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Background

In 2011 the IMO adopted resolution MEPC.207(62), as the 'Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species'.

In 2012, the Marine Environment Protection Committee (MEPC) at its sixty-fourth session (1 to 5 October 2012), approved the Guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ.792, and MEPC 64/23, paragraph 11.8).

In 2013, the MEPC, at its sixty-fifth session (13 to 17 May 2013), approved the Guidance for evaluating the Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (MEPC.1/Circ.811).

At MEPC 72 Australia, the Netherlands and New Zealand proposed a new output to the biennial agenda of MEPC for reviewing the IMO guidelines (MEPC.207(62) in document (MEPC 72/15/1). The Netherlands in particular doubted the existence of sufficient awareness of the guidelines for recreational crafts (MEPC.1/Circ.792) and suggested that there may be benefits in an awareness campaign. The Committee at this session agreed to include a new output on Review of the 2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (resolution MEPC.207(62)) in the post-biennial agenda of the Committee, assigning the PPR Sub-Committee as the associated organ, with two sessions needed to complete the work (MEPC 72/17). An important note here is that it was not specifically mentioned to include a review of MEPC.1/Circ.792, but the Netherlands consider this important to include.

At the meeting of the OSPAR Environmental Impact of Human Activities (EIHA) in 2016, the Netherlands highlighted biofouling as an important pathway for non-native species and promised to commission a study to investigate the significance of Biofouling as a pathway in the Netherlands.

In 2018, at the meeting of the OSPAR-Environmental Impact of Human Activities (OSPAR-EIHA), the Netherlands provided additional information on biofouling. The recent GiMaRIS report (GiMaRIS; 2017-03) was used to further strengthen the assertion that hull fouling is one of the main pathways (vectors) of marine non-native species around the world and seems to be the main transport vector (pathway) next to Ballast water.

Further review of the data and information collected during the GiMaRIS (2017) study provoked several questions regarding the implementation and the effectiveness of the Biofouling Guidelines. The before mentioned IMO Biofouling Guidelines appears to be unknown to most recreational boat owners and harbour masters in the Netherlands. Further investigations lead to the perception that the Netherlands situation could not be different from those of other countries around the OSPAR and HELCOM regional seas.

OSPAR

EIHA 2018 agreed to provisionally add the issue of hull fouling to the terms of reference of the HELCOM/ OSPAR Joint Task Group on Ballast Water, subject to agreement by HELCOM Maritime and to ask the Netherlands to present a document on this issue at the next JTG- Ballast meeting, if the change to the ToR was agreed.

HELCOM

HELCOM Maritime 2018 discussed the proposed amendment to the JTG-HELCOM/OSPAR ToR to include hull fouling of recreational vessels. While some support was expressed to the proposal, concern was also raised due to the limited timeline (2017-2020) and scope of the current ToR, and the possible need to enhance the ToR more than just including biofouling of recreational vessels. HELCOM Maritime 2018 agreed that the matter should be considered further at TG Ballast before the matter could be submitted to HELCOM HOD for approval.

The Netherlands

Subsequently to the discussion at OSPAR EIHA 2018, the Netherlands commissioned a study to highlight the challenges and the opportunities for the implementation of Biofouling Guidelines for recreational boats. This study was based upon questionnaire presented in the IMO evaluation guidance document MEPC 1/Circ.811. and additional questions.

For the purpose of understanding the awareness level and the effects of the biofouling measures in the contracting parties, it is therefore valuable to evaluate within the contracting parties of the HELCOM and OSPAR conventions the implementation of Biofouling measures using MEPC1/Circ.811 as a basis.

As was also discussed at the EIHA 2018 meeting, relevant matters considered important for investigation were considered in the present study and therefore could be included in the proposed investigations by contracting parties. The relevant issues include the following:

a. Awareness in Contracting Parties about the IMO Guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ.792)
b. Existing national actions to increase the awareness concerning this guidance
c. Planned or existing additional policy or measures
d. Information available on hull fouling as pathway for non-native species by recreational boating
e. Best practices known against hull fouling as pathway for non-native species by recreational boating
f. Urgency for an evaluation of the IMO guidelines.

A summary presentation of the results obtained from the investigation of these six issues in the Netherlands is presented in Annex 1.

Detailed information about the entire investigation procedure, the results and the recommendations from the study is presented in the report given in Annex 2.

Next steps

To take the investigation forward to regional seas levels and even beyond, OSPAR-EIHA perceives the input from the Joint HELCOM/OSPAR Task Group to be inevitable. The Joint HELCOM/OSPAR Task Group could coordinate the evaluation of the IMO Biofouling Guidelines (MEPC.207(62) and (MEPC.1/Circ.792)). The Joint Task Group on Ballast Water has the relevant structural composition and expertise to organize and develop methods for investigation while using the IMO Biofouling evaluation guidance (MEPC.1/Circ.811) as basis for the way forward. The results of the investigations could

contribute firstly to the existing review of the IMO guidelines within the IMO, and could presented at the annual meetings of EIHA 2019, OSPAR 2019 and HELCOM 2019 for evaluation and to consider the future activities towards the harmonised evaluation of the IMO biofouling Guidelines in Europe.

Action required

The Meeting is invited to:

- take note of the information provided on bio-/hull fouling as important pathway for non-native species by recreational boating in the Dutch Delta area, North Sea coast and Wadden Sea;
- discuss the occurrence and relevance of hull-fouling as pathway for NIS and concerns regarding awareness and application of IMO guidance on this issue among recreational boat owners and harbour masters in the HELCOM and OSPAR convention areas;
- discuss the harmonisation of the proposed evaluation procedure of the IMO Biofouling Guidelines MEPC.207(62) (commercial ships) and MEPC.1/Circ.792, (recreational boats) with a view to contribute to the work done in IMO PPR, using (MEPC.1/Circ.811) as the basis;
- consider the information in this document and the discussions at this Meeting to describe the next steps such as taking up the issue of hull fouling (recreational and commercial crafts) in the current ToR for JTG Ballast or by means of setting up a new Joint Task Group for Bio-fouling.

ANNEX 1

Highlights of the evaluation of the IMO guidelines for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft in The Netherlands

1. Awareness in Contracting Parties about the IMO Guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft
In general contracting parties, including the Netherlands, are well aware of the existence of the IMO Guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft.

2. Existing national actions to increase the awareness concerning the guidance
During the evaluation of the IMO guidelines in August-September 2018, no national action could be identified with the aim of increasing the awareness concerning the guidance for minimizing the transfer of invasive aquatic species. Various awareness campaigns concerning hull-fouling were mentioned by ship-owners, maintenance providers, harbour masters and governmental parties, but all of them targeted the problem of anti-fouling paints containing biocides. Most ship-owners, maintenance providers, and harbour masters pointed out that the use of biocide free anti-fouling paints appears to be linked to more fouling attaching to the boats in recent years (and certainly not a decrease), thereby increasing the potential risk of the transfer of invasive aquatic species.

3. Planned or existing additional policy or measures taken on this issue

Regardless of the relatively low awareness of the IMO guidelines for minimizing the transfer of invasive aquatic species as biofouling, various IMO guidelines were followed in the marinas of the Netherlands because they were awarded Blue Flag sites (http://www.blueflag.global/). The coordinator of the Blue Flag initiative (worldwide organisation) of the Netherlands indicated during the evaluation of the IMO guidelines that he was unaware of these guidelines and thereby the risk of invasive aquatic species related to hull fouling. As the Blue Flag initiative does already aim at reducing the risk of biocides in anti-fouling paints, he was very interested to potentially incorporating the risk of invasive aquatic species too. It will therefore be evaluated whether the Blue Flag initiative may be of assistance in raising the awareness of this risk and thereby the IMO guidelines.

4. Information available on hull fouling as pathway for non-native species by recreational boating
In 2017 a review study was done focused on “biofouling as a transport vector of non-native marine species in the Dutch Delta, along the North Sea coast and in the Wadden Sea”. Based on this study it was concluded that at present hull fouling is the main transport vector with which non-native marine species get introduced into the Netherlands and subsequently transported along the Dutch coast. This conclusion was based on the facts that harbours are, along the coast, the hotspots where most non-native species are found, and on average 59% of all pleasure crafts in marine harbours have fouling on their hulls. Hereby a large proportion of

the pleasure crafts visiting Dutch harbours may introduce non-native species from not only neighbouring countries like Belgium, the United Kingdom and France, but also from other continents like America, Africa, Asia and Australia.

5. Best practices known against hull fouling as pathway for non-native species by recreational boating

Relatively little is known about the best practices against hull fouling as a pathway for non-native species by recreational boating as the focus of alien species management has been on transport vectors related to ballast water exchange and shellfish transports. Initiatives like the Blue Flag are already helping in reducing the risk of alien species being transported and introduced by hull fouling on recreational crafts. Hereby several, but not all, IMO guidelines for minimizing this risk, are already followed. As these IMO guidelines describe best practices against hull fouling as a pathway for non-native species by recreational boating, evaluating these guidelines and increasing the awareness, will minimize the risk further.

6. Urgency for an evaluation of the IMO guidelines

As it is clear that pleasure crafts are at present one of the main anthropogenic transport vectors of invasive aquatic alien species to and within the Netherlands, this may also be true for other European countries. Because the IMO guidelines describe best practices for minimizing this risk, they can form a valuable tool not only for alien species management by governments, but also for the individual boat owners. Acknowledging the differences between countries and the fact that alien species management is most effective on an international scale, it is important that these IMO guidelines are therefore evaluated by more OSPAR/HELCOM countries than the Netherlands alone.

Evaluation of biofouling guidelines in the Netherlands for the control and management of recreational ships' biofouling to minimize the transfer of invasive aquatic species

Issued by the Dutch Ministry of Infrastructure and Water Management

A. Gittenberger

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1 Summary

The IMO 2012 Guidance for Minimizing the Transfer of Invasive Aquatic Species as Biofouling for Recreational Craft (MEPC.1/Circ. 792) was evaluated in the Netherlands using the questionnaire of the IMO guidance (MEPC 1/Circ.811) for the evaluation of the Guidelines for the Control and Management of Ships' Biofouling (MEPC 62/24/Add.1). This project, which was issued by the Dutch Ministry of Infrastructure and Water Management, used the input of 16 stakeholders including harbour masters and recreational craft owners to a yacht builder, a marina quality mark institution, the European Boating Association and member state representatives. Although the recreational craft owners and harbour masters were generally unaware of the IMO guidance, they did show much interest in the guidance when it was explained. They mentioned possibilities for future dissemination of the IMO Guidance to recreational craft owners and marinas by harbour masters and potentially the Blue Flag marina quality mark organisation. Although IMO guidance recommendations, especially concerning on-land cleaning, were already followed, some of the in-water cleaning of recreational craft hulls is not done accordingly. Where much was known by all stakeholders of research projects and efforts into the development of anti-fouling systems without biocides, the potential risks of alien species within hull fouling communities and potential ways to minimize these risks were relatively unknown. Although research projects on this topic within the Netherlands appear to be scarce, some government authorities have taken steps to carry out projects in this direction. A recent review study issued by the Dutch government (BuRO, nVWA) was done describing studies on the transfer of invasive aquatic species as biofouling on recreational craft in the Netherlands since 2006.

2 Introduction

In 2011, the Maritime Environment Protection Committee (MEPC) at its 62nd session adopted the Guidelines for the Control and Management of Ships' Biofouling as a means to further minimize the transfer of aquatic invasive species (MEPC 62/24/Add.1). The aim of the guidelines was to produce a globally consistent approach to managing biofouling by providing useful recommendations to minimize the risks associated with all types of ships. A separate guidance was developed by IMO to assist Member States and observers who wish to collect information needed to undertake future reviews of these Biofouling Guidelines and to do this in a consistent way (MEPC 1/Circ.811). As the Biofouling Guidelines focused mostly on the commercial shipping industry, a separate guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft was developed by IMO (MEPC.1/Circ. 792) in 2012. In 2017, a review study in the Netherlands showed that biofouling on recreational ships is an important pathway for the transfer of invasive aquatic species to and within the coastal waters of the Netherlands (Gittenberger et al. 2017) whereby hull fouling in general is assumed to be most important import vector of marine alien species at present (Gittenberger & Rensing, 2017). Further review of the data and information collected during these studies provoked several questions regarding the implementation and the effectiveness of the IMO 2012 Guidance for Minimizing the Transfer of Invasive Aquatic Species as Biofouling for Recreational Craft (MEPC.1/Circ. 792). Since most of the questions posed were similar to the ones specified in the questionnaire of the IMO guidance for evaluating biofouling guidelines (MEPC 1/Circ.811), the Netherlands issued the here presented pilot evaluation of the IMO Biofouling Guidance for Recreational Craft (MEPC.1/Circ. 792) based on this questionnaire.

3 Materials & methods

The questionnaire in the IMO guidance for evaluating biofouling guidelines (MEPC 1/Circ.811) was used for the evaluation of the IMO 2012 Guidance for Minimizing the Transfer of Invasive Aquatic Species as Biofouling for Recreational Craft (MEPC.1/Circ. 792). For answering the questions concerned a stakeholder inventory was done with the aim of involving stakeholders from various backgrounds including not only member state representatives but also harbour masters, recreational craft owners and boat builders in addition to stakeholders that focus specifically on minimizing the impact of marinas and recreational crafts on the environment and representatives of groups of related stakeholders. Within the time planned for the questionnaires (40 hours) as many stakeholders as possible were interviewed in August-September 2018. Hereby each of the stakeholders was contacted by phone or in person. During these conversations the stakeholders were asked to answer the questions in the questionnaire, with a focus on the ones specifically meant for them (as specified in the evaluation guidance MEPC 1/Circ.811). As not all questions are relevant for all questionees, the main questionees on the basis of which the questions were answered, are specified in the results. The answers given during the conservations were written down by GiMaRIS and checked directly afterwards for accuracy with the stakeholders concerned. By doing so, the questions in the questionnaire were explained to the stakeholders in more detail where necessary (e.g. when the IMO guidance was unknown to a stakeholder). This also ensured that questions were answered in a consistent manner by the various stakeholders. If necessary, for the stakeholder concerned, questions and answers were translated to Dutch. Although the identities of the stakeholders are known, they are anonymized within the present report whereby the answers provided by the stakeholders are combined and summarized for each question. Where different answers to the same question were given, this is specified.

4 Results

4.1 Questionees

Although the stakeholders that were interviewed are anonymized in the present report, their affiliations and backgrounds, for which they were selected as a stakeholder in the present evaluation are described in table 1 and the following paragraph.

4.2 Affiliations of questionees

The harbour masters and pleasure craft owners questioned came from marinas surrounding the Dutch Wadden Sea, i.e. the marinas of Den Helder, Oudeschild, Terschelling and Delfzijl. With the exception of the marina of Delfzijl, these marinas were all awarded the Blue Flag quality mark. The iconic Blue Flag is one of the world's most recognised voluntary eco-labels awarded to beaches, marinas, and sustainable boating tourism operators (www.blueflag.global). In order to qualify for the Blue Flag, a series of stringent environmental, educational, safety, and accessibility criteria must be met and maintained. Within the Netherlands the Blue Flag coordinator, which was one of the questionees, working on behalf of the KMVK foundation (Stichting Keurmerk Milieu, Veiligheid en Kwaliteit: www.stichtingkmvk.nl), which concerns a cooperation between RECRON (recreation & tourism trade organisation), the HISWA Foundation (water sports trade organisation), the ANWB (Royal Dutch touring club) and the KHN (catering industry trade organisation). Another representative of a group of stakeholders concerns the president of the European Boating Association (EBA: www.eba.eu.com). The EBA aims to ensure boat users are informed and consulted about EU legislation and to make their views known to relevant European institutions. The work of the EBA embraces environmental, technical and regulatory issues. As representa-

tives of a Dutch recreational craft builder, an environmental coordinator and a paint master of a high end yacht builder were contacted. In their line of work they aim at building the best yachts possible with the technology available to their knowledge. Two representatives of the Dutch Ministry of Infrastructure and Water Management, the ministry that issued the present evaluation, were questioned as representatives of the Netherlands member state.

Table 1. Stakeholders in the evaluation of the IMO guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ. 792).

Stakeholders	**Functions and roles**
Harbour master of the marina of Oudeschild	Harbour master at a "Blue Flag" awarded marina; Recreational craft owner; Service provider; Organization involved in seafarer education.
2 x Recreational craft owners in the marina of Oudeschild	Recreational craft owners.
Harbour master of the marina of Terschelling	Harbour master at "Blue flag" awarded marina; Service provider; Organization involved in seafarer education.
2 x Recreational craft owners in the marina of Terschelling	Recreational craft owner.
Harbour master of the marina of Delfzijl	Harbour master; Service provider.
2 x Recreational craft owners in the marina of Delfzijl	Recreational craft owner.
Coordinator of the Blue Flag on behalf of the KMVK	Coordinator marina quality mark "Blue Flag", on behalf of the KMVK, a cooperation between the RECRON, HISWA, ANWB and KHN, i.e. trade organizations focused on recreation, tourism and water sports.
Environmental coordinator of luxury yachts builder	Recreational craft / yachts designers and builders; Maintenance provider; Environmental coordinator.
Paint master of luxury yachts builder	Recreational craft / yachts designers and builders; Maintenance provider; Anti-fouling coating applier.
President of the European Boating Association; Recreational craft owner in the marina of Den Helder	President of an European organisation focused on monitoring the development of national, regional, European and international legislation to protect and preserve the environment, participating wherever possible to represent the interests of the recreational boater; Recreational craft owner.
Representative of the member state the Netherlands	Senior advisor of RWS (Ministry of Infrastructure and Water Management), responsible for issues related to national and international water management of alien species.
Representative of the member state the Netherlands	Senior advisor of RWS (Ministry of Infrastructure and Water Management), used to be responsible for issues related to anti-fouling system solutions for recreational crafts, including the prohibition of tbt containing anti-fouling paints.
Director of GiMaRIS	Research organisation focused on the marine environment and specialising in marine alien species related surveys and management solutions

4.3 Questionnaire

To evaluate the level of IMO Biofouling guidance implementation for recreational craft (MEPC.1/Circ. 792) in the Netherlands, the IMO guidance for evaluation (MEPC 1/Circ.811) was followed. Although the latter (MEPC 1/Circ.811) focuses on the IMO guidelines for biofouling management in the commercial shipping industry (MEPC 65/22), the evaluation of the IMO guidance for recreational craft was done in a similar manner by using the same questionnaire. The answers given by the stakeholders described in table 1 are summarised and discussed. The short discussion, where applicable, includes aspects like feasibility issues raised concerning the IMO guidance for recreational craft (MEPC.1/Circ. 792), potential differences between the recreational boating and commercial shipping industry, and possible solutions to issues raised where mentioned by one of the stakeholders. Although most questions of the questionnaire are discussed separately in the paragraphs below, questions that clearly concern the same topic are discussed together.

Some of the answers may be redundant as the same answer was given to more than one question. They are included however to make it easier to compare the present evaluation results with a similar evaluation of the IMO guidelines more focused on the commercial shipping industry (MEPC 65/22), and potential future evaluations of the IMO guidance on recreational crafts (MEPC.1/Circ. 792) in other countries.

As is also indicated in the IMO guidance for evaluation (MEPC 1/Circ.811) not all questions are relevant for all questionees. The main questionees on the basis of which the questions were answered, are therefore specified in each of the paragraphs.

4.3.1 Have you disseminated the IMO guidance, or communications based on the IMO guidance, to relevant parties including: shipowners and operators and shipping agents; maintenance/ recycling facility owners and operators; in-water inspection and cleaning service providers; ship designers; anti-fouling coating companies; Harbour Masters; and organizations involved in maritime/seafarer education and training?

Main questionees:

- **Member state representatives**

The Netherlands member state was actively involved in its original development, and has engaged relevant stakeholders and representatives in the development of the Biofouling guidance for recreational craft (MEPC.1/Circ. 792) during expert-meetings. The stakeholders and representatives have been informed on the availability of the guidelines, with the intention of futher dissemination by those parties. For example, The European Boating Association (EBS) president indicated that they actively disseminated the IMO guidance to their members, i.e. National Recreational Boating Associations and Federations throughout Europe. The government of the Netherlands itself has not actively approached and informed individual entities or members of representatives. However, the guidelines were made available through the Netherlands Regulatory Framework Maritime (NeRF) (formerly known as EasyRules), a service to inform the shipping industry of new rules and regulations (https://puc.overheid.nl/nsi/).

4.3.2 Are you aware of the guidance? Is the information in the guidance clear?

Main questionees: All questionees

With the exception of the member state representatives, the director of GiMaRIS and the president of European Boating Association none of the other questionees, including for example harbour masters and recreational craft owners (Table 1), had been aware of the IMO guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ. 792), before this evaluation took place. It was therefore not possible within the present evaluation to assess whether the information in the guidance is clear. All questionees were aware of the risks of biocides in anti-fouling systems, but not of the risks of alien species being spread by hull fouling. Especially the harbour masters and the Blue Flag coordinator were very interested to get more information about the IMO guidance for minimizing the transfer of invasive aquatic species. Hereby the harbour masters of the marinas of Terschelling and Oudeschild specifically referred to their marina's Blue Flag quality mark indicating their aim to preserve the marine environment. In order to qualify for this quality mark a series of stringent environmental, educational, safety and accessibility criteria must be met and maintained (www.blueflag.global). One of the requirements is for example to provide training in environmental matters and best practice methods for free to marina personnel, suppliers to the marina and other tourist services operating in the area of the marina. Videos and folders about the marine environment were accordingly presented for recreational craft owners and other interested parties in the buildings of the harbour masters. The blue flag coordinator of the Netherlands (on behalf of the KMVK) was also unaware of the IMO guidance but very interested in hearing more about it as he could potentially introduce the guidance within an international meeting of Blue Flag coordinators. Through the Blue Flag quality mark organisation it would be potentially possible to disseminate the guidance not only to a large number of the marinas within the Netherlands but also globally (Fig. 1; www.blueflag.global/marinas2). Some of the criteria to be assigned the Blue Flag quality mark (http://www.blueflag.global/criteria/), already match the recommendations set in the IMO guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ. 792). For example, if a marina has on-land boat repairing and washing areas, no pollution must enter the sewage system, marina land and water or the natural surroundings. Although this criterion appears to be mainly aimed at reducing the risks of pollutants and biocides within anti-fouling paints, it also reduces the risk that alien fouling species that are scraped of the hull get released into the marine environment.

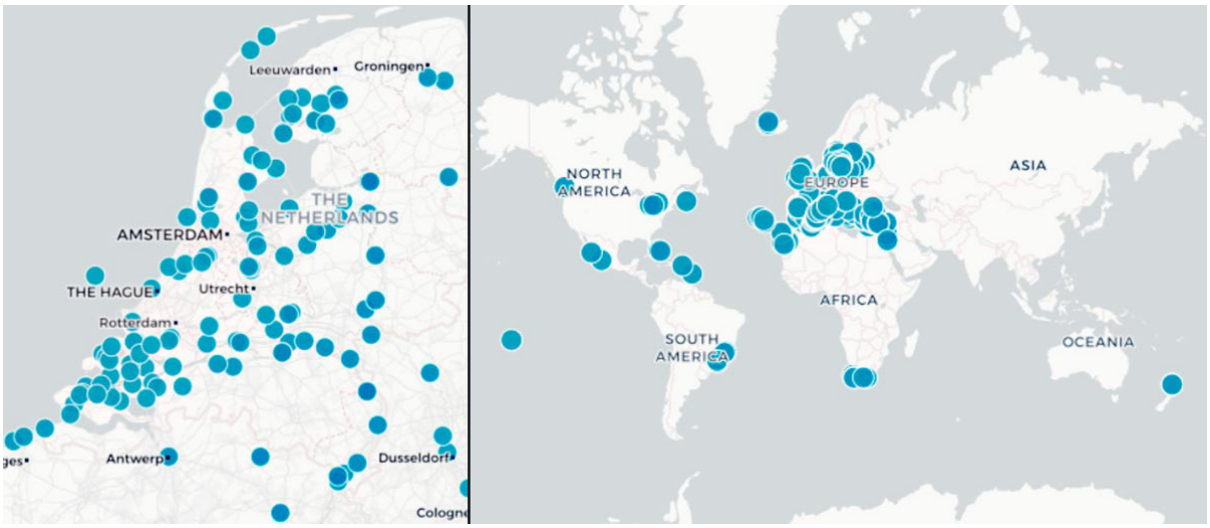

Fig. 1. Blue flag locations within the Netherlands and worldwide. Picture adjusted from www.blueflag.global/marinas2, © OpenStreetMap contributors and © CARTO.

4.3.3 Have you developed biofouling management measures in addition to the guidance, e.g. national regulations? Are these measures based on the guidance? Has this additional information been provided to IMO?

Main questionees:
- **Member state representatives**

In the Netherlands there is a national regulation (De Water wet), which supports water quality management measures and forbids one to throw boat scrapings from biofoulings and other waste material into surface waters in ports, marinas or in the sea. Part of this measure can be considered to be a biofouling management measure for minimizing the transfer of invasive aquatic species in biofouling (hull fouling) from recreational and commercial crafts. These water quality management measures are not based on the IMO biofouling guidance. They were purely developed to improve surface water quality in the Netherlands. Additional measures based on the IMO biofouling guidance may be developed but these may need to be effectively communicated with stakeholders and the public before implementation. Afterwards, formal reporting about the measures to IMO could be done. For formal dissemination of such measures, certain organisations like the Blue Flag quality mark provide the desired possibilities.

4.3.4 Are there any feasibility issues, omissions or errors that have meant the guidelines with the guidance are difficult to implement?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**
- **Recreational yachts designers & builders**
- **Maintenance provider**
- **Environmental coordinator**
- **Anti-fouling coating applier**

As the IMO guidance was unknown to most questionees, the guidelines for the questionees concerned were first explained, before asking for any potential feasibility issues. Although most guidelines were considered useful and feasible to apply, all harbour masters and recreational owners agreed that it is not feasible to request that biological, chemical and physical debris is captured (and disposed of to an appropriate onshore facility) when doing in-water cleaning. Many of the floating docks and recreational crafts are cleaned in-water in the marina and this is especially done when heavy fouling is observed, while the IMO guidance indicates only that in-water cleaning can be suitable for removing light fouling (e.g. the slime layer). The European Boating Association and one of the member state representatives were aware of hull cleaning systems that could capture debris. They indicated however that these were too expensive from a cost-benefit point of view of the average recreational craft owner. For larger (commercial) ships, which are often cleaned by specialised companies, there are various possibilities like hull cleaning underwater robots that do catch the debris. To the knowledge of the questionees such systems (at reasonable cost) are not available yet for recreational craft owners.

Another recommendation that may be feasible for the commercial shipping industry but not for recreational craft owners, concerns the advice to retain the craft's biofouling management information within a logbook. Such a book should

include for example the anti-fouling system, its effectiveness over time, planned time interval between anti-fouling renewals and how niche areas should be treated. This type of logging information is considered by the recreational craft owners to be more appropriate for commercial (larger) ship owners. Where it concerns recreational crafts, the environmental coordinator and paint master of the yacht builder (Table 1), did indicate that they kept detailed records of the anti-fouling systems they applied to the crafts they sold and the effectiveness of these systems based on the information they received from their clients when these crafts were dry-docked for maintenance.

4.3.5 Are facilities and/or tools available to support the implementation of the Guidelines?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**

With the exception of a ramp to take the vessel out of the water, little to no facilities were available in the marinas of Oudeschild, Terschelling and Delfzijl to specifically support the implementation of the guidelines. Areas within the marinas where hull could be cleaned on land did have the appropriate systems installed to make certain that debris did not flush back into the marina's water but was disposed of to an appropriate onshore facility in accordance with the IMO guidance. For applying anti-fouling coatings and storing recreational crafts out of the water in winter time, various more inland marinas do have facilities available.

4.3.6 Have any safety issues been identified in implementing the Guidelines?

Main questionees:
- **Harbour masters;**
- **recreational craft owners**

Where it concerns in-water cleaning of the hull it would have been good if the IMO guidance specifically indicated that it is not advisable to do this while snorkelling or scuba-diving (in a potentially busy marina). Both harbour masters and recreational craft owners indicated that they or others do occasionally go into the water with snorkelling and/or scuba-diving gear to do the in-water cleaning of hulls or floating docks. This may cause safety issues with other vessels travelling through the marina. Such safety issues are probably marina specific as in-water hull maintenance of larger (commercial) vessels is assumed to be mainly done by specialised underwater robots or professional scuba-divers.

4.3.7 Are ships developing biofouling management plans and maintaining their biofouling record books?

Main questionees:
- **Recreational craft owners**

None of the recreational craft owners questioned maintained a biofouling record book or knew of anyone maintaining such a book. They were also not planning to do so as they did not see the greater benefit in relation to the effort that it would take to maintain such a book and/or management plan. The questioned yacht builder did indicate that they kept such records for the recreational crafts they sold and advised their clients on maintenance plans.

4.3.8 Are you undertaking in-water inspections and in-water cleaning? Are these activities in line with the Guidelines?

Main questionees:
- **Harbour masters;**
- **recreational craft owners**

Yes, most harbour masters and recreational craft owners are undertaking in-water inspections and in-water cleaning. They do not do so in line with the guidelines as the debris is not captured and in-water cleaning is mostly done with increasing fouling intensities, while the IMO guidance only recommends in-water cleaning when light fouling (e.g. a slime layer) is present.

4.3.9 Does your facility capture hull cleaning waste to minimize the risk of it entering the water?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**

Yes, marinas with on-land hull cleaning facilities and sites make certain that the cleaning waste does not enter the marina's water but is disposed of to an appropriate onshore facility. This is also in accordance with the criteria of the Blue Flag quality mark, which has been awarded to a large number of marinas in the Netherlands and worldwide (Fig. 1).

4.3.10 Do your practices follow, or align with, the Guidelines?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**

Although the recommendations of the IMO guidance were not known to the harbour masters and recreational craft owners questioned, various practices follow the guidelines. Recommendations that are in general followed by recreational craft owners include the switching between fresh water and marine water marinas to reduce fouling, the regular (usually once per year) on-land hull maintenance, the maintenance of an anti-fouling system, the capture and disposal of debris during on-land cleaning and the specific cleaning of fouling in niche areas. Practices that are done by recreational craft owners that do not align with the guidelines include the in-water cleaning without capturing the debris, the in-water cleaning of more heavily fouled crafts, and not maintaining a biofouling management plan and record book. Also, none of the questionees could give an example of anyone using a different anti-fouling system for niche areas. The recreational craft owners and the yacht builder questioned were interested in more information about such more niche specific anti-fouling systems.

4.3.11 Is your in-water cleaning technology able to capture most of the macro fouling debris from in-water cleaning?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**

Both harbour masters and recreational craft owners indicated that they did not have in-water cleaning technologies available to capture macro fouling debris from in-water cleaning. Possibilities mentioned by the other questionees like underwater robots and other in-water cleaning facilities that do catch debris, were generally considered to be too costly from a cost-benefit point of view for recreational craft owners.

4.3.12 Are the submerged hull surfaces of ships as free of biofouling as is feasible? Have you seen a decrease over time in the amount of biofouling on submerged hull surfaces?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**
- **Yacht builders**

All recreational craft owners indicated that the amount of biofouling on the hulls of recreational crafts has increased with the stricter rules on biocides within anti-fouling coatings. Two craft owners indicated that they still did not have any fouling on the hulls of their recreational crafts because they managed to buy the "good stuff" from unspecified sources. Both harbour masters and pleasure craft owners did also indicate the warmer weather in recent years as a potential reason for increased fouling. The environmental coordinator and paint master of the yacht builder indicated that they were not aware of an increase or decrease of the amount of hull fouling in recent years since they use anti-fouling coatings with less or no biocides. They did indicate however that most of their clients have the hulls of their yachts cleaned by professionals, possibly within maintenance contracts.

4.3.13 Are the niche areas of ships as free of biofouling as is feasible? Have you seen a decrease over time in the amount of biofouling in niche areas and internal seawater cooling systems of ships?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**
- **Yacht builders**

All questionees indicate that the niche areas are probably not as free of biofouling as is feasible. It is difficult however to find out how this is resolved and what anti-fouling systems are available for such areas. The yacht builder indicated that they do not switch between anti-fouling systems on their yachts that often anymore because the system they are now using is predictable in its effectiveness. The questionees indicated that there are a large number of anti-fouling systems available, but it is very difficult to distinguish between them as they all indicate to be the best. If there would be information available from an independent, reliable source on the effectiveness of various anti-fouling systems for recreational crafts, also taking into account niche area specific solutions, both recreational craft owners and the yacht builder have indicated that they would be very interested.

4.3.14 Have you collected information about the effectiveness of specific measures in the guidelines through dry dock inspections of ships?

Main questionees:
- **Harbour masters**
- **Recreational craft owners**
- **Yacht builders**

As the IMO guidance was unknown, no information was collected about the effectiveness of specific measures in the guidance through dry dock inspections of ships.

4.3.15 Do you have any information on the direct or indirect benefits associated with implementing with the Guidelines? Do you have any information on the additional costs associated with implementing the Guidelines? Are you aware of any research and/or development of technologies to improve biofouling management? Are you aware of any research into indirect or consequential benefits of implementing the Guidelines?

Main questionees:
- **Member state representatives**

No specific information could be given on the direct or indirect additional benefits or additional costs associated with the implementing of the IMO guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ. 792). This may be because the recommendations of the guidance that are implemented were already implemented by harbour masters and recreational craft owner without knowing of the existence of the IMO guidance. A large number of studies have focused on the development of technologies to improve biofouling management, but most of these appear to be focused on creating and testing biocide free anti-fouling systems and hull cleaning technologies that focus on the outer hull and miss most niche areas. As the expressed experiences of the questionees indicate that with the biocide free anti-fouling the amount of hull fouling has certainly not decreased and may in fact have increased, these technologies do not appear to improve biofouling management where the risk of alien fouling species is concerned. This also accounts for studies that focus on cleaning the outer hull and not specifically on niche areas, which are known (MEPC.1/Circ. 792) to shelter alien species. A review study in 2017, issued by the Netherlands member state (BuRO, nVWA) could be given as an example of a study focussing on the risk of alien fouling species on pleasure crafts in the Netherlands (Gittenberger et al., 2017). It also shortly describes the implementation of recommendations from the IMO guidance for recreational craft (MEPC.1/Circ. 792) based on a large number of interviews of 143 recreational craft owners and 38 harbour masters throughout the Netherlands between 2009 and 2016. As those interviews were partly done before the implementation of the IMO guidance and not done with the purpose of evaluating it, they may be less informative for the evaluation than the focused questionnaire results described in the present report. Regardless, there are not apparent differences between the results of the present study and the 2017 study where it concerns the implementation of the IMO guidance recommendations for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft (MEPC.1/Circ. 792).

5 Conclusions

In accordance to the IMO evaluation guidance (MEPC 1/Circ.811) the answers to the questions in the questionnaire should be used to evaluate the biofouling guidance based on the following five performance measures:

[1] Awareness and dissemination of the Guidelines
[2] Impediments to implementation of the Guidelines
[3] Application of the Guidelines
[4] Change in level of biofouling
[5] Research and Development

For each of these performance measures the IMO evaluation guidance (MEPC 1/Circ.811) has goals on which the following conclusions were made where feasible for the evaluation of the IMO guidance focussed on recreation craft (MEPC.1/Circ. 792) and possible based on the answers given in the questionnaires.

Although the recreational craft owners and harbour masters that were questioned were unaware of the IMO guidance, they did show much interest. Hereby several possibilities for the further dissemination of the IMO guidance were indicated with the assistance of harbour masters and the Blue Flag network. The Blue Flag quality mark for environmentally friendly marinas already sets criteria that partly overlap or are linked to IMO guidance recommendations. This is done for example by the criterion that marinas have to annually organize educational events aiming at raising the environmental awareness of harbour masters and recreational craft owners. More directly linked to an IMO guideline concerns the Blue Flag criterion concerning on-land cleaning whereby debris has to be captured and is not allowed to flush back into the marina. Where it concerns the in-water cleaning of hulls, safety issues were mentioned with snorkelers and scuba-divers. In addition no facilities or technologies were known to the harbour masters and recreational craft owners for capturing debris during in-water cleaning as is recommended in the guidance and is obliged by Dutch law (Water wet). Similarly little was known about potential anti-fouling systems that could be used for the in the IMO guidance mentioned niche areas on the hull where alien species may reside. In recent years the level of biofouling, depending on the questionee asked, is said to have remained the same as in previous years or worse. This fouling increase is said to be related to the stricter rules on biocides in anti-fouling coatings and potentially the warmer temperatures. Although much is known of research projects into the development of anti-fouling systems without biocides, no specific research projects could be specified by the questionees concerning the development of technologies specifically aimed at reducing the risk of alien fouling species in for example niche areas. Concerning the risk of the transfer of invasive aquatic species as biofouling on recreational craft, a review study was done in 2017 including data from various studies in marinas along the Dutch coastline since 2006.

In conclusion, although the IMO guidance was not well known among the stakeholders questioned, the guidelines given are partly applied in marinas in the Netherlands. Although some of the guidelines in the guidance were not assumed feasible for recreational craft owners, the evaluation did not indicate the need for adding any additional guidelines. In general the guidelines in the IMO guidance were found to be adequate for their purpose to minimize the transfer of invasive aquatic species as biofouling on recreational crafts.

6 References

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