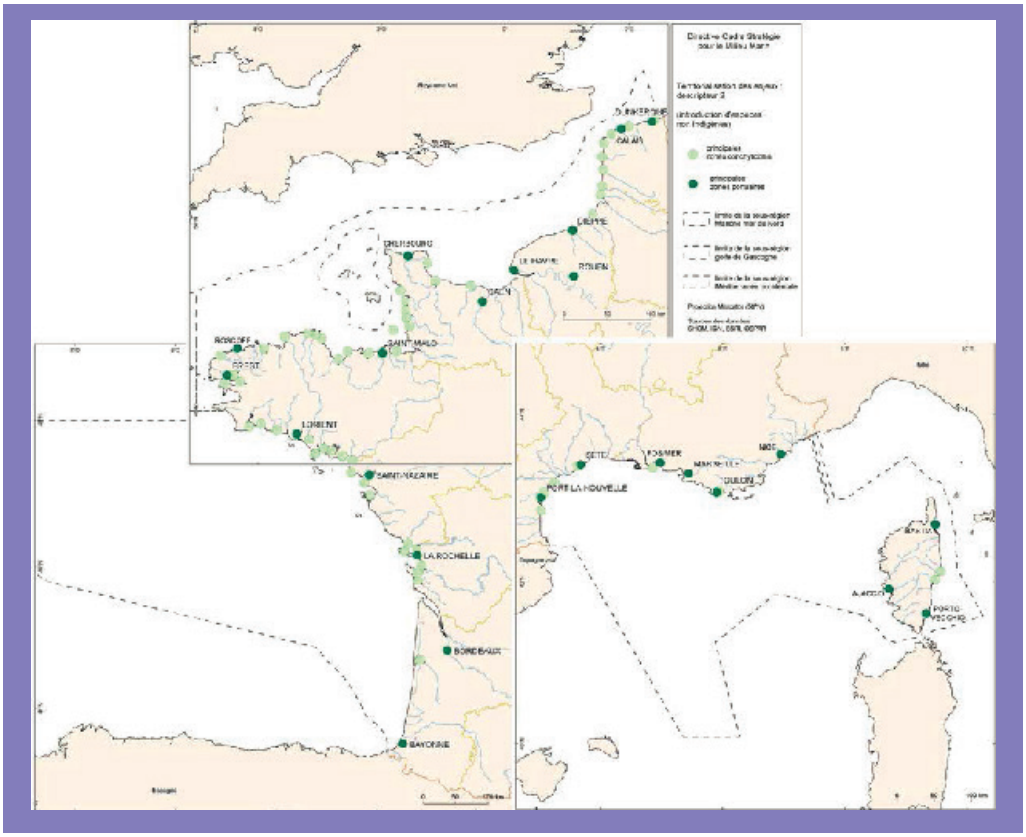
Alt-risk area: a geographical area in which the propagule pressure (due to vector flows) is high, and therefore the risk of introduction is high (e.g. ports, aquafarms).

Vulnérable area: a geographical area noted for its specific or remarkable biodiversity (rare, endangered, endemic or heritage habitats/species), or where the geographical or ecological characteristics make it particularly sensitive to biopollution (e.g. ocean islands, lagoons, gulfs, areas under high pressure, etc.). It is therefore important to limit, as far as possible, the risks of introduction of non-indigenous species in these areas, and to introduce introduction early warning systems.

Reservoir area: a geographical area that houses one or more established, non-indigenous species (or recurrent for plankton), that are likely to be transported by a vector, resulting in secondary propagation (e.g. the Étang de Thau lagoon system, which houses numerous such species, shoals of slipper shells spread by dragnet fishing, seaweed on the sea bed spread by the anchors of ships, etc.).

«bio-impactée» area: a geographical area that is largely subject to (extent, intensity) and impacted by «non-indigenous species» biological pressure, and according to as-yet undefined thresholds.

Figure 1: *Location of the main commercial shipping ports and shellfish waters in mainland France, representing major potential entry points (at-risk areas) for non-indigenous species. This map does not show marinas and other at-risk areas, particularly those areas through which living organisms are imported (excluding shellfish waters), as well as areas sensitive to biopollution. The «Celtic Sea» sub-region does not present any major risk and is therefore not included. (source: Guérin & Lejart, 2013, based on Quemmerais, Amice et al., 2011, adapted to include the main ferry ports).*



1.1.2 - Challenges

Under favourable environmental and ecological conditions, certain non-indigenous species become invasive or even engineers. These species are often less sensitive to ecological regulation factors (predation, competition, etc.) than in their original, natural area of distribution.

As a result, the populations of these species grow rapidly and often colonise their new environment, causing disruption and major changes to ecosystems and their functions. These disruptions and changes can impact the environment, the economy and human health, as shown in Table 2.

Table 2 : Definition and typology of impacts caused by invasive marine species.

Impact category	Nature of impacts
Main ecological impacts	▪ Specific diversity (composition of species within a community): introduced species replace indigenous species, which may be eliminated, thereby changing the very nature of the communities. This disruption varies according to the scale considered. Locally, specific diversity may increase. However, as habitats (biotopes and associated communities) become more uniform on a wider scale, this may lead to a reduction in biodiversity at habitat level. ▪ Genetic diversity: the presence of established, non-indigenous species may lead to hybridisation with compatible indigenous populations. The indigenous species may therefore disappear via a process of «genetic dilution». ▪ Ecological niche: if the non-indigenous species is more competitive than the indigenous species (occupation of space, access to resources, etc.), it may cause spatial and/or temporal changes to pre-existing ecological niches, and therefore to ecosystem structure and functions. ▪ Ecological function: «domino-effect» consequences leading to changes to ecological functions, such as changes to the trophic network associated with changes to the biotope, the elimination (predation, competition, parasitism, toxicity, etc.) and/or addition of new species, as well as changes to other ecological functions (productivity, reproduction, sedimentary changes, etc.). ▪ Habitat (communities of species and associated biotopes): introduced engineer/architect species modify/build new habitats and may replace indigenous habitats, either at specific community level, or in terms of physico-chemical conditions (fluid dynamics, substrate, access to light, water quality, etc.). ▪ Landscape (habitat complex): changes to habitats may, at a larger scale, result in changes to and greater uniformity in underwater and coastal landscapes.
Main impacts on human and animal health	▪ Parasites, toxicity, viruses and diseases, in some cases fatal, impacting human health through contact or ingestion. ▪ Parasites, toxicity, viruses and diseases, in some cases fatal, impacting the populations and stocks of farmed marine animal species.
Main economic, social and cultural impacts	▪ Economic losses in the natural resource exploitation sector (e.g. fishing, aquaculture, aggregates, etc.). ▪ Economic losses in the tourism sector. ▪ Costs of infrastructure cleaning and repair operations. ▪ Costs of inspection, treatment and quarantining operations. ▪ Degradation of the cultural values and use values of the marine and coastal environment.

Over recent decades, with the growth of international trade and technological developments (ship sizes and ballasts), particularly in the transoceanic maritime transport sector, coastal States have faced a new type of ecological problem caused by the regular release of alien living organisms into the local environment.

An estimated 7,000 species are transported worldwide each day in ballast water, and 5 billion tons of ballast water are transported across the globe each year. Transport in ballast water is currently considered one of the main causes of introduction of non-indigenous species. According to Ifremer, approximately 22 million tonnes of ballast water are released into French ports each year.

The aim of this guide is to assist with implementation of the binding recommendations of the Ballast Water Management Convention.

2 - International regulations

2.1 - The International Convention for the Control and Management of Ships' Ballast Water and Sediments

The issue of harmful aquatic organisms contained in ballast water was first addressed in 1988 by the International Maritime Organization (IMO), primarily under the influence of Canada and Australia. During the 1990s, only the non-binding provisions were ratified within the framework of the IMO[6]. The International Convention for the Control and Management of Ships' Ballast Water and Sediments was adopted by the IMO on 16 February 2004[7]. France formally ratified the convention via Act no. 2008-476 of 22 May 2008.

2.1.1 - General obligations

The Convention is intended to apply to all ships, designed to transport ballast water[8], with no tonnage-related conditions.

Its main objective is to control ballast water loading and discharge operations, which are often performed in environments with diverse characteristics, in order to limit the introduction of invasive species. The Convention also governs the management of sediment that may be located within ballast tanks following the accumulation of organic matter during tank filling or emptying operations.

It does not cover the management of sediment contained in ballasts, where this sediment is disturbed during ship repair operations. This falls under the responsibility of shipyard operators or managers. This type of practice is governed by other Guidelines issued by the International Maritime Organization[9].

The government of the flag State must determine the management method applicable to these ships, according to their Ballast Water Capacity and their date of construction, according to the implementation deadline stated in Regulation B-3, on the understanding that all ships (new or otherwise) must comply with the conditions of Regulation D-2 by 2016.

There are three possible management methods:

- Ballast water exchange (Regulation D-1) is considered a transitional solution suitable for the majority of ships: this must be performed with an efficiency of at least 95% volumetric exchange of ballast water, or three times the volume of each ballast water tank for ships using the pumping-through method. This exchange must take place at least 200 nautical miles from the nearest land and in water at least 200 metres in depth, or where this is not possible, at least 50 nautical miles from the nearest land (Regulation B-4.1)[10] ;

[6] *Resolution A.868(20), adopted on 27 November 1997.*

[7] *The Convention will enter into force 12 months after ratification by 30 States, representing 35% of world merchant shipping tonnage.*

[8] *Excluding «any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service» (article 3, paragraph 2, point e) of the Convention).*

[9] *Resolution MEPC.152(55): Guidelines for Sediment Reception Facilities (G1).*

[10] *A ship may be exempt from these requirements if the master reasonably decides that such exchange would threaten the safety or stability of the ship, its crew, or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition (Regulation B-4.4). The Convention also states that, where the master's choice is not made for the reasons indicated in Regulation B-4.4, the reasons for the exemption must be entered in the ballast water record book (G4, 1.2.1.4).*

- Ballast water treatment (Regulation D-2) is envisaged as the long-term solution, but requires the development of treatment processes. Regulation D-2 sets qualitative criteria for ballast water in terms of the number of micro-organisms it may contain, and therefore imposes a treatment system ;

- Discharge of ballast water and sediment to a reception facility (Regulation B-3.6).

2.1.2 - Exemptions

Regulation A-4 of the Convention allows States, in waters under their jurisdiction, to grant exemptions to any requirements to apply Ballast Water Management regulations (in particular Regulation B-3):

Regulation A-4:

1. A Party or Parties, in waters under their jurisdiction, may grant exemptions to any requirements to apply regulations B-3 or C-1, in addition to those exemptions contained elsewhere in this Convention, but only when they are:

1.1 granted to a ship or ships on a voyage or voyages between specified ports or locations; or to a ship which operates exclusively between specified ports or locations;

1.2 effective for a period of no more than five years subject to intermediate review;

1.3 granted to ships that do not mix Ballast Water or Sediments other than between the ports or locations specified in paragraph 1.1; and granted based on the Guidelines on risk assessment developed by the Organization.

Exemptions granted pursuant to paragraph 1 shall not be effective until after communication to the Organization and circulation of relevant information to the Parties.

2. Any exemptions granted under this regulation shall not impair or damage the environment, human health, property or resources of adjacent or other States. Any State that the Party determines may be adversely affected shall be consulted, with a view to resolving any identified concerns.

3. Any exemptions granted under this regulation shall be recorded in the Ballast Water record book.

In other words, one of the Parties may grant exemptions in waters under its jurisdiction, provided that certain conditions and procedures are met.

The Convention will apply to a ship that makes a voyage between a French port and the port of a third State. As such, the ship may not request the granting of an exemption. Instead, the request must be made by the charterer of the ship concerned to the government of the flag State, which will forward the file to the coastal State and other third States concerned.

In order to be admissible, the exemption request must comply with three conditions (on a cumulative basis):

- the ship must be operated exclusively between specified ports
- the ship must only fill its ballast tanks with water from these specified ports
- a prior risk assessment must be performed.

This means that exemptions are only possible for one or more ships performing one or more specified voyages. The various coastal States involved may only grant these exemptions following the submission of an impact analysis demonstrating the absence of risks. At best, this is only conceivable for local voyages.

2.1.3 -IMO guidelines for invasion risk assessment

The Guidelines for Risk Assessment under Regulation A-4 of the BWM Convention (G7) were adopted on 13 July 2007 by the IMO Marine Environment Protection Committee (MEPC)[11].

Three methods may be used, separately or in combination:

- **environmental matching risk assessment:** this involves comparing the characteristics (temperature, salinity, nutrients, oxygen) of the donor and recipient regions to indicate the likelihood of establishment of harmful species in the new environment.
- **species' biogeographical risk assessment:** this involves observing the biogeographical distributions of species, identifying their origins, and detecting known invasion or colonisation phenomena.
- **species-specific risk assessment:** this involves identifying so-called species «of concern» in a given port, State or geographical region, i.e. those species that may impair or damage the environment, human health, property or resources.

[11] *Resolution MEPC.162(56): Guidelines for Risk Assessment under Regulation A-4 of the BWM Convention (G7).*

2.2 - Other international policies governing the invasion of non-indigenous species

2.2.1 - Marine Strategy Framework Directive 2008/56/EC of 17th June 2008 (MSFD)

Directive 2008/56/EC of the European Parliament and of the Council of 17th June 2008, known as the «Marine Strategy Framework Directive»[12], encourages European Union Member States to take measures to reduce the impacts of their activities and to maintain or achieve Good Environmental Status of marine waters by 2020. In particular, qualitative descriptor 2 seeks to limit disruption caused by non-indigenous species.

In France, the Directive has been transposed into the Environment Code (articles L.219-9 to L.219-18 and R.219-2 to R.219-17) and applies to mainland areas under French sovereignty or jurisdiction. The latter are divided into four marine sub-regions: English Channel-North Sea, Celtic Seas, Bay of Biscay and Western Mediterranean. A marine environment action plan (PAMM) is developed and implemented for each marine sub-region. This action plan contains five elements:

1. An initial assessment of the environmental status of marine waters and the environmental impact of human activities on these waters (conducted in 2012):

The issue of non-indigenous marine species was covered in specific reports as part of the initial assessment of environmental status, pressures and impacts, as well as the economic and social analysis. The knowledge and expertise mobilised on these four marine sub-regions provide a recent, documented inventory of the situation in mainland France. The results of these assessments indicate that non-indigenous species represent major environmental and socio-economic challenges.

2. The definition of Good Environmental Status for these waters, based on qualitative or quantitative descriptors (conducted in 2012):

Non-indigenous species are covered by descriptor 2 for defining Good Environmental Status (GES), which states that «non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems». Commission Decision 2010/477/EU of 1 September 2010[13] sets out the potential criteria and indicators that may be used to measure the achievement of descriptor 2. The Decision recommends an initial state characterisation focusing on pressure from the introduction of non-indigenous species (criterion 2.1), with a view to assessing the scale of the associated environmental impacts (criterion 2.2). The qualitative definition of GES has been transcribed into French law[14], as indicated in Table 3. The indicators have not yet been finalised, and are still under development as part of national and international MSFD-related work.

[12] *Available at http://eur-lex.europa.eu/*

[13] *Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine water. 2010/477/EU.*

[14] *Order of 17 December 2012 on the definition of good environmental status of marine water, NOR: DEVL1240628A, Official Journal of the French Republic, text 89 of 168. Available at http://www.legifrance.gouv.fr.*

Table 3 : GES criteria and indicators relating to descriptor 2

GES criteria	French definition of GES
2.1. Abundance and state characterisation of non-indigenous species, in particular invasive species	Good Environmental Status is achieved when the frequency and intensity of new introductions of non-indigenous species, via human activity, are reduced to a minimum level.
2.2. Environmental impact of invasive non-indigenous species	Good Environmental Status is achieved when the impacts of invasive non-indigenous species are reduced to a minimum level.

As a result of work conducted in France on the definition of GES, based on the outcomes of the initial assessment, an initial list of non-indigenous species has been drawn up for mainland France. Work is currently ongoing, within the framework of the MSFD and in conjunction with other international efforts, to update these lists.

3. The definition of environmental objectives and associated indicators in order to achieve good environmental status for the marine environment (conducted in 2012).

The three marine sub-regions in the Atlantic Arc have defined environmental objectives for combating non-indigenous species. The first objective aims to «limit the risks of accidental introduction, the risks associated with the deliberate introduction, and the dissemination of non-indigenous species». The second objective seeks to «reduce the impacts of invasive non-indigenous species».

The Western Mediterranean marine sub-region has defined one general objective and four specific sub-objectives. The general objective aims to «reduce the risk of introduction and dissemination of invasive non-indigenous species». The associated specific objectives are:

a) to define a decision-making and information process covering the prevention, monitoring and combating of invasive non-indigenous species ;

b) to reduce the risk of introduction of invasive non-indigenous species associated with the import of living organisms ;

c) to reduce the risk of introduction of invasive non-indigenous species via ballast water ;

d) to limit the specific risks associated with the transfer of aquaculture species from other sites.

4. A monitoring programme with a view to ongoing assessment of the status of marine waters and regular updating of environmental objectives.

In terms of non-indigenous species, the monitoring programme is designed to assess the level of introductions of non-indigenous species into the environment, as well as the consequences (impacts) of these introductions on marine ecosystems. The key challenge in this area involves implementing a system to monitor the arrival of new species and the spread of existing introduced species. Two of the three recommended sub-programmes are expected to be implemented during the first cycle of the MSFD. The first sub-programme covers the in situ monitoring of non-indigenous species, in areas at particular

risk of introduction of species (mainly ports and aquaculture areas), and in areas particularly sensitive to biopollution (islands, lagoons, gulfs, marine protected areas, areas under high pressure). The second sub-programme involves the state and impact characterisation of non-indigenous species in biopolluted areas and in non-indigenous species reservoir areas. The third sub-programme, which will require additional measurement and analysis prior to implementation, involves monitoring introduction pathways and vectors and the associated species (e.g. species present in ballast water and sediment or in shipments of species traded and introduced into the natural environment).

5. A programme of measures to achieve or maintain Good Environmental Status of marine waters in 2020 (for 2015/2016).

In terms of the first cycle of the MSFD, the programmes of measures currently under development for the four marine sub-regions[15] do not include any measures in anticipation of the entry into force of the Ballast Water Management Convention, relating to maritime transport as a vector of introduction and/or dissemination of non-indigenous species.

Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22th October 2014 on the prevention and management of the introduction and spread of invasive alien species (IAS Regulation).

This Regulation provides for the development of a list of species of concern at EU level or marine sub-regional level, and enables Member States to produce an additional list of invasive alien species of concern at national level. Furthermore, Member States may identify, within their national list, species of concern at regional level with a view to developing coordination with the other States concerned, with the assistance of the European Commission.

The text reinforces the need for regional cooperation between Member States, and for controls at EU borders to combat these species. It seeks to apply precautionary principles, preventive measures and the «polluter pays» principle1 in terms of restoration cost recovery. Any operator who introduces a prohibited species will therefore be subject to sanctions.

The Regulation requires the implementation of surveillance systems and action plans, as well as enhanced controls at EU borders. Member States will be required to establish suitable sanctions for infringement of these provisions. With the authorisation of the European Commission, States may issue permits to specialist establishments to conduct certain commercial activities involving invasive alien species.

This European Regulation will enter into force on 1st January 2015.

[15] See the websites of the Interregional Directorates for the Sea: Eastern Channel-North Sea (http://www.dirm-memn.developpement-durable.gouv.fr/), North Atlantic-Western Channel (http://www.dirm.nord-atlantique-manche-ouest.developpement-durable.gouv.fr/), South-Atlantic (http://www.dirm.sud-atlantique.developpement-durable.gouv.fr/), and Mediterranean (http://www.dirm.mediterrannee.developpement-durable.gouv.fr).

[16] Principles adopted by the OECD in 1974, mentioned in the Barnier Act (95-101), defined in article L110-1, II, 3 of the Environment Code, and repeated in articles 3, 4 and 5 of the Charter of the Environment of 2004.

2.2.2 - Regional Seas Conventions

European waters are subject to four Regional Seas Conventions. France is a Contracting Party to two of these conventions, since they concern waters under its jurisdiction (OSPAR and Barcelona). All Contracting Parties to these conventions are bound by obligations to monitor and assess biodiversity and pressures upon it.

The Oslo-Paris Convention (OSPAR) for the Protection of the Marine Environment of the North-East Atlantic was signed in Paris in 1992.

The OSPAR Commission's Biological Diversity and Ecosystems Strategy concerns all human activities that may have an adverse effect on the protection and conservation of the ecosystems and the biological diversity of the North-East Atlantic. The OSPAR Commission's primary role is to issue recommendations on the management of fisheries and maritime transport. However, it may also implement legal measures to monitor implementation of the Convention, facilitate research activities, and encourage the dissemination of information between members. The Commission produces Quality Status Reports, which assess marine environment quality and the effectiveness of measures taken. It is also responsible for identifying and reporting on biodiversity impact issues to the relevant authorities and international organisations concerned, including fisheries and maritime transport management authorities and organisations.

The HELCOM Convention on the Protection of the Marine Environment of the Baltic Sea Area was signed in Helsinki in 1974. The Helsinki Commission (HELCOM) is the main body responsible for implementation of the Convention.

The Barcelona Convention for the Protection of the Mediterranean was adopted in 1976, and subsequently amended in 1995. States must take suitable measures to prevent, reduce and combat pollution.

The Bucharest Convention on the Protection of the Black Sea Against Pollution was signed on 21th April 1992 and applies to the territorial waters and exclusive economic zones of the Contracting Parties. The Parties must prevent, reduce and control pollution from land-based sources, ships, dumping of waste, activities on the continental shelf, the atmosphere, and transboundary shipments of waste.

The purpose of this guide is to assist charterers who wish to apply for exemption from the Convention for the Control and Management of Ships' Ballast Water and Sediments (2004), pursuant to Regulation A-4. It does not address ballast water management methods, nor does it cover the management of sediment contained in ballast.

The joint HELCOM/OSPAR guidelines on the granting of exemptions under Regulation A-4 of the Convention were adopted on 3rd October 2013 in Copenhagen[17], and were used as the basis for this document. It has been adapted to the situation in France, particularly with regard to risk assessment, through joint work by the Marine Protected Areas Agency, Ifremer and the French Natural History Museum.

[17] *Available at http://www.helcom.fi/*

3 - RISK ASSESSMENT METHODOLOGY

Resolution MEPC.162(56), adopted on 13th July 2007 (Guidelines for Risk Assessment under Regulation A-4 of the BWM Convention (G7)), describes three complimentary approaches to risk assessment. In the context of waters under French jurisdiction, these three approaches are used in combination, via a single methodology, for the purposes of exemption application.

The information and data collected via these three approaches, with a view to implementation of this risk assessment methodology, provide all the details necessary to take an informed and rational decision.

The exemption applicant or petitioner is responsible for supplying complete, accurate and up-to-date data. The application may be based on existing information; however where such information is incomplete, additional information collected by the applicant must be included. In such cases, a quality assured laboratory should be used, certified to the ISO/IEC 17025, ISO 9000 or EN 45001 standards or equivalent. In this sense, all laboratories involved in HELCOM and OSPAR programmes are considered to be quality assured[18], as is any laboratory accredited by the French authorities. With respect to the detailed risk assessment described here, the exemption applicant may contact the relevant local authorities beforehand (see Table 3 below) and explain the scientific, operational, administrative or any other reasons why it is unable to produce a comprehensive exemption application.

Table 4: Relevant local authorities

Port activity data and environmental data for port waters (collected in application of other regulations)	Port authorities	▪ Directorate of major sea ports (Dunkirk, Le Havre, Rouen, Nantes-Saint-Nazaire, La Rochelle, Bordeaux, Marseille). ▪ Regional or General Councils ▪ Chambers of Commerce and Industry
Physico-chemical environmental data	Departmental Directorate for Territories and for the Sea (DDTM)	▪ Coastal water police service (SPEL) ▪ Delegation for the sea and coastline
Waterway hydrological regime data	Water Agency: Regional Directorates for the Environment, Development and Housing (DREAL-river basin data)	

If the information supplied is incomplete or inaccurate, the precautionary principle must be applied, and the overall risk assessment must reflect the highest-risk situation.

The characteristics and quality of the risk assessment must be based on the key fundamental principles listed in the G7 Guidelines, as specified in Table 4.

[18] The criteria for these laboratories are specified in Appendix 2 of the joint HELCOM/OSPAR guidelines on the granting of exemptions under Regulation A-4. Available at http://www.ospar.org.

Table 5: Definition of principles

Principle	Definition
Effectiveness	The risk assessment must accurately measure the risks to the extent necessary to achieve an appropriate level of protection.
Transparency	The reasoning and evidence supporting the action recommended by risk assessments, and areas of uncertainty (and their possible consequences to those recommendations), must be clearly documented and made available to decision-makers.
Consistency	The risk assessment must achieve a uniform high level of performance, using a common process and methodology.
Comprehensiveness	The full range of values, including economic, environmental, social and cultural, must be considered when assessing risks and making recommendations.
Risk Management	Low risk scenarios may exist, but zero risk is not obtainable, and as such risk should be managed by determining the acceptable level of risk in each instance.
Precautionary	The risk assessment must incorporate a level of precaution when making assumptions, and making recommendations, to account for uncertainty, unreliability and inadequacy of information. The absence of, or uncertainty in, any information should therefore be considered an indicator of potential risk.
Science based	The risk assessment must be based on the best available information that has been collected and analysed using scientific methods.
Continuous improvement	Any risk model should be periodically reviewed and updated to account for improved understanding.

3.1 - Information for environmental matching risk assessment

Environmental matching risk assessment compares regional and local environmental conditions in the locations frequented by the ship. A high degree of similarity between these locations indicates the likely survival and eventual establishment of species transferred between these locations within ballasts. Conversely, significant differences between the regional and local environmental conditions in the locations frequented by the ship may reduce the number of species that are sufficiently tolerant (depending on their biological and biogeographical characteristics) to survive and eventually establish a population following transfer.

The purpose of this approach is to estimate whether the regional and local environmental conditions of the locations frequented by the ship, as well as the characteristics of stopover ports, are conducive to the survival and establishment, or secondary spread, of non-indigenous species that may be transferred from one ballast loading or discharge point to another (potential introduction pathway).

Depending on its characteristics, a port (at-risk area) where ballast waters are loaded or discharged may therefore be assessed, and the degree of risk of introduction and spread of non-indigenous species may be established.

The benefit of this approach is that it targets specific species or groups of species, on the basis of environmental conditions and port characteristics, by comparing them both with the by geographical characteristics of species present/observed in the ports or ballast loading/discharge points (see 2.2), and with lists of specific species and their generally well-known ecological characteristics (see 2.3).

However, this approach is insufficient if applied in isolation, since many non-indigenous marine species are tolerant to relatively substantial variations in environmental conditions. In other words, there may be known exceptions to this general rule, whereby a species that is indigenous to area A is introduced to, and becomes established in, area B despite the fact that the environmental conditions in area B are markedly different from those in area A.

Various items of information are required to conduct an environmental matching risk assessment, including information about the regional and local environmental conditions (temperature, salinity, turbidity, bathymetric data, nature of sediments) at the ports (at-risk areas) visited by the ship (potential introduction vector). Information is also required about the port itself, including the type, frequency and intensity of vectors visiting the port; structure (size and layout of port areas) and infrastructure (whether ballast discharge zones are isolated, pontoons, buoys that may attract species, etc.); relevant authorities, etc.

Details of this methodology are given in Appendix 4.

3.1.1 - Information at sub-region level

In terms of international maritime traffic, the most relevant scale is the marine sub-region (see map in Appendix 2), as defined in the Marine Strategy Framework Directive (MSFD). For routes that pass through non-European waters, the information used should be of an equivalent geographical scale and validity period to the MSFD marine sub-region descriptions and initial assessments.

The application must include the following information:

- The name or names of the marine sub-region(s) visited by the ship (ports and route) ;
- A map, at a suitable scale and showing the boundaries of the marine sub-regions, indicating the routes and locations of the ports visited by the ship, as well as identified or potential ballast loading/ discharge zones ;
- A description of the general oceanographic conditions (temperature, salinity, currents) for each marine sub-region concerned.

This sub-regional description, amounting to 2 to 4 pages per subregion, will need to include summarised information about temperature, salinity and currents (fluid dynamics, general, residual currents and tidal currents) and must indicate seasonal variations according to the periods during which the ship is in operation.

It is advisable to use the summaries, information, maps and data gathered during the MSFD initial assessment of environmental status. All summaries produced during the initial assessment for waters and parts of marine sub-regions under French jurisdiction are available online at the following address:

http://sextant.ifremer.fr/fr/web/dcsmm/caracteristiques-et-etat-ecologique;jsessionid=228E643BE28810B112FBE1E90C444263

For data concerning other Member States, it is advisable to contact the institutions and bodies that conducted the MSFD initial assessment for the marine sub-region(s) concerned. For data concerning States outside the European Union, similar information may be available via the Regional Seas Conventions.

3.1.2 - Information at WFD water body level

In order to conduct a precise environmental matching assessment, restricted to at-risk areas (ballast loading and discharge zones and the areas immediately surrounding the zones, depending on local fluid dynamics), the most relevant scales are the water bodies defined under the Water Framework Directive (WFD), and the port areas themselves. Where ballast loading and discharge operations take place in non-European waters, the information used should be of an equivalent geographical scale and validity period to the WFD water body assessments.

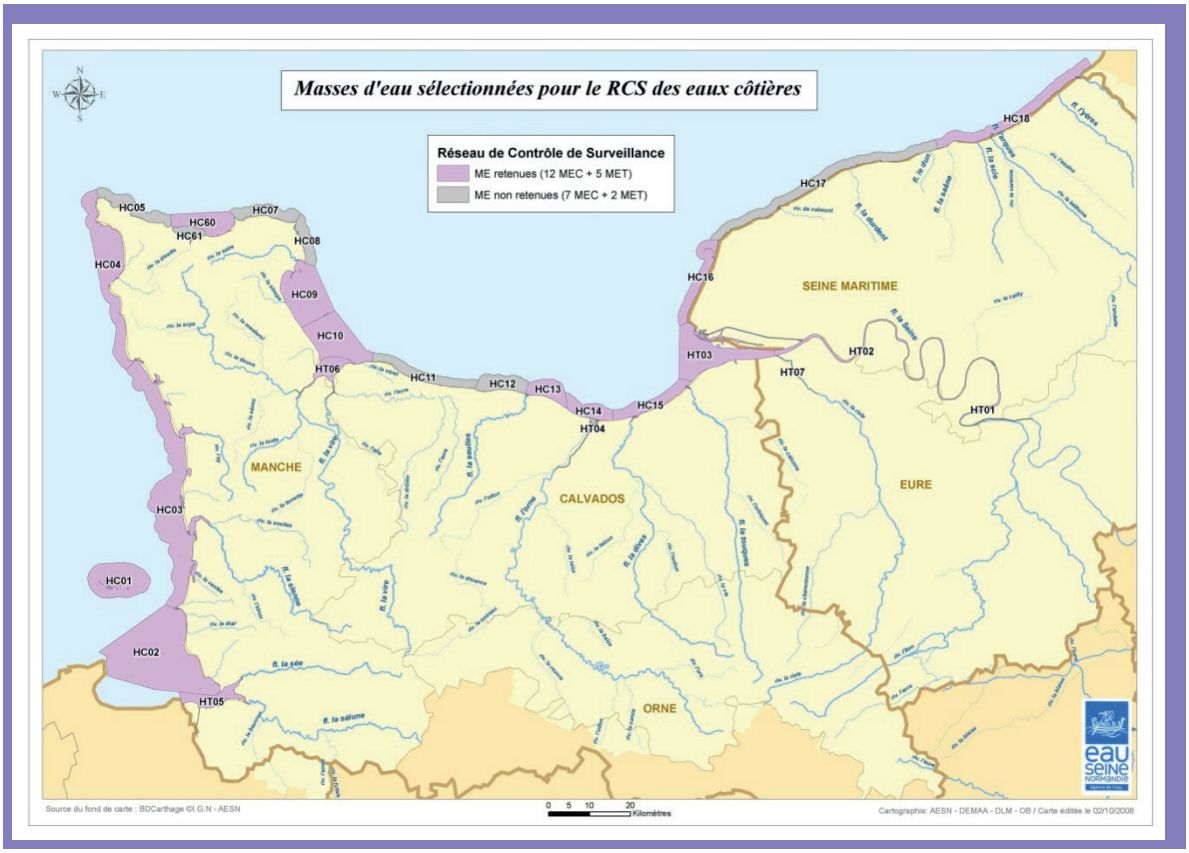


Figure 2 : Examples of coastal and transitional water bodies monitored under the Water Framework Directive for the Seine-Normandie district (source: Seine-Normandie Water Agency 2014, map background: BD-Carthage IGN-AESN)

The application must include the following information:

- The types, codes and official names of the WFD water body or bodies visited by the ship (ports and route)
- A map, at a suitable scale and showing the boundaries of the WFD water bodies, indicating the routes and locations of the ports visited by the ship, as well as actual ballast loading/discharge zones
- A description of the hydrological and ecological conditions (temperature, salinity, currents, turbidity, phytoplankton (as judged from chlorophyll a), bathymetric data, map of habitats) for each water body concerned

- The values and WFD assessment of the chemical status, biological status, hydro-morphological status and physico-chemical status of each water body concerned; for each of these assessments, the application must indicate the assigned confidence levels (where applicable) and the downgrading parameters.

This description at WFD water body level will need to include summarised information about the hydrological and ecological conditions, and must indicate seasonal variations according to the periods during which the ship is in operation and the sites visited.

For French water bodies, status assessment information and the associated confidence levels may be obtained directly from the WFD documentation, available in the Envlit section of the Ifremer website:

http://envlit.ifremer.fr/surveillance/directive_cadre_sur_l_eau_dce/la_dce_par_bassin

Basin-level interactive maps are also available:

http://envlit.ifremer.fr/var/envlit/storage/documents/atlas_DCE/scripts/site/

For data concerning other Member States, it is advisable to contact the institutions and bodies responsible for the WFD assessment for the water body or bodies concerned.

For data concerning States outside the European Union, similar information may be available via the Regional Seas Conventions.

3.1.3 - Information at port area level

For individual port areas, two sources of information and data may be used in combination.

To make the data collection process easier, it is advisable to contact the port authorities concerned to ascertain what information is already available. These authorities hold information about the characteristics of their basins (temperature, salinity, turbidity, physico-chemical quality of sediments at certain sites). These data are generally in the public domain, and may have been produced to meet the requirements of various regulations, relating to the performance of activities/work in contact with the water bodies concerned (dredging, dumping, structural works, etc.).

Data not held by the port authorities may be obtained from local water police authorities (DDTM), or from the Water Agencies or DREALs responsible for coordinating the basins concerned.

The Sea Port Sediment and Water Quality Monitoring Network (REPOM) is a network responsible for monitoring the quality of port sediments, focusing in particular on concentrations of heavy metals and other substances. These data do not relate specifically to water. However, where these data are required for the purposes of assessing an application, they may be obtained from the DDTMs, as well as from CEREMA.

If this information does not provide sufficient detail to characterise the water bodies concerned by the main loading/discharge points (no monitoring in the port concerned or station positioned in a different basin), additional in situ measurements will need to be taken, potentially in conjunction with the acquisition of data about the species present in the port area visited (see 2.2.2).

Physico-chemical data

The following information concerning the environmental conditions in the port areas visited must be provided:

- location (GPS coordinates and map) of the monitoring point(s)
- water temperature (minimum, maximum, average, seasonal values) in degrees Celsius (°C)
- water salinity (minimum, maximum, average, seasonal values) in PSUs (Practical Salinity Units)
- turbidity (minimum, maximum, average, seasonal values) in NTUs (Nephelometric Turbidity Units)
- chlorophyll a (minimum, maximum, average, seasonal values) in $\mu g.l^{-1}$
- any other physico-chemical information resulting from port water quality assessments conducted on behalf of port authorities (e.g. concentrations of contaminants, heavy metals, etc.)

Contextual information

The application must also contain summarised information about the maritime activities occurring within the port areas concerned.

The following information must be provided for each port concerned by the application:

- a paragraph outlining the main geographical and economic characteristics of the port concerned ;
- a map (or aerial photograph) showing the entire port area and indicating the following information:
  - bathymetric data and tidal range (if tidal port), in metres
  - identification and location of the main port infrastructures (blocks, pontoons, terminals, buoys)
- identification and location of terminals and basins within the port area, segregated by activity. In particular, the following activities must be identified separately: cruises, dry bulk, liquid bulk, containers, petrochemicals and hydrocarbons, heavy packages, forest products, marina, fishing, military, passenger transport, etc.
- location of the dock and/or basin normally visited by the ship concerned by the exemption application. If ballast loading and release operations for the ship concerned are performed within these port areas, locate the sites (basins, routes, etc.) in which these operations take place (see Appendix 5 for more details)
- location of all sampling stations cited in the exemption application: physico-chemical characteristics and species (specify whether deep-water sampling, sediment sampling, infrastructure sampling, etc.)
- a table summarising port activity key figures for each sector (tonnage, number of ships per year, origin of ships for regular lines, trend if known, etc.).

For data for other States, it is advisable to contact the port authorities for the ports concerned.

Where data cannot be obtained despite extensive research, the authority concerned by the exemption application must be contacted at the earliest possible opportunity, in order to report the problems encountered and to obtain further instructions regarding an alternative solution.

3.1.4 - Information about the ship concerned and the route

The information that must be provided about the ship concerned and the route is detailed in section 3.1.2. It includes the characteristics of the ship, its route, the ballasts and tanks, and the geographical origin of the ballast water discharged into the ports visited by the ship (ballast loading and discharge locations).

3.2 - Information for species' biogeographical risk assessment

In order to assess the risks of transport of species in ballast water between ports, all organisms present in the ballast loading/discharge zones must be taken into account, since these organisms are potentially likely to be transported (in either adult or larval form), and may therefore be introduced into the recipient region (a species indigenous to area A may become non-indigenous in area B if it is successfully introduced).

Furthermore, those species present in both the donor and recipient ports and in the surrounding areas indicate the respective environmental conditions and level of compatibility in terms of common or similar communities of species. The biogeographical assessment may also be used to identify those local species that are at high risk of introduction or of proliferation. For example, those species native to a donor biogeographical region and that have successfully been introduced and/or have invaded other, compatible biogeographical regions may be considered high-risk species for the recipient port or location.

Those species with a proven capacity to establish a population in, and adapt to, new environments are, by definition, therefore more likely to establish a population in the recipient port or the recipient biogeographical region. This is particularly true for species introduced via ballast water that does not meet the criteria of Regulation B-3 or Regulation C-1. The fact that the donor geographical region is a potential source of one or more specific species (see 2.3) for other regions is of particular importance in terms of risk assessment.

In order to conduct the species' biogeographical risk assessment for species present in the regions of the donor and recipient ports, the application must include a description of the presence and/or abundance, and of the distribution of all species within the following groups (non-exclusive):

- Human and animal pathogens (bacteria, viruses, fungi)
- Plankton (phytoplankton and zooplankton)
- Mobile epifauna (e.g. crabs, fish, starfish, etc.)
- Benthic macrofauna in sediments (small invertebrates)
- Benthic macrofauna (algae)

- Fouling organisms (all macro-organisms attached to submerged structures, such as buoys, pontoons, pilings, chains, ropes and fixed haswers, etc.)

- Non-indigenous species present, irrespective of their status (see Table 1).

Details of this methodology are given in Appendix 6.

3.2.1 - Information at WFD water body level

The application must include the following information:

- The types, codes and official names of the WFD water body or bodies visited by the ship (ports and route)

- A map, at a suitable scale and showing the boundaries of the WFD water bodies, indicating the routes and locations of the ports visited by the ship, as well as actual ballast loading/discharge zones

- An inventory and bibliographical summary of the monitoring programmes (WFD, ZNIEFF, Narura 2000, MPA) and studies (scientific, naturalist, impact assessments, etc.) that produced the information about the species present in the WFD water bodies concerned (coastal and transitional water bodies neighbouring the ports visited and ballast loading/discharge sites)

- A list of species identified, including the date of identification and the person or entity responsible for monitoring each species. The summary must use the WoRMS taxonomy classification system[19]. This list must also be provided in editable electronic spreadsheet format, including the information necessary to interpret these lists, as presented in Appendix 8.

- The values and WFD assessment of the chemical status, biological status, hydro-morphological status and physico-chemical status of each water body concerned; for each of these assessments, the application must indicate the assigned confidence levels (where applicable) and the downgrading parameters.

This description at WFD water body level will need to include summarised information about the hydrological and ecological conditions, and must indicate seasonal variations according to the periods during which the ship is in operation and the sites visited.

For data concerning other Member States, it is advisable to contact the institutions and bodies responsible for the WFD or Habitats Directive (92/43/EEC) assessments for the water body or bodies concerned.

For data concerning States outside the European Union, similar information may be available via the Regional Seas Conventions.

3.2.2 -Information at port area level

Petitioners submitting an exemption application must use existing and available (accessible) data to produce a summary of all studies conducted by the port authorities relating to species present in the water column, in and on sea beds, and on port infrastructures. It must be possible to use this summary to conduct an effective risk assessment.

19 http://www.marinespecies.org/

There is, however, a limit to this requirement, in the sense that producing a summary of these studies is a cumbersome and expensive task. The applicant will need to specify the dates, authors and bibliographical references of these studies, along with details of the sampling and analysis protocols used.

Where multiple comparable studies are available, the summary will need to include a presentation of the trends observed for the species concerned, particularly for non-indigenous species.

In addition to the contextual information (2.1.3 b) and the environmental condition information (2.1.3 a), the application must also contain the following information:

- An inventory and bibliographical summary of the monitoring programmes and studies that produced the information about the species present in the port area concerned (in and around ballast loading/discharge sites in particular)

- A list of species identified, including the date of identification and the person or entity responsible for monitoring each species. The summary must use the WoRMS taxonomy classification system and, in addition to the WoRMS code, must include the scientific name (binomial nomenclature), the most popular common name in French (where it exists) and the most popular common name in English (where it exists). This list must also be provided in editable spreadsheet format, including the information necessary to interpret these lists, as presented in Appendix 8.

If this information does not provide sufficient detail to characterise all species present in the ballast loading/discharge area (no monitoring in the port concerned, station positioned in a different basin, or protocols not suited to some of the species groups defined in 2.2), additional in situ samples will need to be taken, potentially in conjunction with the acquisition of data about the physico-chemical characteristics of the port area visited (see 2.1.3).

In situ sampling must be conducted to identify any non-indigenous marine species present in the port area(s) used for port operations and/or in the port areas visited and in which ballast loading/discharge operations take place. Furthermore, in situ sampling must be conducted to identify any non-indigenous marine species present in the port area(s) that the ship is likely to use or visit and/or in the port area(s) that it is scheduled to use or visit during the period covered by the exemption application.

Two separate sampling surveys must be performed in the same year for each port area concerned, the first in spring and the second in late summer. These two sampling surveys will cover the entire life-cycle periods during which the majority of species present mature and identifiable individuals. Each survey must include the full range of water column, sea bed (surface and depth) and port infrastructure sampling protocols. For each habitat, the sampling sites must be selected in such a way that they cover the various abiotic conditions to the fullest possible extent. The corresponding sampling protocols are detailed in Appendix 9.

Comment regarding taxonomy classification

The process of taxonomy classification to species level is particularly long and complex and requires extensive taxonomic expertise. The following three recommendations should be followed in anticipation of any potential problems:

1. Make arrangements, from the outset of the exemption application process, to ensure that these data (biological samples, photographs, data produced) are subsequently verified by an independent expert. Ensure, from the outset of the exemption application process, that there are no legal, administrative or commercial impediments to this subsequent, independent verification.

2. During the taxonomy classification process, it is possible that the initial species identification and expert verification work will focus on the specific species listed in this guide. This recommendation ensures that the service provider is aware of the minimum list of species that must be identified, and is therefore able to make the necessary expert verification arrangements. It is important to remember, however, that these lists change constantly and that they only reflect the current state of knowledge at a given moment in time. These lists are updated at varying frequencies, and these changes will need to be incorporated into the identification process. After an initial focus on the specific species, the applicant must conduct a broader identification process covering all species listed in the guide, i.e. the specific species followed by all the other species.

3. Create a metadata, traceability and retention system for in situ biological samples and photographs, as well as data (tables, reports, etc.) produced from the analysis of the samples and photographs. Archive this information (metadata, traceability information, retained elements) to ensure that it can be accessed easily when required.

The application must also include the following additional information:

- Location (GPS coordinates and map) of the monitoring point(s) ;

- A list of species identified, including the date of identification and the sampling protocol used for identified species. This list must use the WoRMS taxonomy classification system and, in addition to the WoRMS code, must include the scientific name (binomial nomenclature), the most popular common name in French (where it exists) and the most popular common name in English (where it exists). This list must also be provided in editable spreadsheet format, including the information necessary to interpret these lists, as presented in Appendix 8.

This description (summary of existing data and additional in situ data acquired) at port area level must provide summarised information about the habitats (water bodies, sediments and major infrastructure types for each port concerned) and associated communities, as well as the non-indigenous species present. It must also indicate the seasonal variations associated with the periods during which the ship is in operation and the sites that it visits.

For data for other States, it is advisable to contact the port authorities for the ports concerned.

3.2.3 - Information at ballast water and sediment level

Finally, the applicant must provide information about the species present in the ship's ballast water and sediment. The data may be produced from samples performed in the ship's tanks, under normal operating conditions and in accordance with the protocols detailed in Appendix 9.

Every ship is different, and the ballast sampling protocols must be tailored to each specific ship. It is therefore important to know the depth of the ballasts, and to sample several ballast chambers for each ship. Where a ship contains some chambers that are used regularly, and others that are only used on rare occasions (depending on loads, routes and seasons), the most commonly used ballast tanks must be sampled.

Furthermore, two separate sampling surveys must be performed, the first in spring and the second in late summer, during the same periods in which the port area sampling surveys are conducted. Each survey must include a sample taken before ballast loading in each port visited. If the ship's route includes visits to two ports, a single survey will therefore include two samples, one in each port. Under this configuration, a total of four samples will be taken in the year prior to the exemption application: two in spring during the first survey (one sample in each port, before ballast loading) and two in late summer during the second survey (one sample each port before ballast loading). The sample taken prior to ballast loading with water from the port may be conducted before ballast discharge (i.e. en route or upon approach to the port), during ballast discharge (i.e. upon approach to the port, within the port area for during loading at the dock), or after ballast discharge (where the ballast chambers contain a sufficient amount of water). **In all cases, the sample must be taken from the ballast water arriving at the recipient port.** The corresponding sampling protocols are detailed in Appendix 9.

3.3 - Information for species-specific risk assessment

In light of recent and ongoing work by all European Union Member States within the framework of MSFD implementation, this risk assessment will be conducted at marine sub-region level.

The exemption application may use the lists of known non-indigenous species present in French waters in the English Channel-North Sea, Celtic Sea, Bay of Biscay and Western Mediterranean marine sub-regions. These lists are included in Appendix 8. It is important to remember that these lists reflect the current state of knowledge of the phenomenon at a given moment in time (specify the list creation date) and that this is an ongoing body of work.

In particular, these lists may be used for comparison with the other lists of non-indigenous species presented by the exemption applicant. Where the ship visits only one marine sub-region but at least two different countries, the applicant must provide the MSFD lists produced by the countries concerned.

For each list presented, the applicant must produce tables (presentation and content) that comply with the requirements of Appendix 2 and Appendix 4 (lists of requested information). These lists must contain, in particular, the known and estimated statuses of these species in the marine sub-regions concerned, as defined in Table 1.

3.3.1 - Determination method

This method must use the criteria produced by Ifremer. There are 12 such criteria:

- a) manifest appearance, not previously recorded
- b) geographical discontinuity
- c) highly localised appearance
- d) recent expansion from a highly localised area

- e) insufficient natural dispersion methods to explain the presence
- f) rapid population expansion
- g) association with specific pathways or a specific vector
- h) dependence on an alien species for at least part of the life-cycle
- i) low genetic variability compared with another known population
- j) genetically identical to distant populations
- k) the species belongs to a taxonomic group limited to an area outside the region in which it was found
- l) where a life-cycle phase cannot be dispersed by nature

A list of specific species has been produced, featuring species that must be assessed for their known risk in French waters.

If more than one of these specific species is present in the port waters on the route for which exemption is requested, each species must be assessed using the risk assessment model presented in Appendix 1.

The table shown in Appendix 3, based on criteria produced by the HELCOM-OSPAR group, may be used to determine whether a species is considered a specific species.

3.3.2 - Species categories

There are two types of specific target species, as follows:

Known undesirable species that have already generated severe problems for the environment, the economy, human health, poverty or resources anywhere in the world, for which evidence of previous introductions exists and for which ballast water constitutes an introduction vector

Species of scientific interest that are studied for their potential risk, but that have not yet caused observable harm.

The applicant must produce a comparison of the inventories of species present in each of the ports on the route. For risk assessment purposes, it is important to include all detected species, since the list of target species may be subject to change at any time, reflecting the latest knowledge and risks that they pose.

Lists

The list of target species given below is the result of joint research conducted by Ifremer, the Marine Protected Areas Agency, and the French Natural History Museum in 2014. This list will be update on a regular basis to reflect information supplied by the Ministry for Ecology (relating in particular to implementation of the MSFD, the IAS Regulation and any other monitoring programme), as well as data provided by Convention exemption applicants.All applicants must therefore refer to this list as an initial point of reference, but will also need to apply the additional provisions of points 2.1 and 2.2 to all species identified in port waters or route locations.

The associated methodology is detailed in Appendix 7.

4 - ADMINISTRATIVE PROCEDURE

4.1 - Exemption request

The exemption applicant or petitioner is responsible for supplying complete, accurate and up-to-date data. The application may be based on existing information; however where such information is incomplete, additional information obtained by the applicant must be included. In such cases, a quality assured laboratory should be used, certified to the ISO/IEC 17025, ISO 9000 or EN 45001 standards or equivalent. In this sense, all laboratories involved in HELCOM and OSPAR programmes are considered to be quality assured, as is any laboratory approved by the French authorities.

4.1.1 - Submission rules

The application must be submitted by email the following address: *sm2.sm@developpement-durable.gouv.fr*

During its examination of the application, the government will consult the coastal State(s) concerned.

4.1.2 - Required information

All exemption applications must contain specific items of information on the following subjects:

General information

- Period for which an application is sought; from month and year to month and year
- Why an exemption under Regulation A-4 is sought
- Contact details of the person responsible for the application

Ship's information

- Ship name
- IMO number
- Year of construction
- Port of registry
- Gross tonnage
- Type of vessel
- Owner, charterer, operator
- Call sign
- Ballast water and sediment management option usually undertaken by ship
- A copy of the Ship's Ballast Water and Sediment Management Plan
- Ballast water and sediment management history for a determined period.

- Capacity of ballast tank(s) and average ballast exchange volume per loading/discharge, for each area concerned.

Route information

- Route of application, given as donor port(s) and recipient port for ballast water discharge
- If single voyage: Date and time of departure and arrival
- If multiple voyages: A diagram showing all voyages, including the estimated number of voyages and the quantities of ballast water discharged during the exemption period
- Any voyages the ship plans to take to ports other than the specified ports during the duration of the exemption.

Port water quality and property information

- Physical characteristics
- Human pathogens
- Plankton
- Mobile epifauna
- Benthic endofauna
- Organisms.

The application must include the bibliographical references of the sources of all raw data (list of species and occurrence or abundance, hydrological parameters, characteristics of ports and associated activities, etc.) or summarised data (trend statistics, figures, tables, etc.), texts and citations used.

Depending on the source of these data, and whether they were acquired specifically for the application or taken from other sources (scientific study, impact assessment, institutional monitoring, activity-related databases, etc.), the references must clearly identify the author or authors (or body concerned) and the dates on which the data were acquired, along with any document (title, author, year of publication) or database used as an indirect source.

This information must be supported or supplemented with the identity of the species present in the ports and any specific species, in accordance with the characteristics of paragraph 2.2 and 2.3. This will allow the introduction risks to be assessed according to the method described and the decision-making flow chart shown in chapter 3.

The applicant is responsible for translating information obtained from other ports on the route into the language of the States concerned.

4.2 - Administrative process

4.2.1 - Examination of the exemption request

Pursuant to the G7 Guidelines, «*The port State shall ensure that, as required by regulation A-4.1.3, exemptions are only granted to ships that do not mix ballast water or sediments other than between the locations specified in the exemption. The port State should require evidence of the specific measures undertaken to ensure compliance with this regulation at the time the exemption is granted and over the duration of the exemption. Non-compliance during the period of exemption should result in prompt suspension or revocation of the exemption.*»

As well as the requirement to consult the State of the port of destination or origin, the G7 Guidelines indicate that an applicant must also consult any other coastal State «*that may be adversely affected from any exemptions that may be granted. This should include adjacent States and any other States that may be affected, including those located in the same biogeographic region as the recipient port(s)*». The State concerned must select from one of the following two options:

- 1. Supported without comments or conditions.
- 2. Supported with comments and/or conditions.

The applicant will then need to provide any additional information requested by the authority, to demonstrate its ability to comply with the provisions of the Convention and, where applicable, any additional exemption conditions imposed by the port States on the route.

4.2.2 - Risk analysis and assessment algorithm

According to the terminology used in the G7 Guidelines, a species-specific risk assessment must be supported by information about the environmental conditions and maritime transport activities.

The following key criteria are used to distinguish between an unacceptable (or high) risk, and an acceptable (or low) risk:

- Presence and abundance of target species in one of the ports/locations visited by the ship ;
- Difference in water salinity at the ports/locations visited ;
- Tolerance to salinity of the target species present.

The results of the risk assessment may be classified into three categories (high risk, moderate risk and low risk). The determined risk level will have the following consequences for applications:

High risk	It is highly likely that the target species will be transferred through ballast water and establish a population in a new habitat. The risk is deemed unacceptable. **An exemption cannot be granted.**
Moderate risk	Target species may be transferred through ballast water and establish a population in the new habitat. A more detailed examination is required to assess the risk. This includes the local properties of port waters and tolerance to salinity, temperature, and the behaviour and dispersion/mobility capacity of the species concerned. The negative impacts of species observed in other ecosystems are also taken into account in this assessment. A decision must then be made regarding granting of an exemption, based on this additional information.
Low risk	It is unlikely that the target species will be transferred through ballast water and establish a population in a new habitat. The risk is deemed acceptable. **An exemption cannot be granted.**

4.2.3 - Granting or rejection decision

An exemption may be granted by the Director for Maritime Affairs for a maximum duration of five years. The approval may contain seasonal and time-specific or other restrictions within the time of validity.

The exemption is conditional on an assessment within the five-year period, and the Director for Maritime Affairs may require the applicant to conduct as many further analyses as deemed necessary during the exemption period. Other than in exceptional cases, these further analyses may be requested at a maximum frequency of once per year.

4.2.4 - Withdrawal of exemptions

The G7 Guidelines state that an exemption granted pursuant to Regulation A-4 of the Convention may be withdrawn «*where the actual risk associated with a voyage has increased substantially since the risk assessment was conducted. This would include emergency situations such as outbreaks, incursions, infestations, or proliferations of populations of harmful aquatic organisms and pathogens (e.g., harmful algal blooms) which are likely to be taken up in ballast water (regulation C-2 of the Convention).*» (G7, 10.4).

In the event of an emergency or other high-risk situation, the G7 Guidelines (10.5) state that «*all exemptions should be withdrawn from ships that take up ballast water in the defined area. In such circumstances the shipowners or operators should be notified of the decision to withdraw the exemption as soon as possible.*» Navigators are informed of such situations via a notification issued by CROSS.

The following circumstances are also reasons for the temporary or permanent withdrawal of an exemption, whether arising from emergency situations or violation of exemption conditions, such as:

- A new target species is identified in a port where an exemption is granted
- Mixing of ballast water or sediments between ports or locations other than those described in the exemption is observed.

The decision to withdraw an exemption is taken by the Director for Maritime Affairs. The ship's owner, operator or charterer is notified of the decision by registered mail.

Data usage rights

- The authorities may use some of the data produced for an exemption application for the purposes of implementing public water quality policies, such as port water surveillance programmes, or biodiversity policies, and particularly in connection with implementation of the Marine Strategy Framework Directive:

- data concerning port water properties ;

- data concerning invasive species ;

- results of ballast water invasion risk assessments.

All data relating to the charterer and the ship(s) concerned by the exemption application will remain confidential and linked exclusively to the exemption application.

Transmission in electronic format (Open Office).

Glossary

AAMP	Agence des aires marines protégées (Marine Protected Areas Agency)
GES	Good Environmental Status
BWM	Ballast water management
CROSS	Centre régional opérationnel de surveillance et de sauvetage (Regional operational surveillance and sea rescue centre)
WFD	Water Framework Directive
MSFD	Marine Strategy Framework Directive
HD	Habitats Directive
IAS	Invasive Alien Species
BB	Bay of Biscay
IEC	International electrotechnical commission
IFREMER	Institut français de recherche pour l'exploitation de la mer (French Research Institute for Exploitation of the Sea)
ISO	International organization for standardization
IUCN	International Union for Conservation of Nature
MEPC	Marine environment protection committee
ECNS	English Channel-North Sea
MNHN	Muséum national d'histoire naturelle (French Natural History Museum)
WM	Western Mediterranean
OECD	Organisation for Economic Co-operation and Development
IMO	International Maritime Organization
PAMM	Plan d'action pour le milieu marin (marine environment action plan)
REPOM	Réseau national de surveillance de la qualité des eaux et des sédiments des ports maritimes (Sea Port Sediment and Water Quality Monitoring Network)
MS	Marine Sub-region
WoRMS	World Register of Marine Species
ZNIEFF	Zones Naturelles d'Intérêt Ecologique Faunistique et Floristique (Natural areas of ecological, faunistic and floristic interest)

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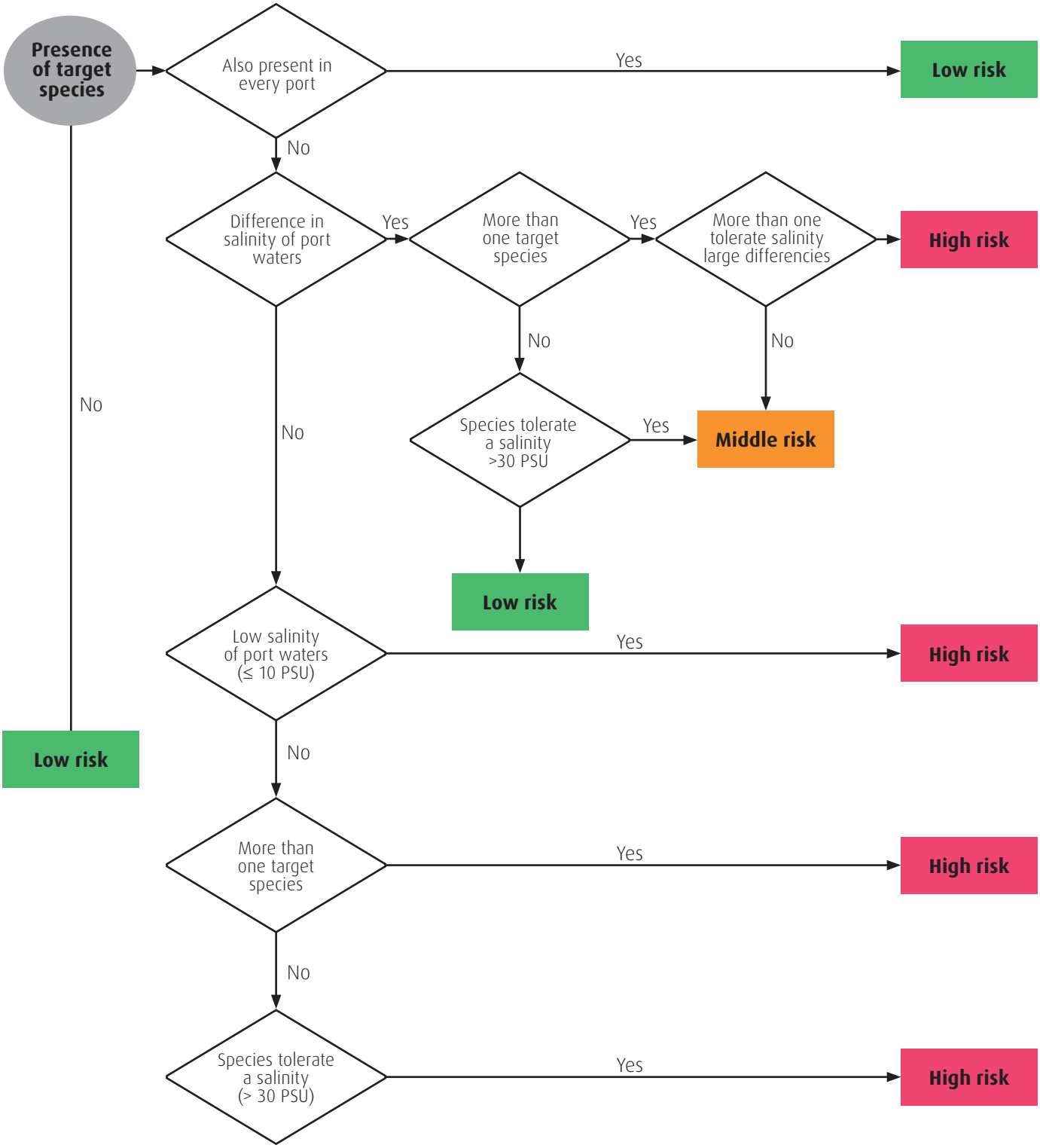
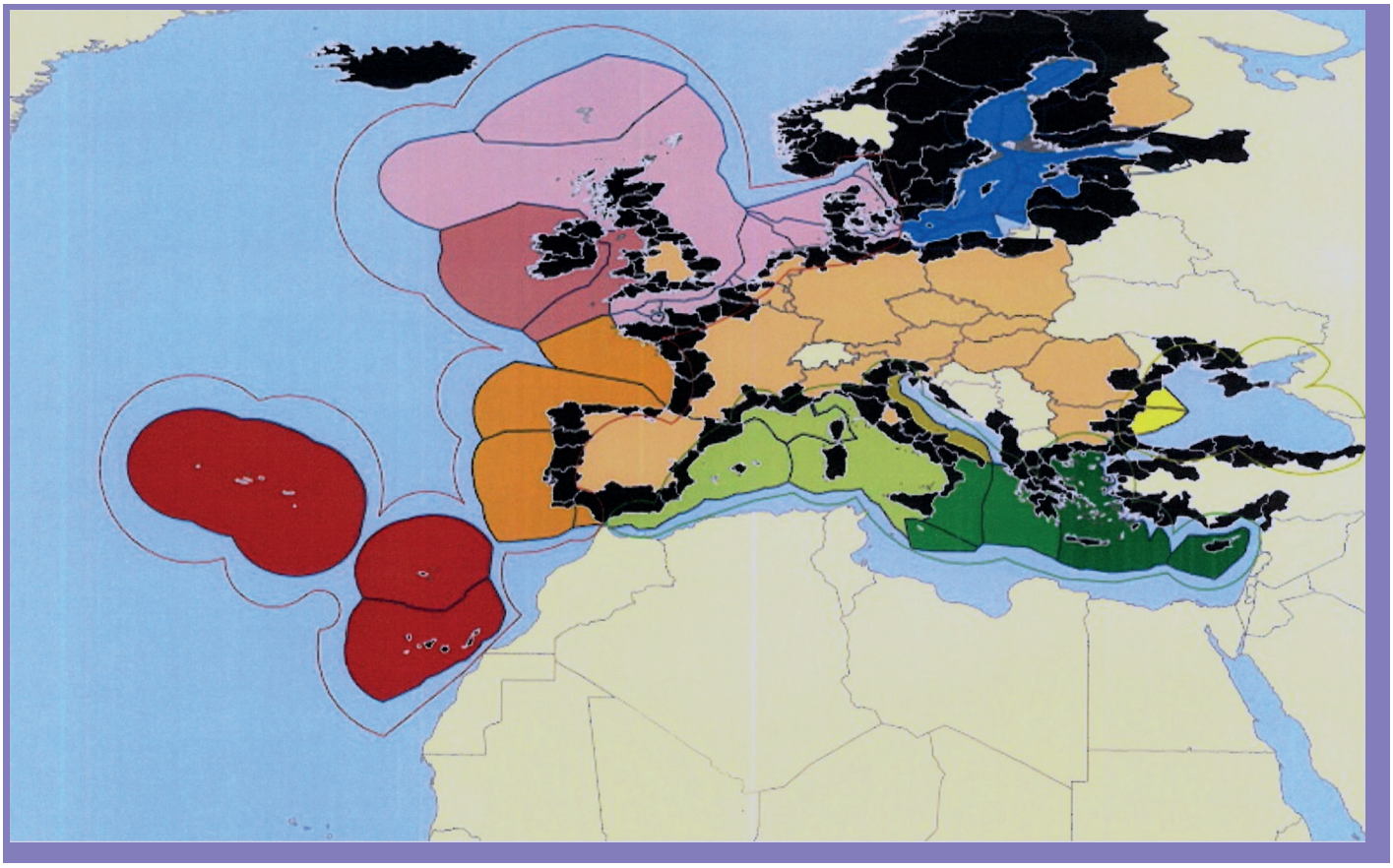
APPENDIX 1 : Risk assessment of introduction scheme



APPENDIX 2 : Map of the marine subregions



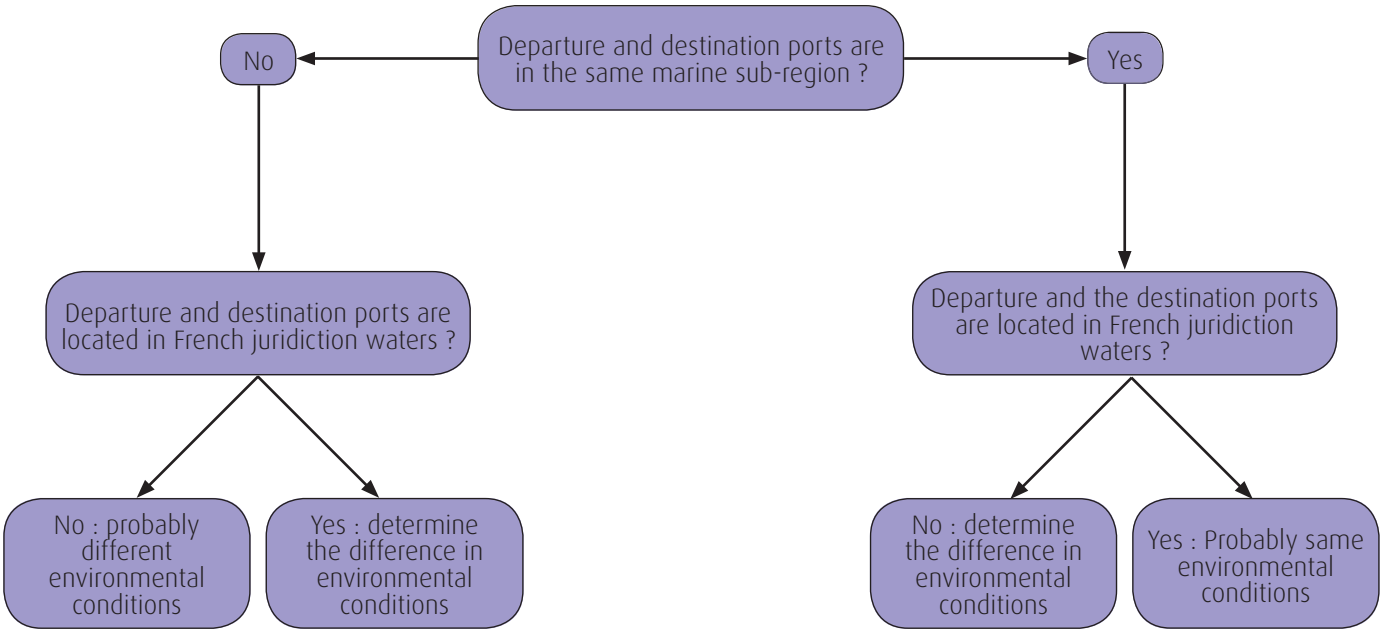
Marine Subregions (MSFD)

- Baltic Sea
- Atlantic NE Ocean
- Mediterranean Sea
- Greater North Sea
- Celtic Sea
- Baltic Sea
- Aegean Levantine Sea
- Ionian Sea
- Adriatic Sea
- Western Mediterranean Sea
- Bay of Biscay and Iberian Coast
- Coastal Regions
- EU member states
- Macaronesia

APPENDIX 3: Ospar-Helcom target species selection criteria table

	Low risk species = 1	Medium risk species = 2	High risk species = 3
1. Dispersion potential or invasiveness	The species doesn't spread in the environment because of poor dispersal capacities and low reproduction potential.	Except when assisted by man, the species doesn't colonise remote places. Natural dispersal rarely exceeds more than 1km per year. The species can however become locally invasive because of a strong reproduction potential.	The species is highly fecund, can easily disperse through active of passive means over distances > 1km/year and initiate new populations.
2. Colonisation of high conservation value habitats	Populations of the non-native species are restricted to habitats of no conservation value.	Populations of the non-native species are usually confined to habitats with a low or a medium conservation value and may occasionally colonise high conservation value habitats.	Non-native species often colonise high conservation value habitats, these are all biotopes where endangered species can be found. Most of the sites of a given habitat are likely to be readily colonised by the NIS when source population are present in the vicinity and makes therefore a potential threat for red-listed species.
3. Adverse impacts on native species	Data from invasion history suggest that the negative impact on native population is negligible.	The non-native species is known to cause local changes (<80%) in population abundance, growth or distribution of one or several native species, especially among common and ruderal species. This effect is usually considered as reversible.	The development of the non-native species often cause local severe (>80%) population declines and the reduction of local species richness. At a regional scale, it can be considered as a factor precipitating (rare) species decline. Those non-native species form long-standing populations and their impacts on native biodiversity are considered as hardly reversible.
4. Alteration of ecosystem functions	The impact on ecosystem processes and structures is considered as negligible.	The impact on ecosystem processes and structures is moderate and considered as easily reversible. Temporary modification of water and sediment properties (e.g. algae which can be removed such as Lemna) or decrease of the rate of colonisation of open habitats by species which build barriers.	The impact on ecosystem processes and structures is strong and difficult to reverse e.g. food web disruption (Crassostrea gigas) or habitat destruction (Eriocheir sinensis).
5. Effects on human health	Data from invasion history suggest that the species has weak toxic effects and no treatment is necessary.	Data from invasion history suggest that the species has moderate symptoms, easily treated, no permanent damage.	Data from invasion history suggest that the species has negative impact on human health, permanent damage or death.
6. Effects on natural resources	Data from invasion history suggest that negative impact on natural resources is negligible.	Data from invasion history suggest that the species has only slight negative impact on natural resources and is restricted only on single locations.	Data from invasion history suggest that the species causes serious loss on aquaculture or fisheries harvest.
7. Effects on property	Data from invasion history suggest that the negative impact on property negligible.	Data from invasion history suggest that the species has only slight negative impact on property and this is restricted only on single locations.	Data from invasion history suggest that the species has high negative impact on property at many locations.
8. Dispersed by ballast water or sediments	Invasion without BW, but target species now found in the harbour with the chance to dispersed further by BW.	Dispersal via BW and other possibilities.	Dispersal mainly by BW or are already found in BW or Sediments.

APPENDIX 4: Environmental compatibility risk assessment



Les questions qu'il faut se poser :

Similarity of environmental conditions between departure marine sub-region and destination sub-region (temperature, salinity, tidal, etc.) ?

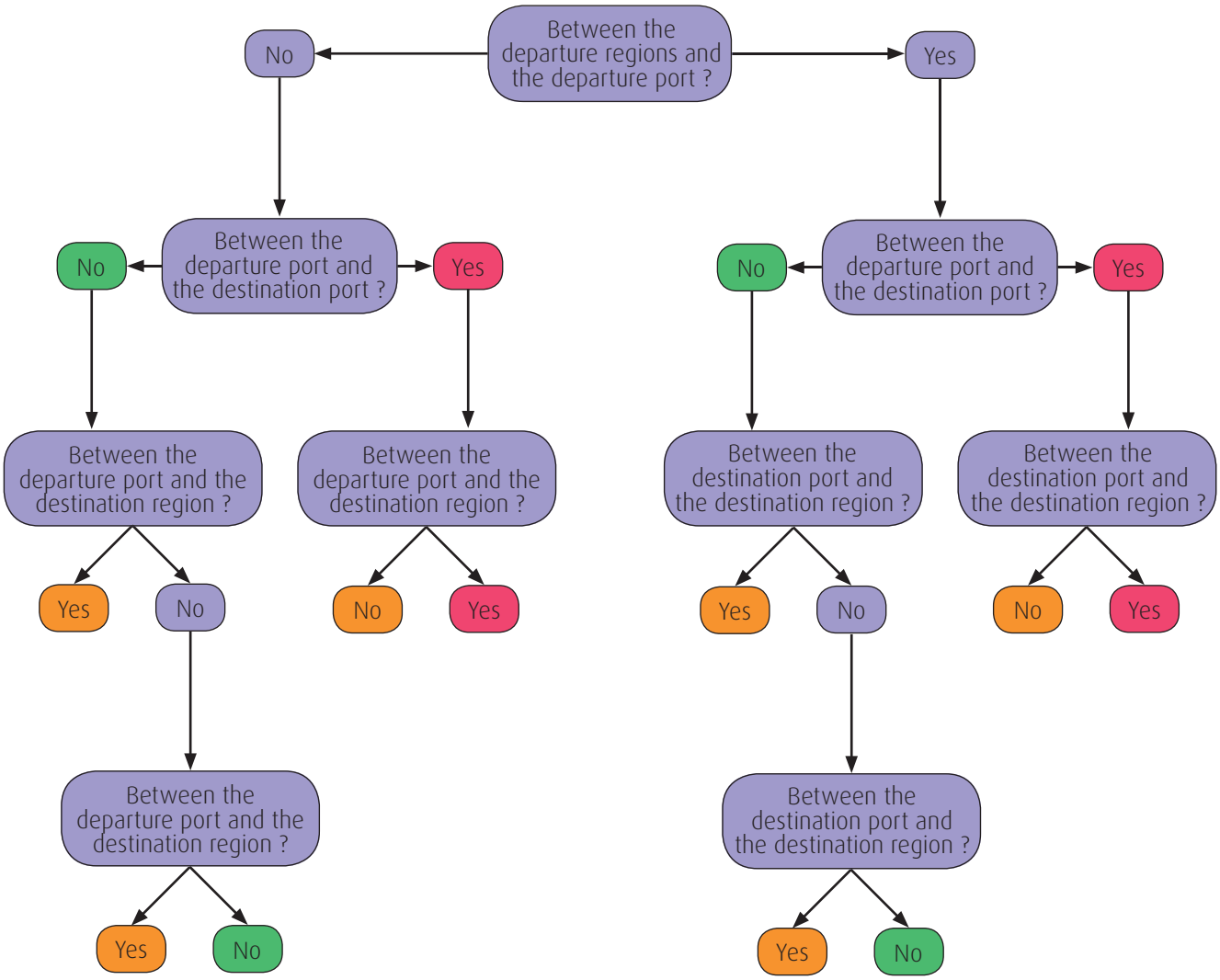
Similarity of environmental conditions between departure water bodies and destination water bodies (temperature, salinity, tidal, etc.) ?

Similarity of environmental conditions between departure port and destination port (temperature, salinity, tidal, etc.) ?

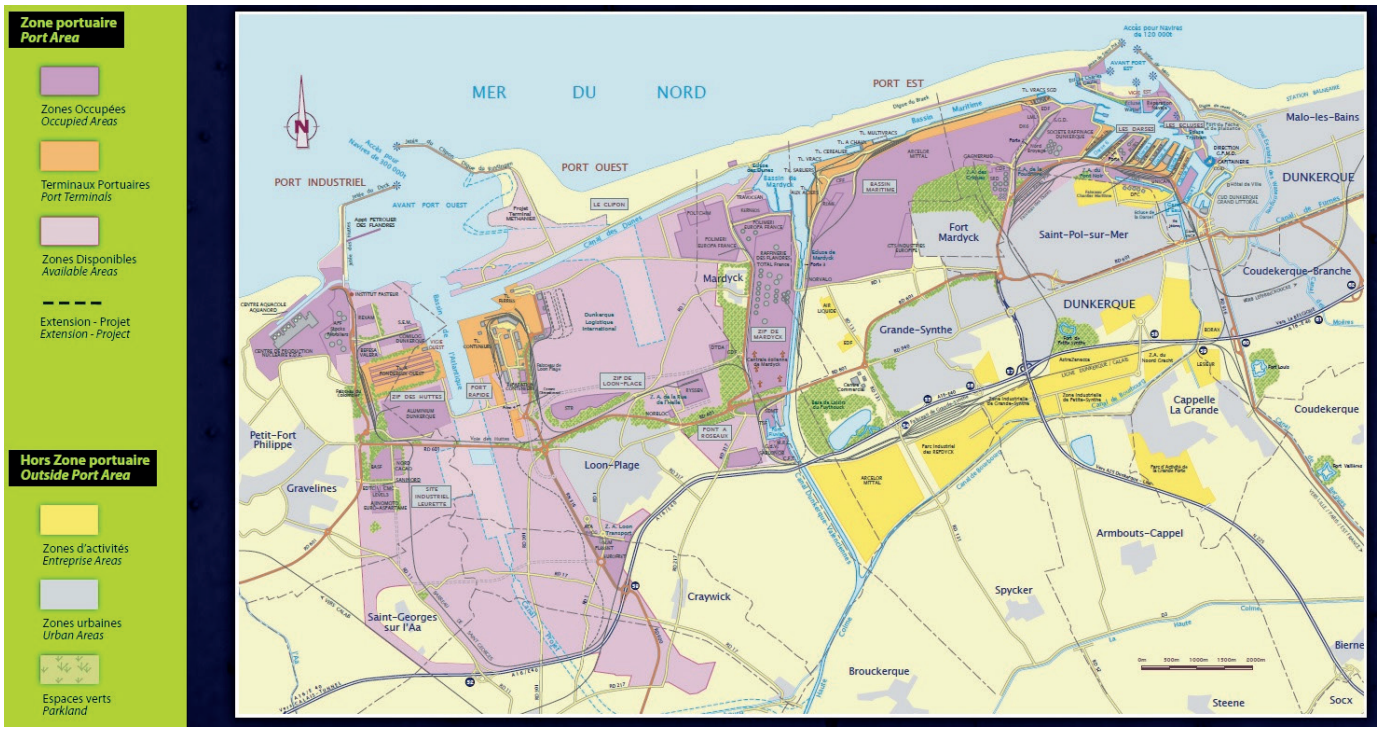
Similarity of environmental conditions between departure port and destination region ?

Similarity of environmental conditions between destination port and destination region ?

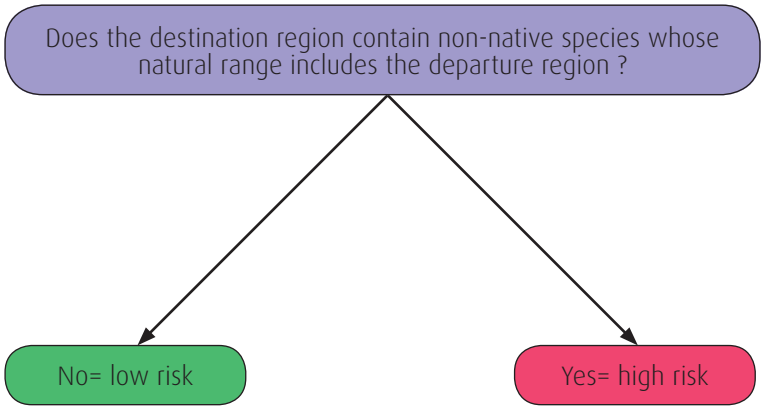
Similarity of environmental conditions (temperature, salinity, tidal, etc.) ?

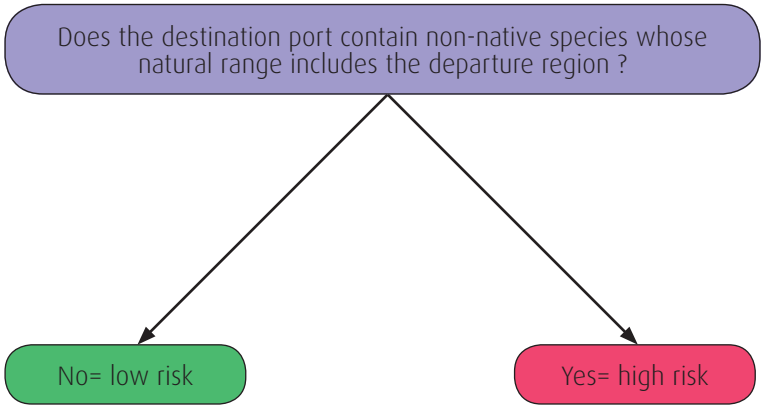


APPENDIX 5: Example of technical map describing the organization of a port and its associated activities: the port of Dunkirk



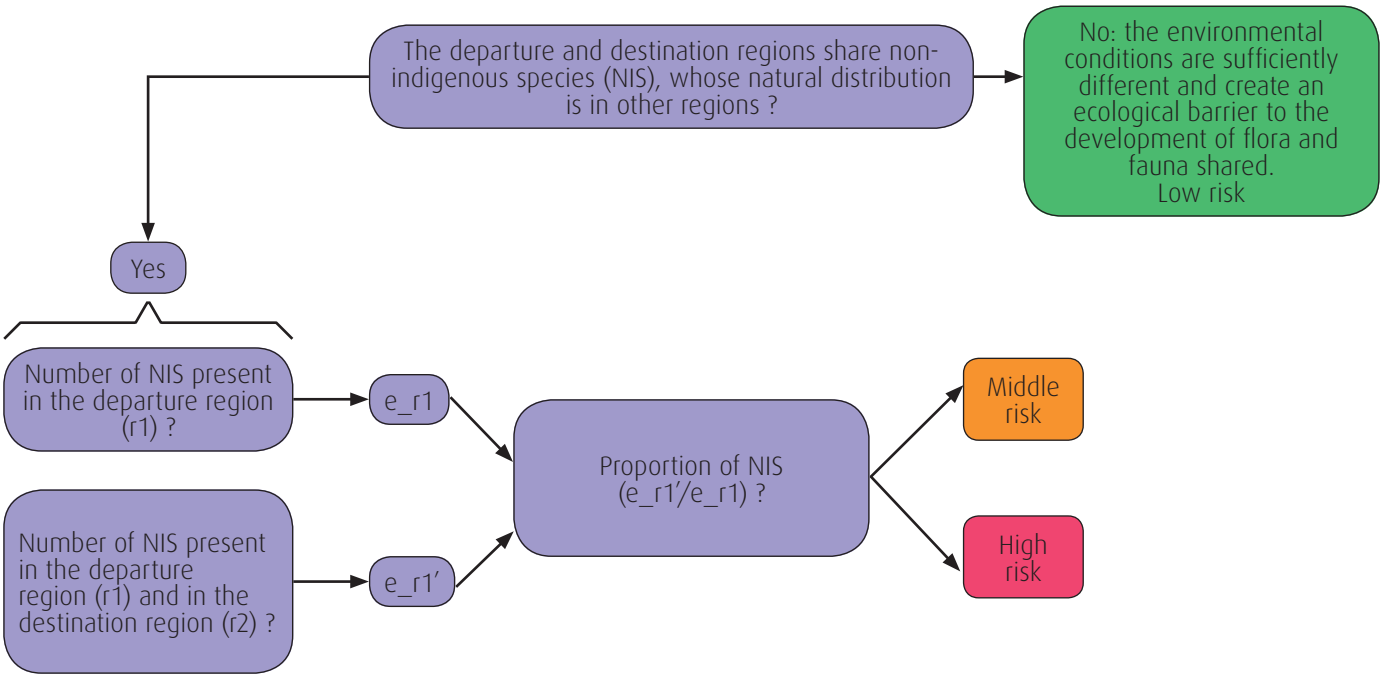
APPENDIX 6: Species' biogeographical risk assessment





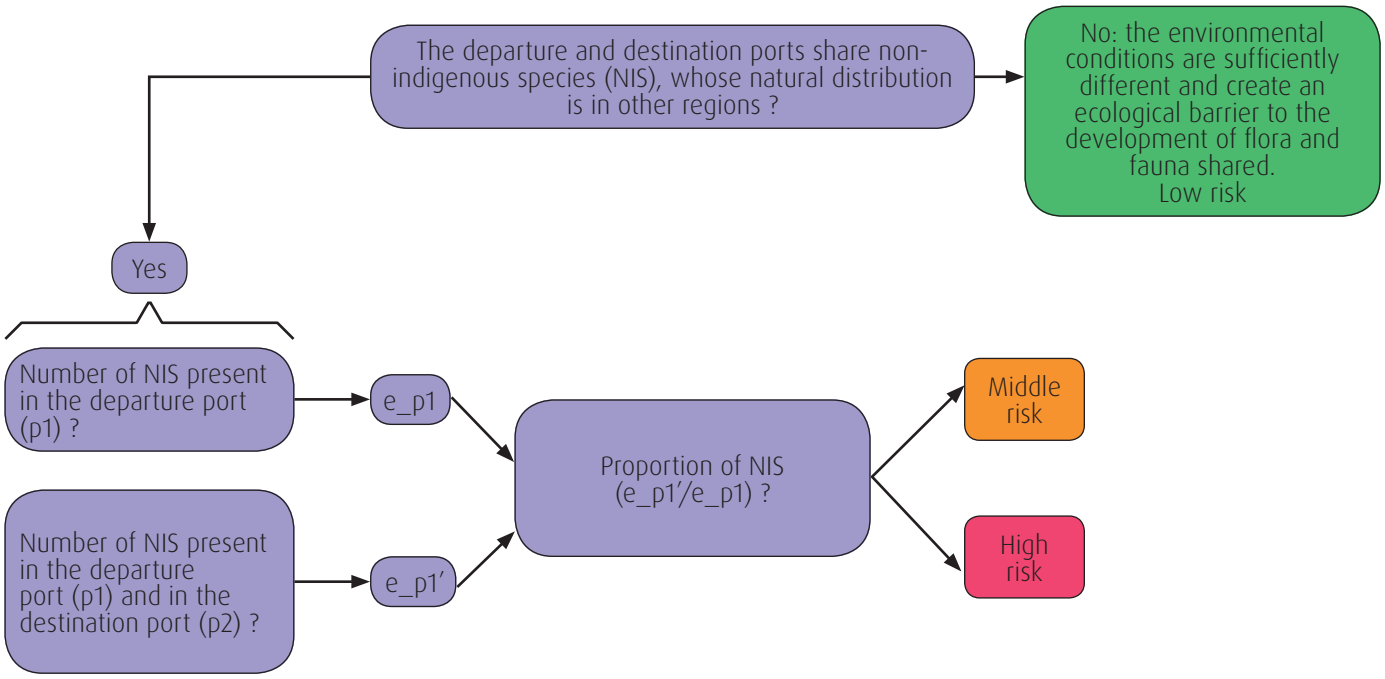
1 - Region scale

Proportion to the number of non-native species in common between the departure region and the destination region:



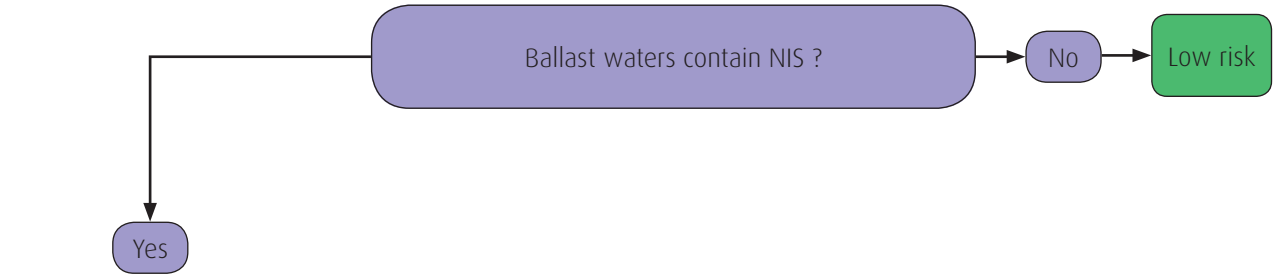
2 - Port scale

Proportion to the number of non-native species in common between the port of departure and the destination port:

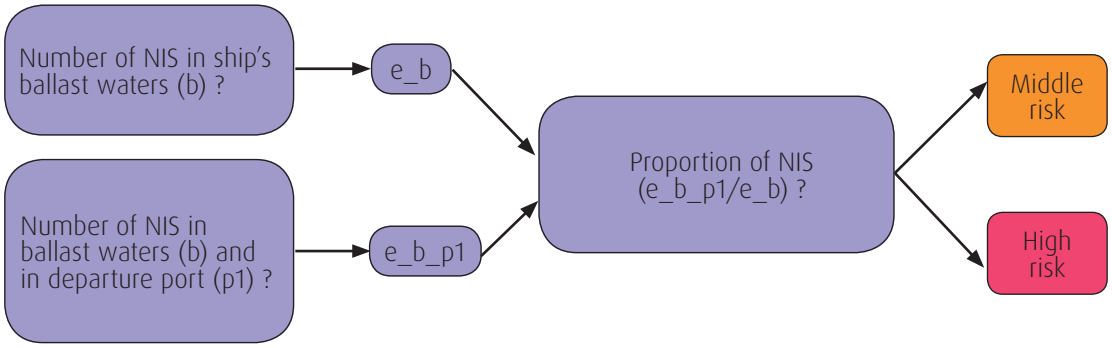


3 - Ship scale

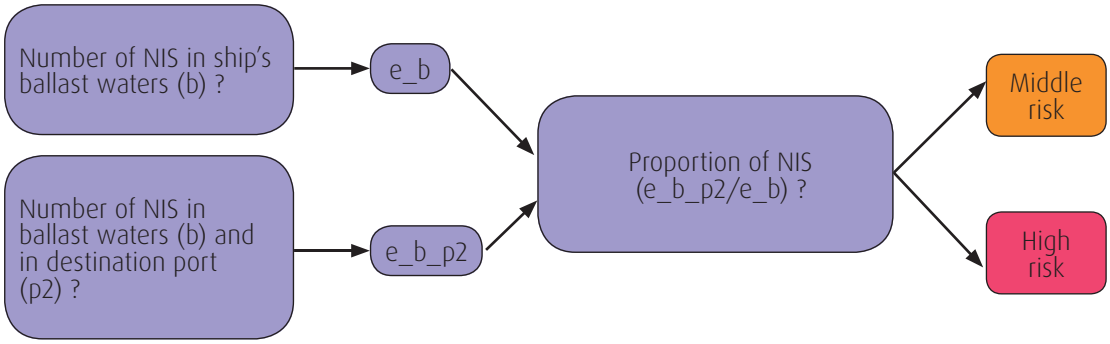
Proportion of NIS between ballast waters and ports departure and destination:



Ballast waters and departure port



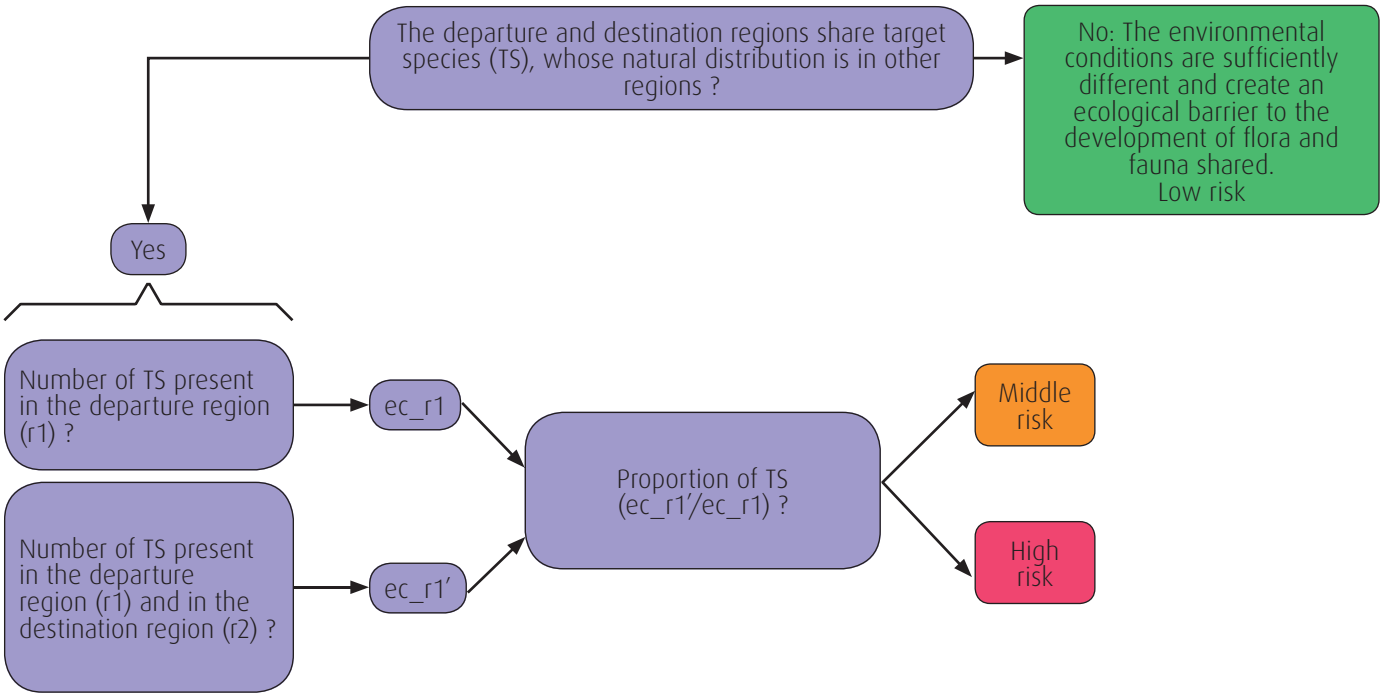
Ballast waters and destination port



ANNEXE 7 : Species-specific risk assessment

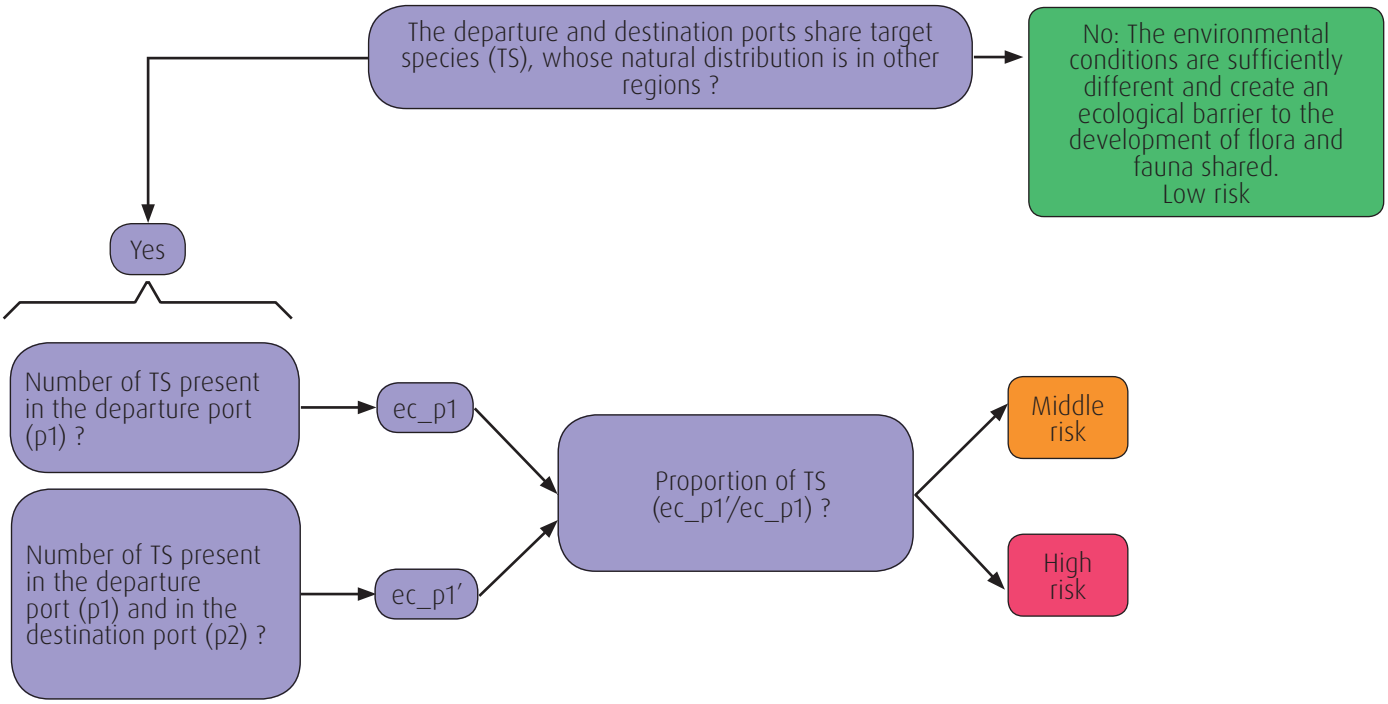
1 - Region scale

Proportion to the number of target species in common between the departure region and the destination region:



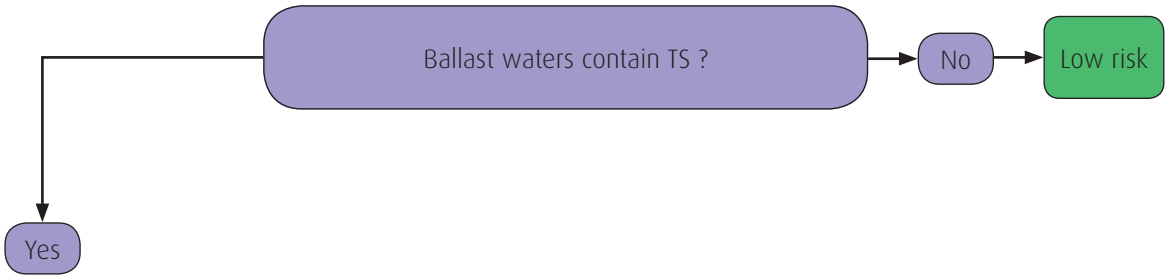
2 - Port scale

Proportion to the number of target species in common between the port of departure and the destination port:

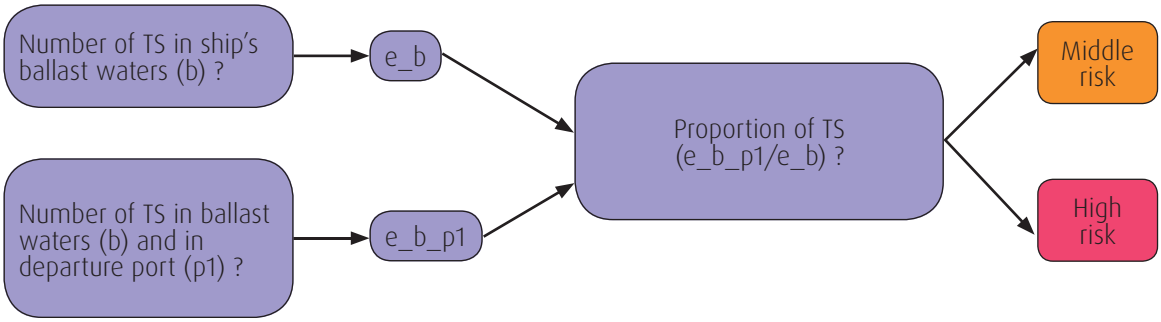


3 - Ship scale

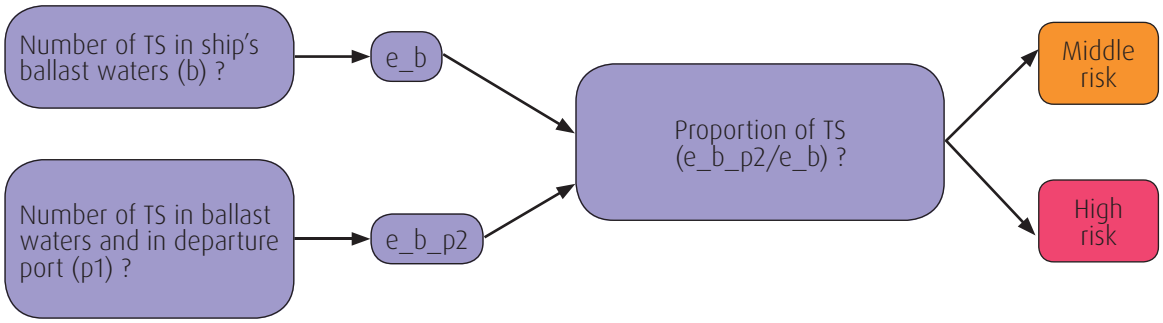
Proportion to TS between ballast waters and ports departure and destination:



Ballast waters and departure port



Ballast waters and destination port



APPENDIX 8: List of special non-native species known in French waters of marine subregions MSFD (Western Mediterranean, the Channel and North Sea, Bay of Biscay)

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
DIVERS PROTOZOAIRES						
	Bonamia ostreae	x	x	?		
	Marteilia refringens	x	x	?		
	Perkinsus olseni	x				
	Photobacterium damselae	x	x	Oui		
FORAMINIFERA						
	Cymbaloporetta plana	x	x	Oui		
	Planogypsina acervalis	x				
	Schackoinella imperatoria	x	x	?		
	Sorites orbiculus	x	x	Oui		
OCHROPHYTA						
	Acrothrix gracilis	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Botryella cf. parva	x				
	Chorda filum	x	x	Oui	observation locale vers Montpellier (étang de Thau) et suspecté au nord de la Corse	Non
	Chrysonephos lewisii	x	x	Oui		Oui
	Cladosiphon zosterae	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Colpomenia peregrina	x	x	Oui	peu fréquent le long des côtes entre Cerbère et Toulon	Non
	Desmarestia viridis	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Dictyota okamurae	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Fucus spiralis	x	x	Non	observation locale vers Perpignan	Non
	Halothrix lumbricalis	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Laminaria japonica	x	x	Non	observation locale vers Montpellier (étang de Thau)	Non
	Leathesia difformis	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Leathesia marina	x				
	Microspongium tenuissimum	x				
	Padina antillarum	x				
	Padina boergesenii	x	x			
	Padina boryana	x				
	Punctaria tenuissima	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Pylaiella littoralis	x	x	Oui	une localisation d'observation sur les côtes vers Montpellier	Non
	Saccharina japonica	x				
	Sargassum muticum	x	x	Oui	observation locale vers Montpellier (étang de Thau) et peu fréquent sur les côtes du Languedoc-Roussillon	Oui
	Scytosiphon dotyi	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Spatoglossum variabile	x				
	Sphaerotrichia firma	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Undaria pinnatifida	x	x	Oui	peu fréquent sur les côtes du Languedoc-Roussillon	Oui
CHLOROPHYTA						
	Caulerpa racemosa var. cylindracea	x	x	Oui	fréquemment observé le long de la côte d'azur et les côtes est, sud et ouest de la Corse	Oui
	Caulerpa taxifolia	x	x	Oui	fréquemment observé le long de la côte d'azur et observation locale sur la côte vermeille	Oui
	Cladophora hutchinsioides	x				Oui
	Codium fragile subsp. fragile	x	x	Oui		Oui
	Codium fragile subsp. tomentosoides	x	x	Oui	sur toutes les côtes de la SRM MO (plus fréquent à l'ouest)	Oui
	Derbesia boergesenii	x	x	Oui		
	Derbesia rhizophora	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Ulva fasciata	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Ulva ohnoi	x	x			
	Ulva pertusa	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Oui
	Ulvaria obscura	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
RHODOPHYTA						
	Acanthophora nayadiformis	x	x	Oui	observation locale sur la côte est du cap Corse	Non
	Acrochaetium robustum	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Acrochaetium spathoglossi	x				
	Acrochaetium subseriatum	x				
	Acrothamnion preissii	x	x	Oui	fréquent le long de la côte d'azur, Esterel	Oui
	Agardhiella subulata	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Aglaothamnion feldmanniae	x	x	Oui	observation locale vers Marseille	Non
	Ahnfeltiopsis flabelliformis	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Anotrichium okamurae	x	x	?		
	Antithamnion amphigeneum	x	x	Oui	peu fréquent sur la côte d'azur	Non
	Antithamnion hubbsii	x	x	Oui		
	Antithamnionella boergesenii	x	x	Oui	observation locale vers Montpellier (étang de Thau)	Non
	Antithamnionella elegans	x	x	Oui	observation locale vers Nice	Non
	Antithamnionella spirographidis	x	x	Oui	sur toutes les côtes de la SRM MO	Non

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Antithamnionella sublittoralis	x	x	Oui		
	Antithamnionella ternifolia	x	x	Oui	observation locale vers Nice, Arles et Marseille	Non
	Apoglossum gregarium	x	x	Oui	peu fréquent sur tout le pourtour méditerranéen de métropole	Non
	Asparagopsis armata	x	x	Oui	sur toutes les côtes de la SRM MO	Oui
	Asparagopsis taxiformis	x	x	Oui	observation locale vers Marseille et fréquemment sur la côte ouest du Cap Corse	Oui
	Bonnemaisonia hamifera	x	x	Oui	peu fréquent le long des côtes de France métropolitaine	Non
	Botryocladia madagascariensis	x	x	oui		
	Caulacanthus okamurae	x	x	oui		
	Ceramium bisporum	x	x	?		
	Chondria coerulescens	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Chondria curvilineata	x	x	oui	observations locales vers Marseille	non
	Chondria pygmaea	x	x	oui		
	Chondrus giganteus f. flabellatus	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Chrysymenia wrightii	x	x	oui	observations locales vers Montpellier et la côte Vermeille	non
	Dasya sessilis	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Dasysiphonia sp.	x	x	oui	observation locale vers Montpellier (étang de Thau)	oui
	Galaxaura rugosa	x	x	oui		
	Ganonema farinosum	x	x	oui		
	Goniotrichopsis sublittoralis	x	x	oui	observations locales vers Nice et Marseille	non
	Grateloupia asiatica	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Grateloupia lanceolata	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Grateloupia luxurians	x	x			
	Grateloupia minima	x	x	oui		
	Grateloupia patens	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Grateloupia subpectinata	x	x	oui		
	Grateloupia turuturu	x	x	oui	observation locale vers Montpellier (étang de Thau)	oui
	Griffithsia corallinoides	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Herposiphonia parca	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Hypnea cornuta	x	x			
	Hypnea spinella	x	x	oui	peu fréquente sur la côte d'azur et observation locale vers Calvi	non
	Hypnea valentiae	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Laurencia caduciramulosa	x	x	oui	observations locales entre Toulon et Arles	non
	Laurencia okamurae	x	x	oui	sur toutes les côtes de la SRM MO	non
	Lithophyllum yessoense	x	x	oui	observation locale vers Montpellier (étang de Thau)	oui
	Lomentaria flaccida		?			

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Lomentaria hakodatensis	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Lophocladia lallemandii	x	x	oui		oui
	Nemalion vermiculare	x	x	oui		
	Neosiphonia harveyi	x	x	oui	fréquemment observé le long des côtes du golf du Lion	non
	Nitophyllum stellato-corticatum	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Osmundea oederi	x	x	?		
	Pleonosporium caribaeum	x	x	oui	observations locales vers Marseille et Toulon	non
	Plocamium secundatum	x	x	oui		
	Polysiphonia atlantica	x	x	oui	fréquemment observé le long des côtes du golf du Lion	non
	Polysiphonia fucoides	x	x	oui	observations locales vers Montpellier et la côte Vermeille	non
	Polysiphonia morrowii	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Polysiphonia paniculata	x	x	non	observation locale vers Montpellier (étang de Thau)	non
	Polysiphonia stricta	x	x	oui		
	Porphyra yezoensis	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Pterosiphonia tanakae	x	x	oui	observation locale vers Montpellier (étang de Thau)	non
	Rhodophysema georgei	x	x	non	observation locale vers Montpellier (étang de Thau)	non
	Rhodothamniella codicola	x	x			
	Sarconema filiforme	x	x	oui		
	Solieria filiformis	x	x	oui	observations locales vers Arles et la côte Vermeille	non
	Spongoclonium caribaeum	x	x	oui		
	Symphyocladia marchantioides	x	x	oui		
	Womersleyella setacea	x	x	oui	fréquemment observé le long de la côte d'azur et des côtes Corses	oui
MAGNOLIOPHYTA						
	Halophila stipulacea	x	x	oui		oui
BRYOZOA						
	Watersipora subtorquata	x	x			
	Arachnoidea protecta	x	x	?		
	Bowerbankia gracillima	x	x	?		
	Bugula fulva	x	x	oui		oui
	Bugula serrata	x	x	oui		
	Pherusella brevituba	x	x	?		
CTENOHORA						
	Mnemiopsis leidyi*	x	x	oui		
CNIDARIA						
Anthozoa	Haliplanella lineata	x	x	oui	?	non
	Oculina patagonica	x	x	oui		

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
Hydrozoa	Amphogona pusilla*	x	x	?		
	Arctapodema australis*	x	x	?		
	Campalecium medusiferum*	x	x	oui		
	Cirrholovenia tetranema*	x	x	oui		
	Clytia hummelincki*	x	x	oui		
	Clytia linearis	x	x	oui	Marseille, Var	oui
	Clytia mccradyi*	x	x	oui		
	Cordylophora caspia	x				
	Coryne eximia*	x	x	?		
	Eirene viridula*	x	x	oui		
	Eucheilota paradoxica	x	x	?	?	non
	Eudendrium carneum	x	x	oui		
	Eudendrium merulum	x	x	oui		
	Filellum serratum*	x	x	?		
	Garveia franciscana	x	x	?		
	Gonionemus vertens	x	x	oui		
	Moerisia inkermanica*	x	x	?		
	Octotiara russelli*	x	x	?		
	Russellia mirabilis	x	x	?		
	Scolionema suvaensis*	x	x	oui		
	Sertularia marginata est	x	x	oui		
Scyphozoa	Phyllorhiza punctata*	x	x	?		
	Stomolophus meleagris*	x	x	?		
PORIFERA						
	Paraleucilla magna	x				oui
NEMATODA						
	Anguillicola novaezelandiae	x				
	Anguillicola crassus	x	x			
PLATYHELMINTHES						
	Allolepidapedon fistulariae	x	x	?		
ARTHROPODA						
	Acartia (Acanthacartia) tonsa	x	x	oui	?	non
	Actumnus globulus	x	x	?		
	Amphibalanus eburneus**	x	x	oui		
	Anoplodactylus californicus	x	x	oui		
	Austrominius modestus**	x	x	oui		

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Automate branchialis	x				
	Balanus onodyates	x	x			
	Balanus reticulatus	x	x	?		
	Balanus trigonus	x	x	oui		
	Bemlos leptocheirus	x				
	Calanopia elliptica	x	x	?		
	Calappa pelii	x	x	?		
	Callinectes sapidus	x	x	?	une observation locale sur les côtes à l'est du golf du Lion	oui
	Cancer pagurus	x	x			
	Caprella scaura	x	x	oui		
	Charybdis feriata	x	x	?		
	Cryptosoma cristatum	x	x	?		
	Dasya sessilis	x	x	oui	?	non
	Elasmopus pectenicrus	x	x	?		
	Elminius modestus	x	x	oui	?	non
	Eocuma sarsii	x	x	oui		
	Eriocheir sinensis	x	x	?	observation dans plusieurs localisation au niveau des côtes de Narbonne	non
	Erythrosquilla sp.	x	x	?		
	Glabropilumnus laevis**	x	x	?		
	Hemigrapsus sanguineus	x	x	?		
	Heteropanope laevis	x				
	Labidocera detruncata	x	x	?		
	Leptochelia dubia	x				
	Marsupenaeus japonicus	x	x	?	une observation locale en Languedoc-Roussillon	oui
	Megabalanus tintinnabulum	x	x	?		
	Menaethius monoceros	x	x	?		
	Mesanthura spp.	x	x	?		
	Metacalanus acutioperculum	x	x	oui		
	Monocorophium sextonae	x				
	Myicola ostreae	x	x	oui		non
	Mytilicola orientalis	x	x	oui		non
	Necora puber	x	x	oui		
	Paracalanus indicus	x	x	?		
	Paracartia grani	x	x	oui		
	Paracerceis sculpta	x	x	oui		

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Paradella dianae	x	x	oui		
	Parvocalanus crassirostris**	x	x	?		
	Percnon gibbesi	x	x	oui		oui
	Pilumnopeus vauquelini	x	x	?		
	Plagusia squamosa	x	x	?		
	Portunus pelagicus	x				
	Portunus segnis**	x	x	?		oui
	Processa macrodactyla	x	x	oui		
	Pseudocalanus elongatus	x				
	Rhithropanopeus harrisii	x	x	oui	fréquent au niveau des côtes près de Marseille	oui
	Scaphocalanus amplius	x	x	?		
	Scolecithrix valens	x	x	?		
	Scyllarus posteli	x	x	?		
	Sinalpheus hululensis Coutière	x				
	Sphaeroma venustissimum	x	x	oui		
	Sphaeroma walkeri	x	x	?		non
	Stenothoe gallensis	x	x	?		non
	Subeucalanus subcrassus**	x	x	?		
	Synalpheus tumidomanus africanus**	x				
	Thalamita gloriensis	x	x	?		
	Triconia rufa	x	x	oui		
	Triconia umerus	x	x	oui		
	Unciolella lunata	x				
ANNELIDA						
	Amphicorina pectinata	x	x	?		
	Apoprionospio pygmaea	x	x	?		
	Branchiomma boholensis	x	x	oui		
	Branchiomma luctuosum	x	x	oui		oui
	Desdemona ornata	x	x	oui		oui
	Dispio uncinata	x	x	?		
	Erinaceusyllis serratosetosa	x	x	oui		
	Eunice antennata	x	x	oui		oui
	Eunice cf. cariboea	x	x	?		
	Eurythoe complanata	x	x	?		
	Fabriciola ghardaqa Banse	x				

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Ficopomatus enigmaticus	x	x	oui		oui
	Haploscoloplos kerguelensis	x	x	?		
	Hesionura serrata	x	x	?		
	Hyboscolex longiseta	x	x	?		
	Hydroides albiceps	x	x	?		
	Hydroides dianthus	x	x	oui	étang de Berre principallement et tout le long des côtes en général	oui
	Hydroides dirampha	x	x			
	Hydroides elegans	x	x	oui	tout le long des côtes en général	oui
	Hydroides heterocerus	x	x	oui		
	Hydroides homocerus	x	x	oui		
	Hydroides steinitzi	x	x	?		
	Leiochrides australis	x	x	?		
	Leocrates chinensis	x	x	?		
	Longibranchium atlanticum	x	x	?		
	Lumbrineris acutifrons	x	x	?		
	Lumbrineris neogesae	x	x	?		
	Lumbrineris perkinsi	x	x	oui		
	Lysidice collaris	x	x	oui		
	Mediomastus capensis	x	x	?		
	Metasychis gotoi	x	x	oui		
	Neanthes agulhana	x	x	oui		
	Neopseudocapitella brasiliensis	x	x	oui		
	Nereis jacksoni	x	x	oui		
	Notomastus aberans	x	x	oui		
	Notomastus mossambicus	x	x	oui		oui
	Novafabricia infratorquata	x	x	oui		
	Oenone cf. fulgida	x	x	?		
	Ophryotrocha diadema	x	x	oui		
	Ophryotrocha japonica	x	x	oui		
	Paraprionospio coora	x				
	Pileolaria berkeleyana	x	x	oui	Région de Marseille	non
	Pista unibranchia	x	x	oui		
	Podarkeopsis capensis	x	x	?		
	Polydora colonia	x	x	?		oui
	Polydora cornuta	x	x	oui		

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Sigambra parva	x	x	?		
	Spirorbis marioni	x	x	oui	tout le long des côtes en général et en Corse	oui
	Streblosoma comatus**	x	x	oui		
	Syllis pectinans	x	x	oui		
	Syllis schulzi	x	x	?		
	Terebella ehrenbergi	x	x	?		
ECHINODERMATA						
	Acanthaster planci	x	x	?		
	Ophiactis savignyi	x	x	?		
	Protoreaster nodosus	x	x	?		
MOLLUSCA						
	Aeolidiella indica	x				
	Alvania dorbignyi	x				
	Anadara inaquivalvis	x				
	Anadara kagoshimensis**	x	x	oui		
	Anadara transversa**	x	x	oui		
	Anteaeolidiella foulisi**	x	x	?		
	Bostrycapulus odites**	x	x	oui		
	Brachydontes pharaonis	x	x	oui		oui
	Bursatella leachii	x	x	oui		oui
	Callista florida	x	x	?		
	Cerithium scabridum	x	x	oui		oui
	Chlamys lischkei	x				
	Chromodoris quadricolor	x	x	?		
	Crassostrea angulata	x	x			
	Crassostrea gigas	x	x	oui		oui
	Crepidula aculeata	x				
	Crepidula fornicata	x	x	oui	toujours rare - Salses-Leucate et Thau - une observation locale à la Seyne sur mer	oui
	Discodoris lilacina	x				
	Favorinus ghanensis	x	x	oui		
	Fulvia fragilis	x	x	oui		
	Gibbula albida	x	x	oui		
	Godiva quadricolor	x	x	?		
	Melibe fimbriata	x				
	Melibe viridis**	x	x	oui		oui

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Mercenaria mercenaria	x	x	oui	observation locale dans l'étang de Thau	non
	Mitrella psilla	x	x	oui		
	Modiolus auriculatus	x	x			
	Musculista perfragilis	x	x			
	Musculista senhousia	x	x	oui	fréquent dans les lagunes du Golf du Lion	oui
	Mya arenaria	x	x	oui	très commun dans l'étang de Berre et dans certaines lagunes du Golf du Lion	non
	Paphia textile	x	x			
	Papyridea australe	x				
	Papyridea papyracea	x				
	Petricola pholadiformis	x				
	Pinctada margaritifera	x				
	Pinctada radiata	x	x	oui	observation accidentelle à Toulon	
	Pleurobranchus forskalii	x	x			
	Polycera hedgpethi	x	x	?		
	Polycerella emertoni	x	x	oui		
	Psammotreta praerupta	x				
	Pseudochama corbieri	x				
	Quoyula madreporarum	x				
	Rapana venosa	x	x	oui		
	Rissoina spirata	x	x	?		
	Rissoina spirata	x				
	Ruditapes philippinarum	x	x	oui	Languedoc	
	Sabia conica	x				
	Saccostrea cucullata	x	x	?		
	Scapharca inaequivalvis	x				
	Thais lacera	x				
	Theora lubrica	x	x	oui		
	Tremoctopus gracilis	x	x	?		
	Xenostrobus securis	x	x	oui	forte présence dans le canal entre la mer et l'étang du Vilourde	
SIPUNCULA						
	Apionsoma (Apionsoma) misakianum	x	x	?		
	Phascolion (Isomya) convestitum	x	x	oui		
CHORDATA						
Actinopterygii	Leiognathus klunzingeri	x	x			
	Abudefduf vaigiensis	x	x	?		

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Acanthurus monroviae	x	x	oui		
	Aluterus monocerus	x	x	?		
	Anarhichas lupus	x	x	?		
	Beryx splendens	x	x	oui		
	Bregmaceros atlanticus	x	x	?		
	Centrolabrus exoletus	x	x	?		
	Chaunax suttkusi	x	x	?		
	Chilomycterus reticulatus	x	x	?		
	Diodon hystrix	x				
	Diplodus bellottii	x	x	oui		
	Fistularia commersonii	x	x	oui		
	Fistularia petimba	x	x	?		
	Gephyroberyx darwini	x	x	?		
	Glaucostegus halavi	x	x	?		
	Gymnammodytes semisquamatus	x	x	oui		
	Halosaurus ovenii	x	x	oui		
	Hippocampus fuscus	x				
	Kyphosus incisor	x	x	?		
	Kyphosus sectator	x	x	oui		
	Lutjanus jocu	x	x	?		
	Makaira indica	x	x	?		
	Microchirus boscanion	x	x	oui		
	Microchirus(Zevaia) hexophthalmus	x	x	oui		
	Pagellus bellottii	x	x	oui		
	Papilloculiceps longiceps	x				
	Pinguipes brasilianus	x	x	?		
	Pisodonophis semicinctus	x	x	oui	présent de manière peu fréquente dans le golf du Lion	
	Plotosus lineatus	x	x			
	Pomadasys stridens	x	x	oui		
	Psenes pellucidus	x	x	oui	présent de manière peu fréquente dans le golf du Lion et sur les côtes jusqu'à Toulon?	
	Pseudupeneus prayensis	x	x	?		
	Rachycentron canadum	x	x	?		
	Scorpaena stephanica	x	x	?		
	Seriola carpenteri	x				
	Seriola fasciata	x	x	oui		
	Siganus luridus	x	x	?	présent de manière peu fréquente dans le golf du Lion	

PHYLUM	TAXONS	MO	SRM MO française	Etablie MOF	Distribution en Méditerranée Occidentale française	Invasive
	Solea senegalensis	x	x	oui	une seule localisation des observations	
	Sphoeroides marmoratus	x	x	?	présent de manière peu fréquente dans le Golf du Lion et sur les côtes du Languedoc-Roussillon	
	Sphoeroides pachygaster	x	x	oui	fréquent sur tout le pourtour méditerranéen (hors Corse) entre 50-250m	
	Sphyraena chrysotaenia	x				
	Spratelloides delicatulus	x				
	Stephanolepis diaspros	x				
	Synagrops japonicus	x	x	?		
	Synaptura lusitanica	x	x	oui		
	Syngnathus rostellatus	x	x	?		
	Trachyscorpia cristulata echinata	x	x	oui		
	Zenopsis conchifera	x	x	?		
Ascidiacea	Cystodytes philippinensis	x				
	Distaplia bermudensis	x	x	oui		oui
	Ecteinascidia styeloides	x	x	oui		
	Microcosmus exasperatus	x	x	oui	Port de Nice et Cannes	oui
	Microcosmus squamiger	x	x	oui		oui
	Perophora multiclathtrata	x	x	oui		
	Polyandrocarpa zorritensis	x	x	oui		oui
	Rhodosoma turcicum	x	x	?		oui
	Styela clava	x	x	?		oui
	Tridemnum cf. savignii	x	x	oui		
Elasmobranchii	Carcharhinus altimus	x	x	oui		
	Carcharhinus falciformis	x	x	oui		
	Galeocerdo cuvier	x	x	?		
	Isurus paucus	x	x	?		
	Rhizoprionodon acutus	x				
	Sphyrna mokarran	x	x	?		

PHYLUM	TAXONS	SRM	Etablie MMN	Etablie GG	Distribution MMN	Distribution GG	Invasive
CHORDATA							
	Bonamia ostreae	MMN, GG	oui	oui	Bretagne, Cotentin	GG (tous les sites abritant des huitres plates)	oui
	Haplosporidium nelsoni	MMN, GG	oui	oui	Finistère	Arcachon, Morbihan	
FORAMINIFERA							
	Quinqueloculina carinatastriata	GG		?		Marennes-Oléron, Ré	
MYZOZOA							
	Alexandrium leei	MMN, GG	?	?	Finistère	Finistère	
	Alexandrium minutum	MMN, GG	oui	oui	Finistère, Ille et Vilaine	GG Nord	oui
	Alexandrium taylori	GG		?		Arcachon	
	Gymnodinium catenatum	GG		oui			
	Karenia mikimotoi	GG		?		Concarneau, Noirmoutier	
	Karenia papilionacea	MMN	?		Finistère		oui
	Neoceratium candelabrum	GG		?			
	Thecadinium yashimaense	MMN			Finistère		
OCHROPHYTA							
	Coscinodiscus wailesii	MMN, GG	?	?	du Cotentin au Nord-Pas-de-Calais	Golfe de Gascogne	
	Odontella sinensis	MMN, GG	?	?	Manche orientale	Arcachon	
	Pleurosigma simonsenii	GG		?			
	Pseudo-nitzschia multistriata	MMN	?		Bretagne Nord		
CHLOROPHYTA							
	Codium fragile fragile	MMN, GG	oui	oui	Bretagne, Cotentin	Arcachon, Loire-Atlantique, Bretagne Sud	
	Kornmannia leptoderma	GG		?		Arcachon	
	Ulva cf. fasciata	GG		oui		Arcachon	
	Ulva pertusa	MMN, GG		oui	Finistère	Arcachon	
	Ulvaria obscura	GG		?		Arcachon	
HETEROKONTOPHYTA							
	Colpomenia peregrina	MMN, GG	oui	oui	Bretagne, Cotentin, Boulogne/mer, Audresselles	Arcachon, Bretagne, Loire Atlantique	
	Fibrocapsa japonica	MMN	oui		Finistère, Calvados		
	Pylaiella littoralis	MMN, GG	oui	oui	MMN	GG	
	Sargassum muticum	MMN, MC, GG	oui	oui	MMN	GG	oui
	Undaria pinnatifida	MMN, MC, GG	oui	oui	MMN	GG	oui

PHYLUM	TAXONS	SRM	Etablie MMN	Etablie GG	Distribution MMN	Distribution GG	Invasive
RHODOPHYTA							
	Anotrichium furcellatum	MMN, GG	oui	oui	Bretagne, Cotentin	Arcachon, Loire Atlantique, Bretagne Sud	
	Antithamnion densum	MMN, GG	oui	oui	Iroise, Baie de Morlaix, Cotentin, Wimereux	Bretagne Sud, Loire Atlantique	
	Antithamnionella spirographidis	MMN, GG	oui	oui	Bretagne, Cherbourg	GG	
	Antithamnionella ternifolia	MMN, GG	oui	oui	Bretagne, Cotentin, Boulogne/mer, cap Gris nez	GG	
	Asparagopsis armata	MMN, GG	oui	oui	Bretagne, Cotentin	Côte basque, Bretagne, Loire Atlantique	
	Bonnemaisonia hamifera	MMN, GG	oui	oui	Bretagne, Cotentin, Calvados	GG	
	Caulacanthus ustulatus	MMN, GG	oui	oui	Bretagne, Le Havre	GG	oui dans le 29
	Centroceras clavulatum	GG		oui		Arcachon	
	Colaconema codicola	GG		oui		Arcachon	
	Dasya sessilis	GG		oui		Arcachon	
	Gracilaria vermiculophylla	MMN, GG	oui	oui	Bretagne	Arcachon, Bretagne	
	Grateloupia subpectinata	MMN, GG	oui	oui	Plougasnou	Arcachon, Morbihan, Finistère	
	Grateloupia turuturu	MMN, GG	oui	oui	Bretagne, Cotentin	GG Nord	
	Griffithsia corallinoides	MMN	?		Bretagne, Cotentin, Calvados, Picardie-Nord-Pas-de-Calais		
	Herposiphonia parca	GG		oui		Arcachon	
	Heterosiphonia japonica	MMN, GG	oui	oui	Bretagne, Cotentin	Arcachon, Bretagne, Loire Atlantique	
	Hypnea valentiae	GG		oui		Arcachon	
	Laurencia brongniartii	GG	dispa-rue	?		Bretagne Sud, Loire Atlantique	
	Lomentaria hakodatensis	MMN, GG	oui	oui	Bretagne, Cotentin	Arcachon, Bretagne, Loire Atlantique	
	Neosiphonia harveyi	MMN, GG	oui	oui	MMN	GG	
	Polyopes lancifolius	GG		oui		Golfe du Morbihan	
	Pterosiphonia tanakae	GG		oui		Arcachon	
	Spongoclonium caribaeum	MMN, GG		oui	Brest, Cotentin	Bretagne Sud, Loire Atlantique	
MAGNOLIOPHYTA							
	Spartina alterniflora	MMN, GG	oui	oui	rade de Brest, Nord-Pd-Calais (estuaires et baie de Somme)	Sud GG, Brest	
	Spartina townsendii var. anglica	MMN, GG	oui	oui	MMN	GG	
	Spartina townsendii var. townsendii	MMN, GG	oui	oui	MMN	GG	

PHYLUM	TAXONS	SRM	Etablie MMN	Etablie GG	Distribution MMN	Distribution GG	Invasive
	Spartina versicolor	GG		oui		Sud GG	
BRYOZOA							
	Bugula neritina	MMN, GG	oui	oui	14, 76, Bretagne Nord	Bretagne, Arcachon, Hendaye	
	Bugula simplex	MMN, GG	oui	oui	Trébeurden	Arcachon	
	Bugula stolonifera	MMN, GG	oui	?	14, côte d'Opale, sud Mer du Nord	Arcachon, Morbihan	
	Caulibugula zanzibarensis	GG		?		Arcachon	
	Fenestrulina delicia	MMN	?		N. Bretagne, Normandie		
	Pacificincola perforata	GG		?		Arcachon	
	Schizoporella unicornis	MMN	oui		Picardie-Nord-PdCalais		
	Tricellaria inopinata	MMN, GG	oui	oui	Normandie, Le Havre	Côte basque, G morbihan, Arcachon	
	Victorella pavida	GG	?	?		Arcachon, Finistère, Morbihan	
	Watersipora subtorquata	MMN, GG	?	?	Cotentin	Bretagne, Arcachon, Loire Atlantique	
CTENOPHORA							
	Mnemiopsis leidyi	MMN	?		Le Havre, Nord-PdCalais		
CNIDARIA							
	Aiptasia pulchella	GG		?		?	
	Blackfordia virginica	MMN, GG	?	?	Finistère, Cotentin	Bretagne Sud, Loire Atlantique	
	Cordylophora caspia	MMN, GG	oui	oui	Bretagne (22, 35), Cotentin, baie de Seine	Arcachon, marais et estuaires GG	
	Diadumene cincta	MMN, GG	oui	oui	Bretagne, Le Havre, Pas de Calais	Pertuis Charentais, Bretagne, Loire Atlantique	
	Diadumene lineata	MMN, GG	oui	oui	Bretagne Nord, Cotentin, Le Havre	GG	
	Gonionemus vertens	MMN, GG	oui	oui	Finistère, Cotentin, Le Havre, Picardie-Nord-PdCalais (1sig)	Finistère	
	Maeotias marginata	GG		?		Estuaire Loire	
	Nemopsis bachei	MMN, GG	?	oui	Cotentin	Estuaires Loire, Gironde, Arcachon	
PORIFERA							
	Celtodoryx ciocalyptoides	GG		oui		G Morbihan, Etel	oui (localement)
NEMATODA							

PHYLUM	TAXONS	SRM	Etablie MMN	Etablie GG	Distribution MMN	Distribution GG	Invasive
	Anguillicoloides crassus	MMN, GG	oui	oui	Finistère, Cotentin, baie de Seine	GG	oui
PLATYHELMINTHES							
	Koinostylochus ostreophagus	MMN, GG	?	?	Finistère, Cotentin	GG	
	Pseudodactylogyrus anguillae	MMN, GG	oui	oui	Finistère, Cotentin	GG	
ARTHROPODA							
	Caprella mutica	MMN	oui		Le Havre		
	Monocorophium sextonae	MMN, GG	oui	oui	MMN	GG	
Cirripedia	Amphibalanus amphitrite	MMN, GG	oui	oui	Bretagne Nord, Cotentin, Le Havre, Port de Dunkerque	Bidassoa, Pertuis charentais, Sables d'Olonne, Bourgneuf, Bretagne	
	Amphibalanus eburneus	MMN, GG	?	oui	Rade de Brest, Cotentin, Le Havre	Côte Basque, Arcachon, La Rochelle, Vendée	
	Amphibalanus improvisus	MMN, GG	oui	oui	Bretagne, Iles anglo-normandes, Manche (50), ports du Nord-PdCalais	GG	
	Balanus albicostatus	GG		?		?	
	Balanus trigonus	MMN	?		Brest		
	Elminius modestus	MMN, GG	oui	oui	Bretagne, Cotentin, Le Havre, ports du Nord-PdCalais	GG	
	Megabalanus coccopoma	MMN	?		Picardie-Nord-PdCalais		
	Megabalanus tintinnabulum	MMN, GG		?	Normandie	Loire Atlantique	
	Solidobalanus fallax	MMN, GG	oui	oui	Bretagne Nord (22, 35), Ile anglo-normandes, Manche (50), Picardie-Nord-PdCalais	St Jean de Luz, Noirmoutier, Bretagne	
Copepoda	Acartia (Acartiura) omorii	MMN	?		port de Calais (1 signalisation)		
	Acartia (Acanthacartia) tonsa	MMN, GG	oui	oui	Calvados, Nord-PdCalais	Gironde, Arcachon, Oléron	
	Eurytemora americana	MMN	?		port de Dunkerque		
	Myicola ostreae	GG		oui		GG	
	Mytilicola intestinalis	MMN, GG	oui	oui	Bretagne, Cotentin, Nord-PdCalais	GG	
	Mytilicola orientalis	MMN, GG	oui	oui	Finistère, Golfe Normand-breton	GG	
	Pseudomyicola spinosus	GG		?		GG Nord	?
Decapoda	Brachynotus sexdentatus	GG		?		La Rochelle, Charente	
	Callinectes sapidus	MMN, GG	?	?	Baie de Seine, Wimereux, Boulogne sur mer	Estuaire Gironde	
	Hemigrapsus sanguineus	MMN	oui		Cotentin, Le Havre, Nord P. Calais		oui

PHYLUM	TAXONS	SRM	Etablie MMN	Etablie GG	Distribution MMN	Distribution GG	Invasive
	Hemigrapsus takanoi	MMN, GG	oui	oui	Finistère, Cotentin, Calvados, Le Havre, côte d'Opale, Port de Dunkerque	GG	oui
	Homarus americanus	MMN, GG	?	?	Bretagne, Manche	GG Nord	
	Marsupenaeus japonicus	GG	?	?		Noirmoutier, Quiberon, GG	
	Palaemon macrodactylus	MMN, GG	oui	oui	MMN	GG	oui
Isopoda	Paranthura japonica	GG		?		Arcachon	
	Synidotea laticauda	GG		oui		Estuaire Gironde	
Stomatopoda	Odontodactylus scyllarus	MMN	?		St Malo (1 sign.)		
ANNELIDA							
	Boccardia polybranchia	MMN, GG	?	oui	Anse St Martin (Cotentin)	GG	
	Boccardia semibranchiata	MMN, GG	oui	oui	Baie des Veys	GG Sud	
	Clymenella torquata	MMN	oui		Manche orientale		
	Desdemona ornata	GG		?		Bidassoa	
	Ficopomatus enigmaticus	MMN, GG	oui	oui	MMN	GG	oui
	Goniadella gracilis	MMN, GG	?	?	Finistère	Finistère, Morbihan	
	Hydroides dianthus	MMN, GG	oui	oui	Bretagne, Cotentin, Le Havre, Picardie-Nord-PdCalais	GG	
	Hydroides elegans	MMN	?		Le Havre		
	Hydroides ezoensis	MMN	oui	?	Le Havre, Picardie-Nord-PdCalais		
	Marenzelleria viridis	MMN	oui		Picardie-Nord-PdCalais		
	Neodexiospira brasiliensis	GG		oui		G Morbihan	
	Pileolaria berkeleyana	MMN, GG	oui	oui	Bretagne Nord	G Morbihan	
	Streblospio benedicti	GG	?	?		Estuaire Loire	
MOLLUSCA							
Bivalvia	Anomia chinensis	GG		?		?	
	Arcuatula senhousia	GG		oui		Arcachon, Hossegor, Bidassoa	oui
	Crassostrea gigas	MMN, GG	oui	oui	MMN	GG	oui
	Ensis directus	MMN	oui		Baie de Seine, Picardie-Nord-PdCalais		oui
	Mercenaria mercenaria	MMN, GG	oui	oui	St Vaast la Hougue, Nord-PdCalais	Golfe Morbihan	
	Mizuhopecten yessoensis	MMN, GG	?	?	Côtes d'Armor, Finistère, Manche	?	
	Mya arenaria	MMN, GG	oui	oui	MMN	GG	
	Petricolaria pholadiformis	MMN, GG	oui	?	estuaire de la Seine, large de Dunkerque	GG	

PHYLUM	TAXONS	SRM	Etablie MMN	Etablie GG	Distribution MMN	Distribution GG	Invasive
	Ruditapes philippinarum	MMN, GG	oui	oui	Bretagne, Cotentin, Port de Dunkerque, côte NordPdC	GG	oui
Gastropoda	Corambe obscura	GG		?		Fouras	
	Crepidula fornicata	MMN, GG	oui	oui	MMN	GG	oui
	Cyclope neritea	MMN, GG	oui	oui	Côtes d'Armor, Finistère	GG	
	Fusinus rostratus	MMN	oui		Baie de Morlaix, Baie de St Brieuc (1 signalisation)		
	Gibbula albida	MMN, GG	oui	oui	Côtes d'Armor, Finistère, Manche	GG	
	Hexaplex (Trunculariopsis) trunculus	GG		?		Arcachon	
	Ocenebra inornata	MMN, GG	oui	oui	22, 35, 50	Marennes-Oléron, Arcachon, Bourgneuf, Morbihan	oui
	Potamopyrgus antipodarum	MMN, GG	oui	oui	22, 35, Normandie, Manche Orientale (estuaires côte d'Opale)	Arcachon, Nantes, St Nazaire, Bidassoa	
	Rapana venosa	GG		oui		Quiberon, S Bretagne	
	Urosalpinx cinerea	MMN, GG	oui	?	Iles anglo-normandes, Pays de Caux, Cap gris nez et Blanc nez	Arcachon, Brest, Morbihan	
CHORDATA							
Actinopterygii	Acipenser baerii baerii	GG					
	Onchorynchus mykiss	MMN	?		Bretagne Nord (22,35), Cotentin		
Ascidiacea	Botrylloides violaceus	MMN, GG	oui	oui	Bretagne N (22,35), Le Havre, port de Dunkerque	Morbihan	?
	Corella eumyota	MMN, GG	oui	?	Bretagne (22,29), Cotentin, Iles anglo-normandes, Le Havre	Morbihan, Loire Atlantique	
	Didemnum vexillum	MMN, GG	?	oui	Brest, Camaret, Perros-Guirec, Le Havre	Concarneau, Pornic, La Rochelle, Arcachon	oui
	Molgula manhattensis	MMN, GG	oui	oui	Bretagne, Cotentin, Wimereux, NordPdCalais	GG	?
	Perophora japonica	MMN, GG	oui	oui	Bretagne, Iles anglo-normandes, Cotentin	Arcachon, Ile de Ré, Bretagne, Loire Atlantique	
	Styela clava	MMN, GG	oui	oui	MMN	GG	oui

APPENDIX 9: Sampling and data processing protocols

The sampling sites must be determined on the basis of the areas visited by the ship(s) concerned by the exemption application. The sampling protocol must be adapted to suit the size and organisation of the ports concerned, to ensure that it is effective and appropriate.

A - Sampling protocol within port areas

A.1 - General information about sampling protocols in the water column, in and on sea beds, and on port infrastructures

Location and number of samples

In situ samples must be performed to identify any non-indigenous marine species present in the port area(s):

- used in port operations and/or in the port areas visited by the ship(s)
- likely to be used during the period covered by the exemption (technical shutdown locations)
- concerned by ballast loading and/or discharge operations.

Two separate sampling surveys must be performed in the same year for each port area concerned, the first in spring and the second in late summer. These two sampling surveys will cover the entire life-cycle periods during which the majority of species present mature and identifiable individuals.

Each survey must include the full range of water column, sea bed (surface and depth) and port infrastructure sampling protocols. For each habitat, the sampling sites must be selected in such a way that they cover the various abiotic conditions to the fullest possible extent. These heterogeneous abiotic conditions are linked to sunlight, tidal range, the nature of the substrate (plastic, concrete, aluminium, ferrous metals, etc.), currents and exposure.

For each survey and in each port area, port infrastructure samples must be performed at three separate sites, and sea bed samples (surface and depth) at three separate sites. For each of these two habitats, one of the sampling sites must be the «dock» used by the ship. The water column sample may be performed at a single site within the port area, since this habitat is less susceptible to spatial heterogeneity. However, it is much more sensitive to temporal changes.

For port infrastructure sampling, one sample must be taken below the surface (lit conditions) and another sample at depth (unlit conditions) for each ballast water loading and discharge site.

Field operations

All field sampling operations performed on boats, on docks and in the water column (using scuba-diving gear) must focus exclusively on acquiring data and information, rather than on interpreting observable phenomena. The in situ identification of benthic, pelagic and plankton marine species is highly dependent on taxonomic expertise, the observer's experience, and the prevailing meteorological and oceanographic conditions. In order to mitigate this «observer effect» as far as possible, field operations must be limited to high-quality photography and the in situ sampling of organisms. Analysis of these samples and photographs must be performed at a later date in the office and in the laboratory.

Survey and sampling metadata

The exemption application must include survey-related metadata. In particular, the following information must be provided for each survey:

- name of the port
- name or precise reference of the port area(s) concerned
- name of the service provider that performed the field operations (if multiple service providers, specify the operations performed by each)
- date on which the field operations were performed
- map of the port area(s) concerned, with location of the sampling sites for each habitat
- list of operations performed per habitat and per site.

Sample preservation

Unless stated otherwise, the biological samples must be preserved in alcohol, in formol or in *RNAlater*. The latter option ensures that all identification analyses can be performed, but it is also much more expensive than preservation in alcohol or formol.

If *RNAlater* is not used, alcohol should be preferred to formol, since it allows morphological and genetic identification. The final mixture, including water naturally occurring in the sample, must form a solution of approximately 70% alcohol. This solution preserves the external morphology of the sample and prevents hardening of the tissues. However, it causes rapid discolouration of the tissues through solubilisation and denaturing of the pigments. If two specimens of each species are available, they may be preserved in different solutions (one in alcohol and the other in formol). Formol solution normally contains between 5% and 10% formaldehyde. It preserves the colours for longer than alcohol.

Algae should be immobilised on silica gel and photographs taken.

Numbering of samples and photographs

Particular care must be taken over the identification of samples, photographs and analysis samples from these. Each element must be clearly coded to provide a direct and reliable link with the associated set of survey and sampling metadata.

Furthermore, the minimum number of replicates per site and per group of organisms must be selected and presented along with the results of each survey. This provides evidence that a sufficient number of samples have been taken at a sufficient number of sites (total percentage of species in each replicate, then at each successive site, compared with the total number of species found in all replicates, then at all sites).

The sampling sites must be identified according to the priority area type: waters in and around ballast discharge areas, active docks, inactive/unused docks, pontoons, buoys, channel markers, tug and pilot boat dock (see Hewitt & Martin protocol, 2001). Water movements within the port must also be taken into account when selecting the sampling sites.

A.2 - Water column sampling

Water column sampling is designed to target pelagic fauna and flora. It may be performed using nets and/or pumps and bottle water abstraction. The sampling process involves defining at least one monitoring point within port area for each survey. The GPS coordinates of each sampling site must be recorded, using the WGS84 coordinate system. The salinity at different depths and changes in salinity due to tidal effects must also be taken into account when designing the sampling survey.

A.2.1 - Physico-chemical characteristics (see REPOM, SOMLIT, REPHY, etc.)

For each sampling site and in each of the two surveys, physical characteristics (water temperature and salinity) must be measured using a submersible data recorder. Water transparency must be measured using a Secchi disk. Turbidity and chlorophyll a must also be measured.

Water salinity and temperature must be measured at intervals of at least 3 metres depth, commencing at 1 metre depth, taking the potential effect of tides and port characteristics into account. Where possible, dissolved oxygen, turbidity and chlorophyll a must also be measured. Wind speed and direction, and temperature and cloud cover should also be noted.

Monitoring frequency: see REPOM = twice a year (spring and late summer)

Human pathogens

In accordance with Regulation D-2 of the Convention, measurements must be taken to determine the presence of intestinal enterococci (*Escherichia coli and Vibrio cholerae*) and other known pathogenic viruses, bacteria and fungi (human or animal) (*Virbio tapetis*), during each sampling survey.

A bottle sample of 500 ml of water, at around 30 cm depth, must be taken for each site. The laboratory analysis may require other samples or larger samples.

The sampling process must follow the recommendations set out in the Bathing Water Directive (2006/7/EC). The sampling depth, the total water depth at the site and other relevant information must be noted.

Monitoring frequency: twice a year (spring and late summer)

Plankton

During each survey and for each sampling site, samples must be taken to identify the composition and abundance of phytoplankton and zooplankton: one combined phytoplankton sample (water sample), one concentrated phytoplankton sample (net sample) and two vertical zooplankton samples using nets of different mesh sizes. In terms of net sizes, the phytoplankton sample should be taken with a 20µm net, and the zooplankton sample with a 200µm net. For samples taken via pumping, the pumped water should be filtered using filters or nets of the same mesh size (20µm and 200µm). It is important to avoid re-pumping previously filtered water by ensuring that there is sufficient distance between the pumping site and the filtered water discharge site.

The plankton samples must be taken and analysed between the spring bloom and late summer.

Monitoring frequency: twice a year (spring and late summer)

Fish

Fish may be sampled using nets or through visual detection by divers. The samples may be taken by divers using scuba gear during dedicated water column monitoring dives, or during sea bed or port infrastructure monitoring dives. Photographs should be taken wherever possible.

A.3 - Port infrastructure sampling

The sampling protocol involves placing a square frame (0.10 m^2) against the port infrastructure, taking a photo, then scraping the area contained within the frame and carefully collecting the fauna and flora scraped off the infrastructure into a large, robust plastic bag. The scraping process must be performed with a sufficiently robust tool, but samples must only be dislodged from the surface, taking care not to «crush» them. These samples will then be preserved and subsequently analysed at the surface. Two square frame samples must be taken each infrastructure concerned (pontoon, dock, etc.): the first at sub-surface level (lit conditions) and the second at depth (unlit conditions). A video must be taken of the sampled infrastructure, at a distance of approximately 50 cm from the wall, starting at the surface and moving down toward the bottom.

It is also beneficial to perform a visual inspection of the area surrounding the dive site, to detect any fixed or mobile non-indigenous species, including fish. This involves a brief inspection of around 20 minutes, covering a straight-line distance of 20 to 30 metres.

Mobile epifauna such as crabs must be sampled at each site during the second sampling survey (late summer), using light traps attached to existing structures (pilings, buoys, docks). The traps must be selective in nature and must only provide information about the presence or abundance of species.

Visual searches must be performed at each site (by divers or using video equipment) before the traps are deployed, to ensure that they are correctly placed and distributed.

Monitoring frequency: twice a year (spring and late summer)

A.4 - Sea bed sampling

The sampling process involves taking three samples using a grab sampler and a core drill.

A.4.1 - Benthic macrofauna

The three samples must be taken at least 15 metres apart using a grab sampler deployed from a dock or boat. The sediment quality may be assessed visually, or a separate sample may be taken for sedimentary analysis. Where the site is a known ballast water discharge location, additional benthic samples must be taken. A satisfactory sample must involve penetration of 5 to 10 cm into the sediment.

A.4.2 - Benthic endofauna

Benthic endofauna samples must be performed by divers, using hand-held core drills. At each sampling site, three separate cores must be drilled, 25 m apart along a transect measuring 50 m in length (i.e. samples at 0 m, 25 m and 50 m). A transect measuring 50 m must be laid on the seabed, perpendicular to the dock used by the ship. The transect line must be marked at intervals of 1 m.

The temperature, salinity and oxygen saturation at the sea bed must be measured using a submersible data recorder. These measurements must be taken at the start of the transect, or at the location at which the grab sampler samples are taken.

Benthic endofauna samples must also be taken during the second survey (late summer).

Monitoring frequency: Due to seasonal variations and the life-cycle of different life forms and species, samples must be performed during at least two different seasons. Where no prior information is available about the species present, sampling must be performed quarterly (winter, spring, summer, autumn).

A.4.3 - Mobile epifauna

Mobile epifauna such as crabs must be sampled at each site during the second sampling survey (late summer), using light traps attached to existing structures (pilings, buoys, docks). The traps must be selective in nature and must only provide information about the presence or abundance of species.

A.4.4 - Fish

Fish may be detected visually during dives, using transects.

B - Ballast water sampling protocol

The sampling procedures must be standardised to ensure that the data provided are comparable. In the majority of cases, ballast water loading/discharge sites are oxidised, muddy, difficult to access and even hazardous. The environment of these sites (pumping with pressure variations, obscurity and low levels of dissolved oxygen) are generally unfavourable to the survival of aquatic species, the majority of which do not survive the journey. However, the short duration of some journeys (from a few hours up to three days) enable certain organisms to develop forms of resistance (cysts for bacteria or phytoplankton) or to survive journeys of this length, in some cases in large populations. This is the case with phytoplankton, for example (Masson et al. 2013).

Although they serve various objectives, this protocol is based on the various ballast water sampling documents produced by the IMO (and in particular the G2 Guidelines of the Convention).

Every ship is different, and the ballast sampling protocols must be tailored to each specific ship. It is preferable to know the depth of the ballasts, and to sample several ballast chambers for each ship. The most commonly used ballast tanks must be sampled.

Furthermore, two separate sampling surveys must be performed, the first in spring and the second in late summer, during the same periods in which the port area sampling surveys are conducted. Each survey must include a sample taken before ballast loading in each port visited. If the ship's route includes visits to two ports, a single survey will therefore include two samples, one in each port. Under this configuration, a total of four samples will be taken in the year prior to the exemption application: two in spring during the first survey (one sample in each port, before ballast loading) and two in late summer during the second survey (one sample each port before ballast loading). The sample taken prior to ballast loading with water from the port may be conducted before ballast discharge (i.e. en route or upon approach to the port), during ballast discharge (upon approach to the port, within the port area for during loading at the dock), or after ballast discharge (where the ballast chambers contain a sufficient amount of water).

In all cases, the sample must be taken from the ballast water arriving at the recipient port.

B.1 - Sampling techniques

- Sampling via access points (hatches, manholes):

This type of access may take time and require the removal of hatches or the displacement of cargo. However, these openings are generally large and permit entry into or down inside the ballast tank. Where the hatch is located on a horizontal surface at the top of the ballast tank, sampling instruments may be lowered into the tank (sediment grab sampler, plankton nets, bottles, etc.). Where the hatch is located in one of the vertical side walls of the ballast tank, the tank must be drained to a sufficient level before the hatch is opened.

- Sampling via sounding pipes on bridges:

These openings are generally narrow (30 to 60 mm in diameter) and can therefore only accommodate small, low-power pipes or submerged pumps. These vertical pipes are often extremely long (15 to 18 m), making it difficult to use stand-alone pumps (which often only have a range of 8 to 10 m). However, these pipes can easily be accessed from the bridge.

- Sampling via overflow:

The ship's ballast pumps can be used to create overpressure and trigger overflow of the water from a given tank onto the bridge.

This technique is easy to use and provides an accurate impression of material suspended in the water throughout the entire system.

- Sampling via drain valves on the ballast water pumps or circuits:

This technique involves switching on the pumps for around 10 minutes, then opening a drain valve. The water can then be filtered or channelled directly into bottles. This procedure is relatively simple to use, provided that the sample quantities are not high (around 50 litres).

B.2 - Sampling protocol

Important criteria:

Representativeness: the organisms concerned by the sampling are not distributed regularly in space and time, and nor are they distributed at random. In most cases, they are grouped together in masses. This type of distribution (known as «contagious» in statistics) can distort the representativeness of a sample. When taking samples, it is important to remember the following principle: the higher the volume sampled, the more likely the sample is to be representative of the whole (Wright, 2012).

Post-sampling analysis methods: the sample volume and sampling conditions will differ depending on the organisms concerned (bacteria, phytoplankton, zooplankton).

When sampling for bacteria, it is necessary to filter between 2 and 4 litres, depending on the number of bacteria concerned (e.g. Ecoli + Vibrio + Salmonella: 4 litres).

When sampling for phytoplankton, it is necessary to filter between 10 litres and 1 m3 at 20µ.

When sampling for zooplankton, it is necessary to filter between 7 litres and 10 m3 at 200µ.

When sampling sediment contained in the tank, the ballast tank must be inspected and the sediment accumulation zones identified. The sediments may be collected using a spade and stored in a bag. Photographs of the walls of the tank should be taken.

Equipment:

- Pumps with a stand-alone power supply (accumulators, batteries, etc.), that are not harmful to the organisms concerned (avoid pumps with sudden internal pressure changes).
- Sieves or nets to concentrate the sample so that it can be more easily transported. Nets to be lowered down into a tank should not exceed 1 m in length and 30 cm in diameter to reduce the risk of becoming entangled in the tank, and should be weighted with a 1 kg weight.
- Reliable flowmeter to measure the pumped or filtered volume.
- Correctly labelled flasks, bottles and other containers, including sterile containers for microbial analysis.
- Spare parts and equipment (especially filters), toolkit.
- First-aid kit.

Safety:

- All electrical equipment used for sampling (pumps, accumulators, torches) must be watertight and must not generate sparks.
- All sampling personnel must be fully protected, reflecting the potential presence of pathogens in the ballast tanks or circuits (gloves, boots, overalls, hard hats).
- All guidelines on entry into confined spaces (IMO Resolution A.864 and others) must be applied to the letter. The space must be checked for the presence of toxic gases before access.
- The ship's officers must be notified of any person entering or leaving these spaces.

Sample transport:

- All samples must be correctly labelled (dates, time, ship's name and IMO number, tank number or type, preservation agent if used).
- All flasks, bottles or containers must be transferred to the analysis centre(s) as quickly as possible, and must be kept in cool (4°C) and dark conditions.

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