

OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, and
Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area
Meeting of the Joint HELCOM/OSPAR Task Group on Ballast Water Management Convention
(BWMC) and Biofouling (TG BALLAST 11-2020)

Online: 26-27 November 2020

Biofouling Risk Assessment Tool.

Presented by Denmark.

Issue: This document presents “Vessel-Check” an example of a cloud-based global vessel risk assessment tool.

Action requested

1. JTG-Ballast is invited to:
 - a. take note of the information.

Background

2. Denmark finds it useful for future discussions on issues related to biofouling to include information from relevant stakeholders, in this case a Danish GTS institute (DHI). Attached is a presentation of one example of a biofouling risk assessment tool.
3. Vessel hull biofouling has been identified as an important vector for introduction of marine non-indigenous species. Effective and efficient prevention measures reduce the likelihood of introducing non-indigenous species and the development of risk assessment tools is important to minimise the risk of introducing non-indigenous species.
4. One example of a risk assessment tool is “Vessel-Check”, which is a cloud-based solution to aid in the mitigation of transferring non-indigenous species and focusses on two key areas: 1) The ability to consistently assess the risk associated with a vessel’s biofouling based on the vessel’s biofouling management practices; and 2) Effective pre-border communication and awareness with industry stakeholders outlining indicative risk profiles, and how the biosecurity risk can be managed appropriately to as low as reasonable practicable (ALARP).
5. The Vessel-Check portal is designed for vessel owners/operators providing information to regulators and seeks what vessel biofouling management is being undertaken for a vessel and assesses whether the outlined management is sufficient to mitigate the transfer of non-indigenous species to as low as

reasonable practicable. The indicative risk provided by the Vessel-Check portal indicates the likely efficacy to mitigate the transfer based on the management practices being employed on a vessel.

6. The portal simplifies the process for vessels to provide information to regulators (relating to biofouling management) and brings in a level of automation through the use of AIS data. It further improves storage and transfer of information both in a historical sense as well as across jurisdictional borders.

7. Further information and a description of the portal methodology is presented in the Annex “Cloud-based vessel biosecurity management”.

Cloud-based vessel biosecurity management

Abstract

Biofouling is widely recognised as one of the most significant pathways for the introduction of non-indigenous species (NIS) that can cause severe social, environmental and economic impacts. We describe a global vessel risk assessment decision support tool; “Vessel-Check”; to aid the maritime industry and governments in identifying actions that can as low as reasonably practicable (ALARP) mitigate the risk of vessels transferring NIS across the world’s oceans. Focusing on a vessel’s biofouling management practices, the portal consistently assesses a vessel’s biofouling management to examine if the actions are sufficient to risk mitigate. The early detection of vessel mediated biofouling risks through Vessel-Check allows for more effective pre-border risk management options for both vessel operators and regulatory agencies. Vessel-Check creates a consistent and level playing field across the spectrum of vessel operators and regulatory agencies, by providing a cost-effective solution for those that have limited capacity to effectively manage NIS risks, as well as enhancing existing practices. Further, increased consistency between biofouling regulators provides certainty and increased understanding of biofouling risk factors within the maritime industry. Vessel-Check provides the global solution to NIS risk mitigation via shipping and will make direct contributions to the targets set out in the United Nations Sustainable Development Goals (SDG)(e.g. SDG 13, 14 & 15), and will contribute to the Convention on Biological Diversity and its Aichi Biodiversity Targets (e.g. Strategic Goal B, and Aichi Target 9).

Introduction

Non-indigenous species invade marine habitats via numerous pathways. Using detailed inventories of marine invasions from different sources, Molnar et al. /1/ and Davidson et al. /2/ identified international shipping as the main human-assisted pathway for the introduction of non-indigenous species (NIS). It is also a trade pathway that has been growing substantially over the last decade and will continue to do so into the future /3/, /4/.

Ballast water and vessel hull biofouling are key potential modes of introduction (MoI) contributing to the risk of spreading NIS along the shipping pathway. A clear commitment to minimising the transfer of NIS through ships’ ballast water has been achieved through the adoption of the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004 (BWM Convention) /5/. However, biofouling is now widely recognised as one of the most significant MoI for NIS that can cause severe social, environmental and economic impacts /5/, /6/, /7/, /8/. NIS on vessels can be transported from source locations and subsequently establish at new locations /9/.

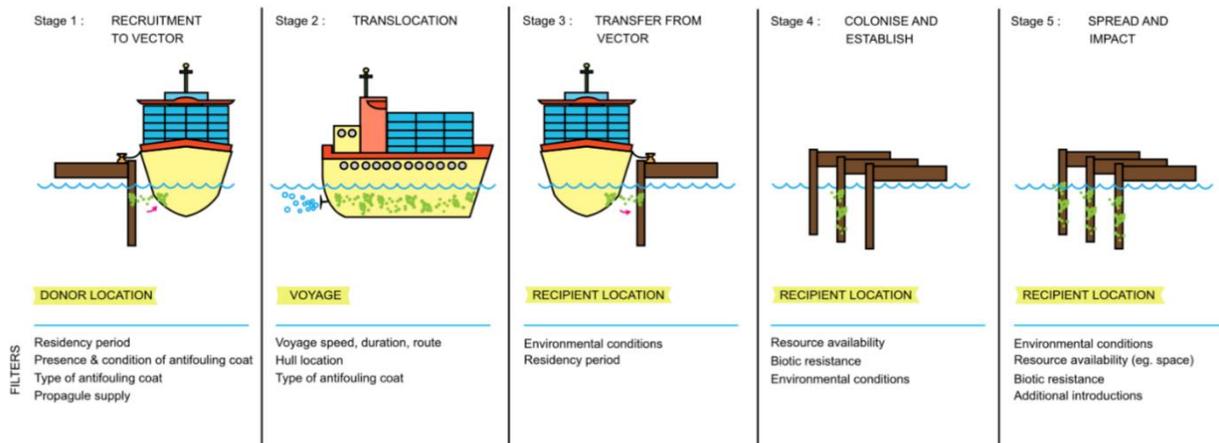


Figure 1 Stages of introduction of non-indigenous species by vessel biofouling /9/.

The potential environmental, social and economic impacts of NIS are varied, and can include changes in biodiversity of marine habitats, erosion and alteration of physical habitat structures and of marine food webs (e.g. *Microcosmus squamiger*); through to impacts on fisheries and aquaculture systems (e.g. *Hydroides elegans*), as well as causing substantial maintenance costs associated with marine/coastal infrastructure (e.g. *Amphibalanus improvises*) /10/, /11/.

Effective and efficient prevention measures reduce the likelihood of entry of NIS and minimises the costs associated with the impacts of an incursion. Maritime trade, and the marine biosecurity risks it presents is a global problem with significant benefits to be gained from a globally consistent approach. Internationally, New Zealand and California have developed regulations to minimise the risk of transferring NIS through the vessel biofouling MoI. New Zealand's 'Craft Risk Management Standard: Biofouling on Vessels Arriving to New Zealand' (CRM) came into force in November 2018. The CRM defines a "clean hull" and prescribes thresholds for long-stay and short-stay vessels. California's State Lands Commission has enforced biofouling management regulations to minimise the transfer of NIS from vessels arriving at California ports since 2017. Australia is moving to implement regulation with the recent release of the Australian Commonwealth Governments Biofouling Management regulatory impact statement for consultation in 2019, however, Australian jurisdictions have already implemented requirements for the management of vessel biofouling (e.g. Western Australia and Northern Territory).

The regulations being set globally are generally aligned between jurisdictions, and consistent with voluntary guidelines published by IMO's Marine Environment Protection Committee (MEPC) for best-practise management of biofouling /5/. Vessel-Check' is a cloud-based solution to aid in the mitigation of transferring NIS through biofouling in line with the IMO guidelines and focusses on two key areas:

1. The ability to consistently assess the risk associated with a vessel's biofouling based on the vessel's biofouling management practices; and,
2. Effective pre-border communication and awareness with industry stakeholders outlining indicative risk profiles, and how the biosecurity risk can be managed appropriately to ALARP.

The Vessel-Check portal has been developed through strong collaboration with biosecurity regulatory agencies. It is designed for vessel owners/operators providing information to biosecurity management agencies, with extensive vessel user testing and feedback. The portal does not rely on any specific questions – it effectively seeks what vessel biofouling management is being undertaken for a vessel and assesses whether the outlined management is sufficient to mitigate the transfer of NIS to ALARP. The indicative risk provided by the Vessel-Check portal indicates the likely efficacy to mitigate the transfer based on the management practices being employed on a vessel.

The portal simplifies the process for vessels to provide information to biosecurity regulators (relating to biofouling management); brings in a level of automation through the use of AIS data, and improves storage and transfer of information both in a historical sense as well as across jurisdictional borders.

Portal Methodology

The portal provides an indicative risk assessment for a vessel, based on its indicated management practices to mitigate the transfer of NIS. It follows the best practice set out by the IMO's guidelines for the management of ships biofouling /5/ and focusses on the risk analysis process to support a jurisdiction's regulatory decision process /12/.

In brief, the portal achieves this by allowing a vessel operator to register on the portal (free to register and use). Associated users for a vessel supply the requisite vessel biofouling management information and any associated documentation (i.e. copy of vessel's biofouling management plan etc). The required information, is outlined in the IMO biofouling management guidelines and covers:

- biofouling management practices employed for a vessel
- characteristics of the vessel
- operational details of the vessel.

The profile for a vessel is only created once, minimising the ongoing burden for vessels when moving between jurisdictions. A vessel only needs to provide updates (as needed/available) to any information

(e.g. implementation of management actions in the portals record book section) to ensure the vessels profile is up-to-date, and their indicative risk is accordingly current.

The Vessel-Check Portal (based on supplied information in vessel's profile) calculates an indicative risk associated with the vessel based on seven (7) metrics covering the vessels management practices and the implementation of its management practices (Figure 2). The overall indicative risk assessment for a vessel is the average of the individual metrics for a vessel. The metrics considered by the Vessel-Check portal examine the proactive and reactive biofouling management actions planned by a vessel, and the implementation of planned actions to mitigate the transfer of NIS. Thresholds used within the risk metric calculations are determined by the jurisdiction relative to their legislative requirements providing a clear avenue for vessel operators to quickly understand the expectations of the jurisdiction they intend to visit.

To further assist regulatory authorities, operational indicators (Figure 2) are also calculated but do not contribute to the vessel's risk assessment. The operational indicators provide further information to assist in the proactive management of an unacceptable risk. For example, if a vessel's overall indicative risk is 'High', the regulatory authority can quickly understand what the likely source/sink environmental compatibility is to guide their understanding of the survival likelihood for NIS that may be present.

As part of the utility of the Vessel-Check portal to further increase efficiencies for regulatory authorities, data source and data validation cross-checking is applied to calculate an assurance measure for the supplied documentation associated with a vessel biofouling management profile.



Figure 2 Vessel-Check metrics (orange text) used to assess the management practices employed by a vessel to mitigate the transfer of non-indigenous species to as low as reasonably practicable. Additional operational indicators (green text) are also calculated by Vessel-Check to further assist regulatory authorities, but do not form part of the overall risk assessment for a vessel. Note: BMP = Biofouling Management Plan, AFC = Antifoulant Coating, IMS = Introduced Marine Species

The indicative biofouling management risk for a vessel is calculated automatically (based on the information contained vessels profile) once the vessel designates in its onboard Automatic Identification System (AIS) system that it intends to enter a jurisdictions port¹ /1/. The indicative risk score is updated automatically daily up to 24hrs form the vessels expected arrival into the intended jurisdiction. After which, the indicative risk can be re-calculated by the jurisdiction which oversees the

¹ For ports monitored by the jurisdiction. If a port has not been designated by the jurisdiction for monitoring within the portal, the nomination will not be captured, and an indicative risk calculation is not possible for the vessels proposed port entry.

intended destination port of the vessel. To maintain the most up-to-date indicative risk profile for a vessel, the vessel operator need only update the record book information associated with the vessel's profile to demonstrate the continued implementation of the vessel's biofouling management practices. A manual nomination process is available for a vessel, to designate its last port of call (LPoC), its destination port and the expected arrival date/time.

From a vessel operators perspective beyond the efficiencies afforded by the portal in communicating their biofouling management practices, the Vessel-Check portal has additional features (planned for release in 2020) to aid in the vessel's biosecurity management and operations, such as Ballast Water exchange/Treatment management, Biofouling Predictor (Fuel Penalty Estimate) and Metocean Forecasting.

Discussion

There is an increased international focus on the need for management of vessel biofouling to mitigate the transfer of NIS, such as the International Maritime Organisation biofouling management guidance and legislation managing vessel biofouling risks (e.g. New Zealand's Craft Risk Management Standard, California's Biofouling Regulations and the proposed Australia Government Biofouling Regulations). To assist and encourage vessels in determining how best to mitigate their likelihood of transferring a NIS, a decision support tool 'Vessel-Check' has been developed.

The Vessel-Check portal improves a vessels proactive management of biofouling risks by allowing a vessel the ability to self-assess and undertake proactive management of biofouling risk when transiting between international jurisdictions and/or domestically between jurisdictions within a country (e.g. Australia). Moreover, the Vessel-Check portal creates an even playing field where not only larger operators with dedicated biosecurity personnel but small vessel owner/operators with limited resources can achieve "best-practice" in aquatic biosecurity across various jurisdictional requirements (Figure 3).

From a regulatory perspective, the Vessel-Check portal improves efficiency in service delivery to industry and an ability to prioritise resources according to risk. Smaller regulatory agencies/port authorities with developing biosecurity management can now achieve awareness and oversight of biofouling risk management issues for international and domestic (interstate and intrastate) vessel arrivals comparable to that of larger or more developed jurisdictions/ports, creating a truly global solution to the impacts of transferring NIS (Figure 3).

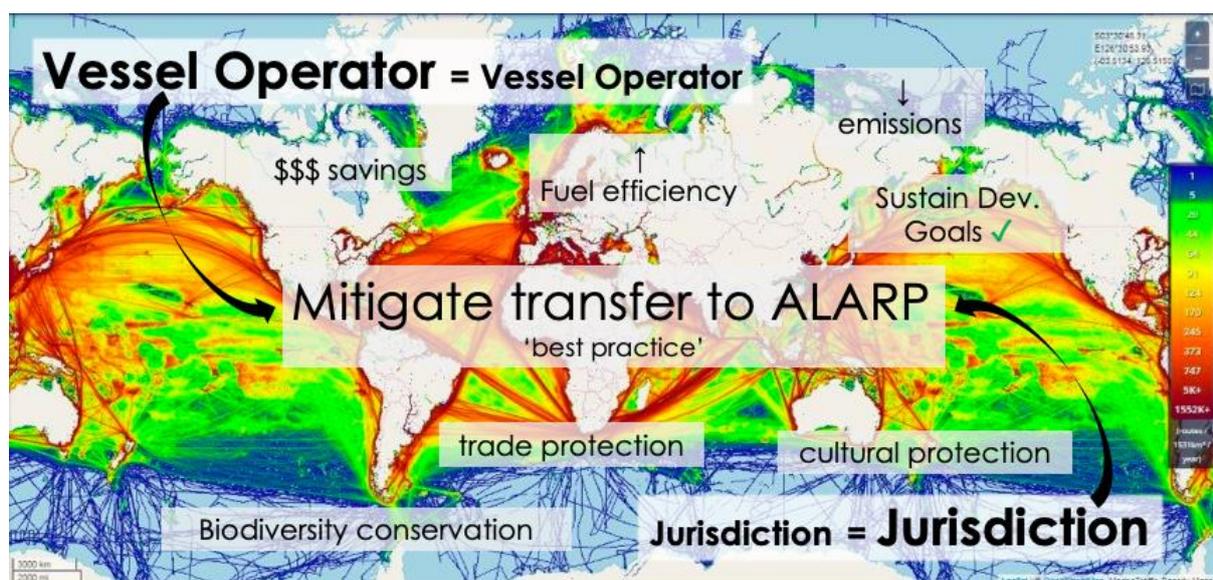


Figure 3 Benefits of implementing next-generation vessel biofouling management practices through the use of the Vessel-Check portal. Small operators/jurisdictions can achieve 'best practice' outcomes of larger operators/jurisdictions with greater capacity/resources.

Early detection of biofouling risk management issues for international and domestic vessel arrivals will allow for more effective risk management options by regulatory authorities ensuring a jurisdictions biosecurity while minimising impacts to industry and economic development.

Synergistically, implementing management of a vessel's biofouling through the Vessel-Check portal can also lead to benefits in a vessel's performance, as hull fouling leads to significant increases in vessel resistance through the water /13/. It is well known that vessel fouling has a large impact on the vessel's performance, fuel consumption and thus operational cost /14/. Therefore, biofouling management through the Vessel-Check portal can be an effective tool in enhancing energy efficiency and reducing air emissions for ships (Figure 3). The IMO's recent study on greenhouse gas (GHG) emissions, attributes 9% (~85 million tons) of shipping related GHG emissions to biofouling. To put that into context, according to the 2018 UNFCCC GHG inventory - Denmark's GHG emissions were ~49 million tons and Australia's were ~558 million tons.

If you just consider vessels visiting Australian ports (~1.5% of the total world port calls in 2018 were in Australian ports), the use of Vessel-Check for better ship biofouling management has the potential to reduce GHG emissions associated with ship biofouling by approximately 1.3 million tons per year (or the equivalent GHG emissions of 283,000 vehicles per annum). This has significant benefits for both vessel owner/operators in ensuring compliance with GHG emission requirements, as well as jurisdictions in contributing to global sustainable development goals.

The 2020 release of additional Vessel-Check feature modules including the incorporation of Biofouling Prediction (BP) and Ballast Water Management (BWM) providing vessel operators further opportunities to maximise efficiencies in their operations. For example, the BP module allows vessel operators to plan appropriate biofouling management according to their existing operational schedule to avoid unnecessary impacts while maximising their biosecurity management/fuel efficiency.

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