Antifouling for leisure boats in the Baltic Sea - mapping the legal situation

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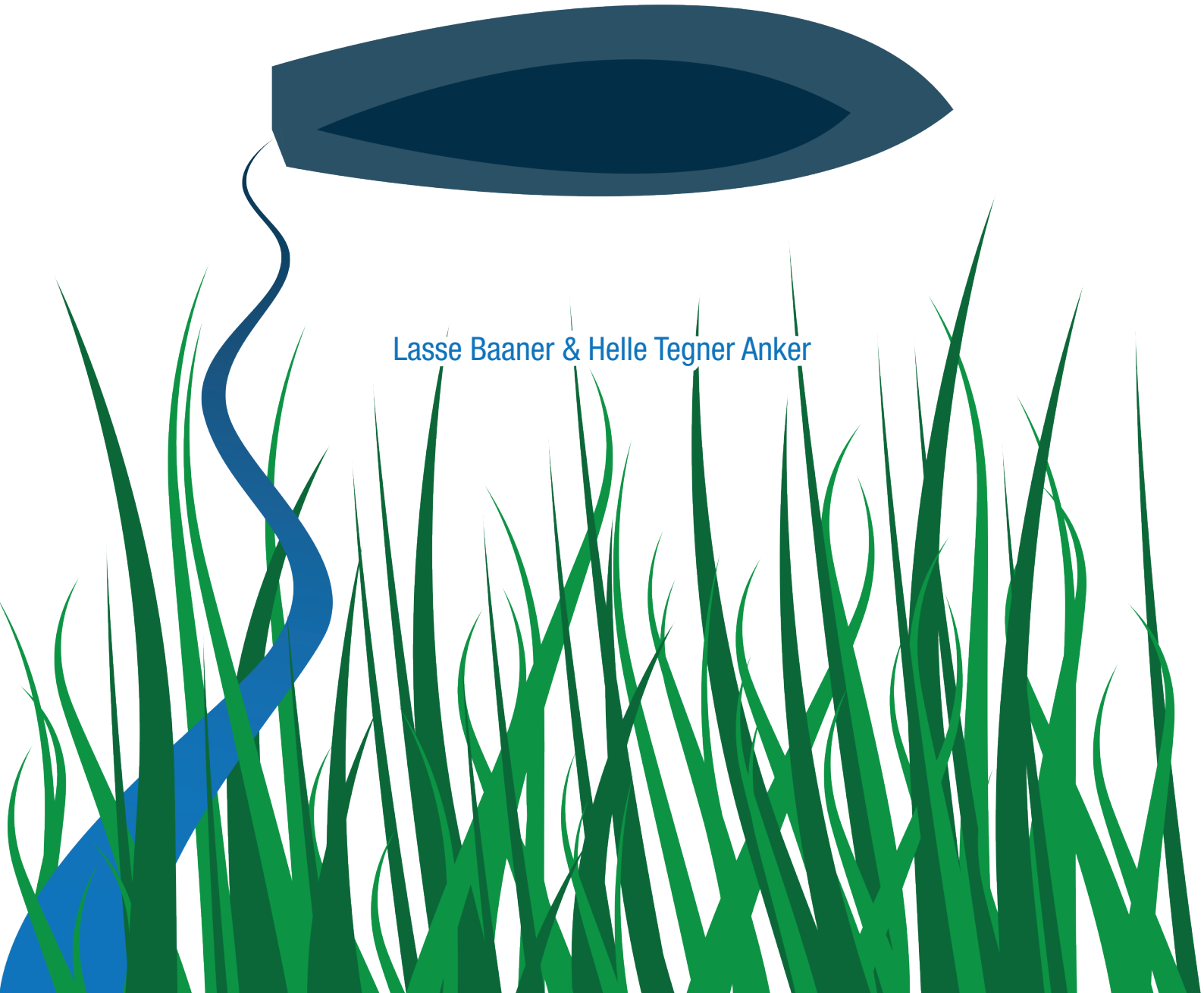

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Preface

This report has been elaborated as part of the CHANGE research project (http://changeantifouling.com/) funded by the BONUS programme and national research funding institutions, in this case the Danish Social Science Research Council. The overall objective of the interdisciplinary CHANGE project is to reduce to a minimum the supply of toxic compounds from antifouling paints used on leisure boats in the Baltic Sea by changing antifouling practices on leisure boats into a sustainable consumption of antifouling products and techniques. As part of the CHANGE project a mapping of EU legislation as well as national legislation in Sweden, Finland and Denmark has been carried out. This report maps the Danish legal framework regarding antifouling paints on leisure boats as well as for the use of alternative techniques.

The report starts with an introduction to the overall governance structure of the legislation and the relevant authorities. It then is divided into four areas of law relevant to antifouling paints and practices, including regulation of environmental quality, products, waste management and other environmental issues as well as contaminated land and sediments. Furthermore, the report in Annex I includes an analysis from an actors' perspective.

The report is based on legal-dogmatic research on applicable national legislation based on relevant sources of law as well as relevant reports, articles etc. Additionally, a few interviews have been conducted to get a better understanding of the legal framework in relation to antifouling products and practices. Danish legislation is accessible at the national database www.retsinformation.dk. The report was finalised in June 2015. As a consequence of the change in Government in Denmark in June 2015 the Ministry for the Environment was by 1st July 2015 merged with the Ministry of Food to a new Ministry of Environment & Food and the Nature Agency was foreseen to be split into two new agencies by 1st July 2016: a new Nature Agency and an Agency for Water and Nature Management. The Agency for Water and Nature Management takes over the tasks of the former Nature Agency as regards antifouling paints.

1 Introduction

Leisure boating is an important recreational activity in Denmark with more than 7.000 km coastline. In 2010 it was estimated that there was a total number of 57.000 leisure boats in the Danish harbours and marinas and that more than 250.000 people regularly were involved in boating activities.[1] On top of the 57.000 boats mooring in marinas, there is an estimated number of 5.000 boats permanently anchored in bays and fjords, and an unknown number of smaller boats kept on trailers at private properties. The Danish Association of Yachtsmen counts around 52.000 members.[2] It also represents about 270 sailing clubs. Surveys indicate that there are around 320 marinas in Denmark with a depth of 1.25 meter or more.[3] There is, however, no official register to rely on. Most marinas – around 200 of them – are organised in the Association of Marinas in Denmark.[4]

Antifouling paint was subject to some public debate in the late 80'ies resulting in the prohibition on TBT paint on leisure boats in 1991. Subsequently, there has been some focus on the possible use of illegal paint as well as on the use of copper based paints. In 2003 an Action Plan on antifouling paint for leisure boats was initiated by the Environmental Protection Agency in cooperation with the Danish Association of Yachtsmen (Dansk Sejlunion) and the Danish Sports Confederation (Dansk Idrætsforbund). The Action Plan included the establishment of more strict requirements for the release of copper in paints aiming at halving the copper content from approximately 80% to 40%.[5] As part of the Action Plan, the Danish Association of Yachtsmen issued new guidelines for the maintenance of leisure boats. In 2009 and 2010 an information campaign was initiated by the Danish Association of Yachtsmen and the Association of Marinas in Denmark focusing on the possible use of illegal paint and in particular the costs of harbours or marinas if they were not allowed to dump dredged material at sea due to TBT residues in the sediment. This campaign was followed by an inspection campaign by the Danish Environmental Protection Agency in the harbours and marinas. In general, there has been a fairly strict policy on antifouling paints in Denmark as reflected in the TBT prohibition in 1991 as well as in the requirements for release rates of copper. In 2008 it was decided that antifouling paints harmful to the aquatic environment (classified as R53 substances) should be prohibited with effect from 2012. This prohibition was later postponed until 2015 and most recently until 2018[6] presumably due to delays in the EU review and authorisation procedures for active substances under the EU Biocidal Products Regulation.[7]

[1] Danboat, 'Pressemeddelelse: 57.000 lystbåde og 250.000 lystsejlere i Danmark', 2010. Leisure boats not located in harbours or marinas was not included in the 57.000 boats. Only leisure boats with a bruttotonnage above 20 tonnes shall be registered in the official ship register (Dansk Skibsregister).
[2] Dansk Sejlunion, 'Dansk Sejlunions medlemstal', n.d.
[3] Danboat, 'Pressemeddelelse: 57.000 lystbåde og 250.000 lystsejlere i Danmark', 2010.
[4] Foreningen af Lystbådehavne i Danmark, 'Fakta om FLID', n.d.
[5] A statutory order no 792/2003 - entered into force 29th September 2003.
[6] Statutory order no 1429/2014.
[7] Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

2 Governance structure

2.1 Summary

Danish environmental legislation is characterised by a large number of sectoral acts. The Environmental Protection Act deals with pollution from primarily land-based sources, whereas the Marine Environmental Protection Act deals with pollution from marine activities, e.g. dumping of dredged materials and pollution from ships. The Chemicals Act on the other hand deals with product related legislation, including the marketing and use of chemical substances. In general, there is a distinction between environmental legislation governed by the Ministry for the Environment, harbour legislation governed by the Ministry of Transport and maritime legislation primarily governed by the Ministry of Business and Growth, i.e. the Danish Maritime Authority. In addition, the Ministry of Defence has some tasks as regards marine pollution and surveillance – in particular oil spills.

The overall governance structure for use and handling of antifouling products is fairly simple – although a number of authorities are involved. Relevant authorities comprise both national and local authorities. At national level the Nature Protection Agency is responsible for the quality of the environment, while in general the Environmental Protection Agency is responsible when it comes to polluting products and processes. The Danish Coastal Authority – since February 2014 part of the Ministry for the Environment - administers the general permit requirement for offshore installations, including marinas. The Danish Transport Agency under the Ministry of Transport administers the Harbour Act that mainly applies to commercial harbours. The Danish Maritime Authority administers the ship register and is responsible for maritime policy in general. At local level the municipalities carry out most tasks in relation to spatial planning, environmental permits, enforcement and control, while the regions only have a few tasks in relation to contaminated soil.

Most boat-owners have their boat in a marina, and the majority of them will be members of the national yachting organisation.

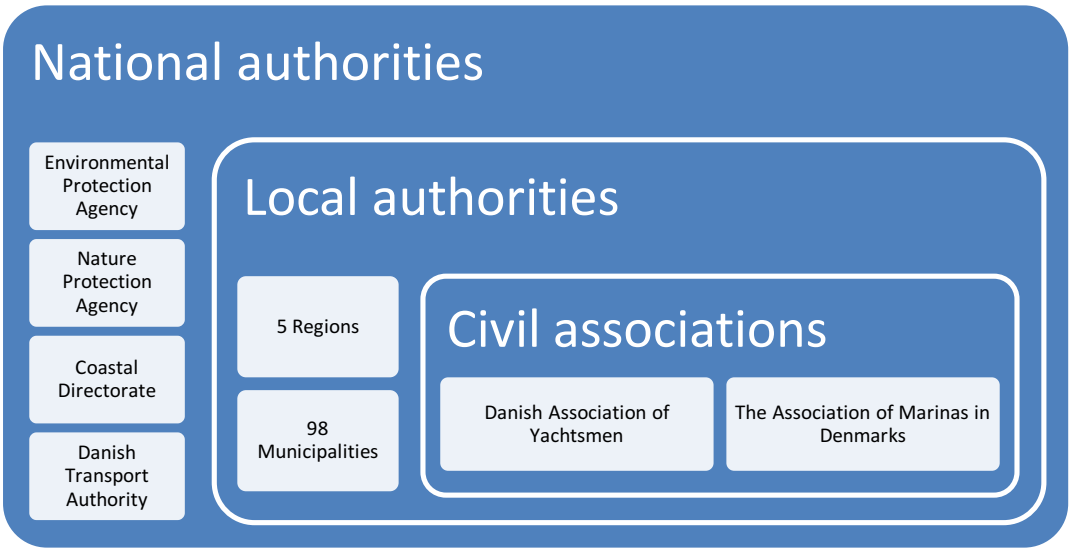

Fig.1. Simplified overall governance structure

2.2 National authorities

2.2.1 The Environmental Protection Agency

The Environmental Protection Agency is responsible for the legislation protecting the environment against pollution and noise, cf. the Environmental Protection Act and the Marine Environmental Protection Act.[8] It also administers and enforces the rules on import, sales and use of antifouling paints, and is the competent authority in relation to authorisation of biocidal products pursuant to the Act on Chemical Products and Substances and the Biocidal Products Regulation. The Environmental Protection Agency is also responsible for the legislation on waste and contaminated soil.

The Environmental Protection Agency has issued rules and guidelines on a large number of subjects, including the rules concerning antifouling paints.[9] In addition on its homepage it provides general instructions and advice addressed to boat owners on how to remove paint, handle dust and scrapings and about the adverse effects from antifouling paints on the environment.[10] The guidelines are straight forward and easy to comprehend.

The Environmental Protection Agency also to some extent initiates research activities. In relation to biocides a report was issued by the Agency in 1998 on the environmental aspects of antifouling paints in Danish waters.[11]

2.2.2 The Nature Agency

The Nature Agency is responsible for the legislation on management of nature and natural resources, including the Water Planning Act, the Marine Strategy Act and the Nature Protection Act. It establishes and implements environmental objectives and quality standards for the environment. Accordingly the management planning in relation to the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD) are assigned to the Nature Agency. Biocides that affect the aquatic environment are therefore also a part of their responsibilities. On their homepage, they account for the status of the environment, the presence of polluting substances and the established environmental quality standards – including for the marine environment.[12] However there is not an explicit focus on biocides from antifouling products.

2.2.3 Other national authorities

In February 2014, the Coastal Directorate and the administration of the Coastal Protection Act was transferred from the Ministry of Transport to the Ministry of the Environment. The Coastal Directorate was also responsible for administering parts of the Harbour Act which remained under the Ministry of Transport. As the legislation as well as homepages have not been fully updated following these organisational changes there is currently a lack of clarity as regards the more precise distribution of tasks in particular under the Harbour Act.

[8] See Danish Ministry of the Environment, 'Environmental protection Agency', n.d.
[9] See Miljøstyrelsen, 'Faktaark - Bundmaling', n.d.
[10] See Miljøstyrelsen, 'Bundmaling til fritidsbåde', n.d.
[11] Torben Madsen et al., 'Kortlægning og vurdering af antibegroningsmidler til lystbåde i Danmark', 1998.
[12] See Naturstyrelsen, 'Havet', n.d.

The Coastal Directorate is generally responsible for the administration of the general permit requirement for offshore installations, including the establishment of marinas, boatlifts etc. The permit requirement also applies to digging or dredging. The Coastal Directorate is also responsible for the dredging in harbours.

It is the Danish Transport Authority that approves regulations for marinas – as this is a matter regulated under the Harbour Act.

The Danish Maritime Authority administers the Act on the Danish international register of shipping, the Merchant Shipping Act as well as the Act on safety at sea.

2.3 Local authorities

2.3.1 The regions

The five Danish Regions are charged with tasks in relation to contaminated soil, cf. the Act on Contaminated Soil. They identify and register contaminated and potentially contaminated sites – including contaminated marinas and winter storage sites for boats. There are no general guidelines for the identification of marinas as contaminated, but contamination from antifouling products is a well-known phenomenon.[13] It is unlikely, that all marinas have been evaluated by the regions (or the previous counties) as potentially contaminated sites.

2.3.2 The municipalities

The 98 Danish municipalities are responsible for granting most environmental permits as well as for supervision and enforcement of most environmental legislation. The use of biocides on smaller boats is, however, enforced by the Environmental Protection Agency (see section 4.3.2).

The municipalities administer and enforce the general ban on pollution of soil and water, cf. the Environmental Protection Act, and issue the necessary permits if such pollution is acceptable in relation to the environment and the activities in question. They carry out spatial planning, including planning for marinas and other harbour facilities. The municipalities also deal with building and construction permits. If a site is registered as contaminated by the regions, such permits shall take due account of that – requiring e.g. a whole or partial clean-up of the land. When contaminated soil is to be moved, it also requires a notification of the municipality.

Finally, the municipalities are the responsible for waste planning and management. Waste shall be disposed in accordance with the waste regulations of the municipality, and if a certain type of waste – e.g. paint scrapings from leisure boats – is not covered by the waste regulations, the municipality must provide an individual instruction on disposal.

2.4 Organisations etc.

[13] Ibid.

2.4.1 Ports, harbours and marinas

Ports, harbours and marinas in Denmark are organised in different ways.[14] Ports and marinas can be operated by an individual, a privately organised corporation, a foundation, company, municipality or several of those together, cf. also Act no. 457/2012 on Harbours. However the port will normally have a board and be the owner or the tenant of the actual land occupied by the port. If the port is a tenant, the owner of the land will often be the municipality. In addition, within a single port, there may be several owners and/or operators also organised in varying ways. Marinas will for example often have their own organisation within a larger port. Such marinas can be large with room for hundreds of yachts, while others can be quite small with room for only a few boats. A marina outside a port will as a main rule have its own board and organisation.

Ports and harbours in Denmark generally appear to be in a period of transitions. They tend to change ownership or organizational structure, merge under same operator or divide into multiple operators and change from commercial ports or fishing harbours to marinas.[15]

Statutory order no. 9139/2002 on standard regulation on the use of Danish marinas and small fishing ports establishes a set of rules for the yachts and boats using the marinas. If the operator of a marina – what would often be a board or a municipal council – wishes to enact a regulation for the use of the marina that adds to or complement the standard rule, the regulation has to be approved by the Danish Transport Authority, cf. appendix 1 to order no. on 9139/2002.

2.4.2 The Association of Marinas in Denmark

Most marinas – around 200 of the 320 marinas – are organised in the Association of Marinas in Denmark.[16] The Association of Marinas in Denmark collaborates with the authorities and seeks to influence the design of the legal rules and regulations governing marinas and ports. It ranges from the port administration of Schengen-rules to regulations on sewage from leisure boats and dumping of dredged sludge from the harbours on the sea.

2.4.3 The Danish Association of Yachtsmen

The Danish Association of Yachtsmen counts around 50.000 members.[17] The ambition of the association is to be the national organisation for all yachting in Denmark – leisure yachting as well as sports sailing. The aim is also to play an active political role in shaping the sport of sailing and unite all water sports in an active community.[18] The association has been involved actively in reducing the environmental impact from boat maintenance and published a guidance concerning environmental friendly maintenance of boats for the marinas and boat owners in 2003.[19]

[14] See Miljøministeriet Miljøstyrelsen, 'Vejledning om udarbejdelse af affaldsplaner for modtagelse og håndtering af affald fra skibe', 2012.
[15] Ibid., 11.
[16] FLID, 'Foreningen af lystbådehavne I Danmark', n.d.
[17] Dansk Sejlunion, 'Dansk Sejlunions medlemstal', n.d.
[18] Dansk Sejlunions bestyrelse, 'Dansk Sejlunions strategi 2011-2016', 2011.
[19] Dansk Sejlunion and Jesper Højenvang, 'Redegørelse om miljørigtig fjernelse og slibning af bundmaling - Retningslinjer for afrensning og vedligeholdelse af bundmaling på lystbåde', 2003.

3 Environmental quality regulation

3.1 Summary

In Denmark the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD) have been transposed by two separate pieces of legislation. They are, however, administered by the same Agency – The Nature Agency. Biocides from antifouling do not appear to be a major concern in Danish environmental quality regulation. The use of biocidal paints has not been an issue in the development of the river basin management plans or the marine strategy. The problems are not sufficiently described or acknowledged in the initial assessment of pressures and impacts and when it comes to measures the authorities rely on the administration of the existing legislation based on the principles of best available technology and clean tech solutions fulfilling the requirements of the EU directives.

It is unclear in a Danish context what legal effect the general objectives and indicators have. However, it appears that the environmental objectives will be recognised as binding for the administration in general, e.g. when granting a permit for dumping of dredged sediments.

3.2 General framework

Environmental quality legislation in relation to the aquatic environment is primarily related to the implementation of the Marine Strategy Framework Directive (MSFD) and the Water Framework Directive (WFD). The rules of the WFD – and the river basin management plans (RBMPs) – in general apply up to 1 nautical mile from the coast where the marine strategies take over. If, however, a matter is not dealt with in the river basin management plans, e.g. certain chemical substances, such issues can be addressed in the marine strategies also within 1 nautical mile from the coast.

The environmental planning according to the WFD and MSFD are established by two separate sets of legislation, however the Nature Agency is responsible for both processes. There are no surveys or other sources indicating to what extent the tasks are coordinated or integrated in practice.

In order to deal with the environmental problems and reduce the human impact on the environment the EU directives rely on environmental objectives in combination with an adaptive management. Each of the processes in the planning and management cycle needs to address the biocides from antifouling products to make a coherent approach to the problem.

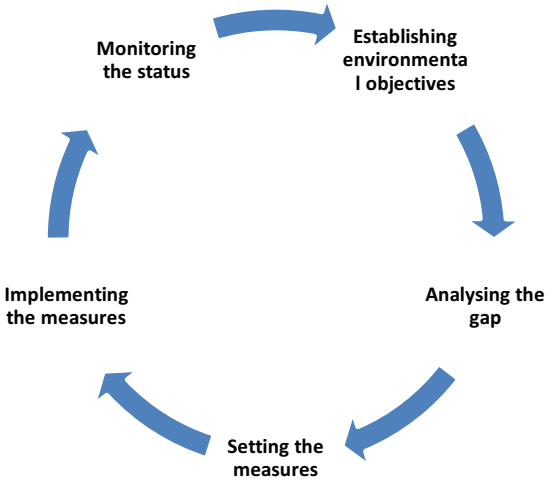

Fig.2. The adaptive management cycle

3.3 WFD implementation and pollution from antifouling paints

The WFD now has 45 priority substances, cf. directive 2008/105 as amended with directive 2013/39. Two of these substances have been used in antifouling paints: Diuron (CAS[20] no.: 330-54-1) and cybutryne/irgarol (CAS no 28159-98-0). Thepreviously used TBT/tributyltin is among the hazardous priority substances. Article 11(3) (k) explicitly requires the member states to take measures to eliminate pollution of surface waters by priority substances and to progressively reduce pollution by other substances which would otherwise hinder the achievement of the environmental objectives.

The first period of river basin management planning in Denmark showed that coastal water bodies were at risk for not achieving their environmental objectives due to pollution with priority substances – mainly TBT – from antifouling paints, but no nationwide overview of the problem was produced.[21]

In a survey of the contamination of harbour sediment with organic pollutants 4 marinas were tested, and 34 polluting substances were found including phthalates, nonylphenols, chlorobenzene, phenol, PAH, PCB, LAS, hydrocarbons and antifouling biocides.[22] The antifouling biocides were diuron, irgarol and TBT.

The programmes of measures in the first generation of the Danish river basin management plans, however, did not address the problem with priority substances from antifouling paints or priority substances in coastal waters in general. There is only a doubtful statement saying that the administration according to the Environmental Protection Act considering the principles of best available technology and clean tech solutions will fulfil the requirements of the Directive.[23]

The article 5 analysis prepared for the second generation of river basin management plans identifies 63 coastal water bodies in risk of not achieving their environmental objective in 2021 due to the presence of priority substances and or other substances with established environmental quality standards. 27 coastal water bodies are not considered to be at risk, while a risk assessment was not feasible for the last 43 water bodies.[24] It is not recorded to what extent pollution with antifouling paints is a concern for the 63 coastal water bodies at risk.

3.4 MSFD implementation and pollution from antifouling paints

In the initial assessment according to article 8 of the MSFD the Danish Nature Agency addresses the presence of TBT together with other chemical substances in marine waters.[25] The discharge of biocides from antifouling paints is, however, not quantified.[26] It is mainly TBT and its adverse effects that are in focus.[27] Screening tests have demonstrated that the major source of TBT to the marine environment is dredged harbour sediments which are dumped in the sea. This source is, however, assumed to be strongly

[20] CAS: Chemical Abstracts Service
[21] See as an example Naturstyrelsen, 'Odense Fjord. Resume af basisanalysen 2005/2006', n.d.
[22] Arne Jensen and Kim Gustavson, 'Havnesedimenters indhold af miljøfremmede organiske forbindelser. Kortlægning af nuværende og fremtidige behov for klapning og deponering', 2001, 9.
[23] Miljøministeriet Naturstyrelsen, 'Forslag til vandplan. Hovedvandopland 1.13 Odense Fjord. Offentlig høring juni 2013', 2013, 236.
[24] Miljøministeriet Naturstyrelsen, 'Basisanalyse for vandområdeplaner 2015-2021', 2014, 34.
[25] Miljøministeriet Naturstyrelsen, 'Danmarks Havstrategi - Basisanalyse', 2012, 9.
[26] Ibid., 11.
[27] Ibid., 50.

reduced due to the 2003 ban of TBT in antifouling paints for all ships.[28] Other harmful compounds in anti-fouling paints do not seem to be paid attention in the initial assessment report.

The environmental objectives established according to article 9 of the Directive addresses chemical substances in accordance with the Directive's annex 1(8) and annex III. However, the established objective is that the content of pollutants in water, sediment and biota do not exceed environmental quality standards established in relevant legislation.[29]

There are two indicators established for assessing if Denmark is approaching the objective. The one is the concentration in sediment and biota of mercury, cadmium, zinc, copper, lead, chromium, nickel, arsenic, TBT and PAHs, the other is cell injury, lysosome stability and imposex in eelpout, mussels and snails.[30]

The gap-analysis in the MSFD is implicit in analysis of pressures and impacts in the initial assessment, cf. article 5(2)a. The programmes of measures will be published in 2015 and made operational in 2016. It is therefore yet to be seen if they will address biocides from antifouling paints.

3.5 Legal status of objectives, standards and management plans

There is no clear general perception of the legal effect of the environmental objectives according to the WFD. Based on the wording of the directive, it has been argued, that the non-deterioration obligation is an obligation of result, while the obligation to reach GES and GEP is more of an obligation of best effort.[31] On the other hand the clear deadlines and provisions for exemptions have been used as an argument for seeing article 4 as a whole as an obligation of result.[32] Apart from the issue of whether the WFD and the MSFD reflects obligations of results or of best efforts, it is, however, also unclear whether the environmental objectives (and environmental quality standards) are binding in the sense, that they should be binding for the administration of the legislation in general, e.g. when granting a permit for dumping of dredged sediments.

In the preparatory works for the Act on Environmental Objectives, that forms the basis for the first generation of river basin management the river basin management plan, the programme of measures as well as the environmental objectives were explicitly stated as binding for the authorities when exercising their powers.[33] It has, however, been emphasised in the preparatory works for the new 2013 Act on River Basin Management Planning, that the environmental objectives are only binding for the measures specified in the programme of measures. Moreover it has been stressed, that the programme of measures should only contain measures with "the aim of" achieving the environmental objectives.[34] The wording indicates reluctance in seeing the environmental objective as generally binding for all public administration, but rather as objectives when designing the programme of measures.[35] However, in the proposed Statutory

[28] Ibid., 66.
[29] Miljøministeriet Naturstyrelsen, 'Danmarks Havstrategi - Miljømålsrapport', 2012, 23.
[30] Ibid., 24.
[31] Helle Tegner Anker, 'Ny lovgivning til gennemførelse af EU's vandrammedirektiv og EU's habitatdirektiv', *Tidsskrift for Landbrugsret 2/2005*, 55.
[32] Lasse Baaner, 'Den Danske vandplanlægning - Vandplaner og miljømål', *Juristen 3/2012*, 125.
[33] Miljøministeren, 'Forslag til lov om miljømål m.v. for vandforekomster og internationale naturbeskyttelsesområder. Lovforslag nr. L 15', 2003, comments to § 3.
[34] Miljøministeren, 'Forslag til lov om vandplanlægning. Lovforslag nr. L 71', 2013, 11.
[35] See also Lasse Baaner, 'Den nye lov om vandplanlægning', *Tidskrift for Miljø 5/2014*, 147–52.

Order on Measures, the measures and objectives are established as a binding reference for permits etc. granted by the authorities.[36] Which decisions and activities they exactly will be considered binding for is yet to be seen.

Due to the particular Danish difficulties in adopting river basin management plans there is so far very limited experiences as regards the enforcement of environmental objectives, quality standards and programmes of measures related to the WFD. In general, the status of the aquatic environment, including the environmental quality standards, should be assessed as part of the river basin management process and should lead to adjustments of the programme of measures if needed. There is no possibility for administrative appeal concerning objectives and measures, but it is considered possible to challenge them in court.

There are no general possibilities for the Nature Agency to enforce the implementation of the identified measures in the RBMP's. The enforcement and the options for appeals will rely on the relevant legislation, e.g. if a permit has been granted under the Environmental Protection Act without appropriate consideration of the environmental objectives and quality standards.

4 Product related regulation

4.1 Summary

There is an unidentified number of biocidal antifouling products available on the market. Denmark has not yet established an authorisation procedure for antifouling products relying on the transitional rules of first the EU Biocide Directive and now the Biocidal Products Regulation. Instead Denmark relies on a restriction approach as reflected in a statutory order on antifouling paints which prohibits marketing and use of some substances and sets standards for copper based paints. It is not clear whether the restriction approach can and will be maintained after the introduction of the BPR authorisation procedure. There is no relevant enforcement information available as regards the possible marketing of illegal paints. Inspections by the Environmental Protection Agency in marinas have not recorded any use of illegal paints on leisure boats. There appears to be a general awareness of the rules among yachting organisations as well as marinas.

4.2 Marketing and retail sale

4.2.1 Production of biocidal antifouling products in Denmark

The Danish company Hempel is one of the world's leading producers of paint for ships and marine industry – including biocidal paints.[37] The company had in 2013 a net profit of 65 million EUR and around 3.600 employees. The goal is to become one of the world's top-10 coatings manufacturers.[38] It has factories in a large number of countries including Poland, UK, Saudi Arabia, China, Argentina, India, Russia, Malaysia and Kuwait, but there is no longer any production of paint in Denmark.[39]

[36] Miljøministeriet Naturstyrelsen, 'Udkast til Bekendtgørelse om indsatsprogrammer. 18. december 2014.', 2014.
[37] See Hempel, 'About Hempel', n.d.
[38] Hempel, 'Annual Report 2013', 2014.
[39] Berlinske, 'Hempel lukker produktion i Lyngby', 2008.

4.2.2 Import, sales and marketing

The Statutory order on import, sales and marketing of antifouling paints (1429 /2014) issued according to the Act on Chemicals has since 1999 established uniform rules for import, sale, marketing and use of biocidal paints for antifouling purposes.

The rules are set out in §§ 2-4.

- It is prohibited to import, sell and use antifouling paints containing irgarol on boats less than 25 meters.
- It is prohibited to sell, import and use antifouling paints on leisure boats that release more than 200 micrograms Cu/cm^2 after the first 14 days and 350 micrograms Cu/cm^2 after the first 30 days.
- It is prohibited to import, sell and use any antifouling paints on leisure boats that predominantly sail in freshwater.
- It is prohibited to sell, import and use any antifouling paints on leisure boats in saltwater, if the boat is less than 200 kg unless it is a wooden boat or it has a berth in an A or B port.

According to § 5 in the Statutory order antifouling paints should be labelled with this text: Do not use for leisure boats used predominantly in fresh waters. Not for use in leisure boats less than 200 kg that is predominantly used in salt waters. This prohibition does not apply to wooden boats used in salt water, and leisure boats that have permanent berth in marinas, that in the insurance industry's list of marinas are classified as "A" or "B" marinas, e.g. marinas approved for harbouring in the water either the whole year or from April to mid November.

From January 1, 2018 the order prohibits painting leisure boats with all sorts of paint that release substances classified with risk phrase R53: "May cause long-term adverse effects in the aquatic environment". Originally the ban on R53 biocidal paint for leisure boats was set to enter into force on January 2003, cf. Statutory order 761/1999, but it has been postponed five times – most recently to January 2018, cf. Statutory order 1429/2014. Apparently it was a pressure from the Association of Marinas in Denmark and probably also the Danish Association of Yachtsmen that resulted in postponing the ban.[40] It appears that the pressure to postpone the ban is linked to delays in the EU procedures under the Biocidal Directive and now the Biocidal Products Regulation as regards the review and authorisation of active substances at EU level. It has been considered unfortunate to move ahead with a Danish ban – in addition to those that are prohibited under the above mentioned rules - if it would result in only a limited number of products available for antifouling purposes.

The Danish Working Environment Authority keeps a register of products, the Product Registry, which can have health hazards when used commercially, including products for anti-fouling purposes. Companies have a duty to notify hazardous chemical products to the Product Registry, the notification is free of charge and are done online by filling a form. The notification duty applies to companies that produce, import or change the trade name of hazardous chemical products in quantities exceeding 100 kg per year. If the product is for private use only, there is no duty to register. By Spring 2015 there were around 150 registered antifouling products in the Product Registry.[41]

[40] FLID, 'Bundmalingsbekendtgørelsen', n.d.
[41] Susanne Hoyer, Arbejdstilsynet , 'Personal communication', 2015.

4.2.3 Authorisation of antifouling products

Authorisation of antifouling products has in Denmark been based on the transitional measures of first the Biocide Directive and now the Biocidal Regulation. This means that no authorisations have been granted in accordance with the Biocide Directive or the Biocidal Regulation in Denmark.[42] The first authorisations are expected to be processed after the approval of P_{21} active substances at EU level. In accordance with the Biocidal Product Regulation, biocidal products are to be authorised by the relevant national authority (in Denmark the Environmental Protection Agency), a similar authority in another EU country or the European Chemicals Agency, ECHA.[43] The Environmental Protection Agency estimates that about 1,700 new products need an authorisation, including a number of antifouling products.[44] According to the transitional rules under the EU Biocidal Regulation it is not allowed to import, market or use biocidal products if the active substances are not or have not been subject to an evaluation at EU level. This means that substances like Diuron are prohibited as they are not subject to evaluation at EU level.

4.2.4 Supervision and enforcement

No information has been found on supervision and enforcement of legislation concerning import, sales and marketing of antifouling products.

4.3 Application and use

4.3.1 The boat owner's legal responsibility when painting the boat

The Statutory order on antifouling paints (1429/2014) also addresses the boat owner and his use of paint for his boat. It is, thus, prohibited to use irgarol on boats less than 25 meters. The general release rate on copper release in paint for leisure boats also applies to the boat owners' use of paint. The release rate in the paint may not exceed 200 micrograms Cu / cm^2 after the first 14 days and 350 ug Cu / cm^2 after the first 30 days.

It is also prohibited for the boat owner to use antifouling paints on leisure boats that predominantly sail in freshwater. For boats less than 200 kg that sail in salt water, you can only use antifouling paints if it is a wooden boat or if the boat has a berth in an A or B port.

It should be kept in mind that the use of organotin compounds such as TBT in antifouling systems is prohibited under the EU Regulation 782/2003 in accordance with the AFS Convention. The Regulation also requires since 1 January 2008 that organotin compounds on hulls shall either be removed or sealed.

4.3.2 Inspection and enforcement by the authorities

The Environmental Protection Agency in 2010 carried out an inspection on the use of illegal antifouling paints as well as waste handling in 15 marinas countrywide. The purpose of the campaign was to check if the boat owners complied with the rules of the statutory order on antifouling paint – and to investigate whether there was still illegal paint containing TBT in use.[45] The inspection did not show any use of illegal

[42] Annette L. Gondolf, Miljøstyrelsen, 'Personal communication', 2015.
[43] Jonas Nilsson and Lena Gipperth, 'Antifouling Biocides for Leisure Boats in the Baltic Sea. A Review of the European Union Chemicals and Water Legislation (In Press)', 2015.
[44] Miljøstyrelsen, 'Biocidforordningen kort fortalt', n.d.
[45] Miljøstyrelsen, 'Ulovlig bundmaling til lystbåde', n.d.

paints. It was repeated in 2011 where a large number of yachts in 25 marinas were tested for illegal paintings, but with the same result.[46] No use of illegal paints was recorded and apparently no unsealed boats with old TBT paints were recorded either.

4.3.3 Involvement of the yachting organisations

The Danish Association of Yachtsmen has an explicit strategy of contributing to compliance with the regulations on antifouling paints,[47] and regularly has articles about the subject in its member's magazine.[48] Also the Association of Marinas in Denmark has contributed actively to the acceptance and compliance with the rules on antifouling paints with articles in magazines[49] and information on its homepage.[50]

4.3.4 Enforcement by the marinas

The marinas can enact their own regulations for use of the marina – including provisions concerning boat owner´s use of biocides (see section 2.5). Those provisions are supplementary to the standard regulations and they have to be approved by the Danish Transport Authority, cf. the Harbour Act. It is not unusual that such local regulations include instructions for the use and handling of biocidal paints and contribute to the enforcement of the rules.[51]

In addition to that, there are examples of marinas including regulations on handling biocidal paints in their Articles of Association together with rules of procedure, membership, etc. Such privately enacted regulations can for example declare that the use of banned antifouling paints will cause loss of the right to a berth in the marina, and be regarded as a major misconduct of membership.[52]

5 Waste management and other environmental requirements

5.1 Summary

More than 80 % of the Danish leisure boats are estimated to be mooring in a marina, and there are some general guidelines and waste regulations as regards handling dust and scrapings in the marinas. When it comes to wastewater from wash down areas, there is no general information available concerning practices, permits or common conditions.

5.2 Waste management

Dust and scrapings from leisure boats became an issue during the 1980-ies and was in a report published in 1992 by the municipality of Copenhagen recognised as a major pollution problem needing urgent response.[53] From 2001 to 2002 a collaborative project between the Danish Association of Yachtsmen and the National Institute of Environmental Surveys worked on the issue. The project was supported by the Environmental Protection Agency and resulted in a set of guidelines for environmentally friendly

[46] Lise Mortensen Hoy, 'TBT-kontrol i lystbådehavnene', *Søfartens Ledere 4/2011*.
[47] Dansk Sejlunions Bestyrelse, 'Dansk Sejlunions Strategi 2011-2016', 18.
[48] Lise Høy Mortensen, 'Ulovlig bundmaling kan lukke havne', *Bådnyt 421/2009*; Jesper Højvang, 'Ulovlige bundmalinger - En rigtig dårlig ide', *Sejler 4/2007*.
[49] Lise Hoy Mortensen, 'TBT-kontrol i lystbådehavnene', *Søfartens Ledere 4/2011*.
[50] FLID, 'Foreningen af lystbådehavne I Danmark', n.d.
[51] Julie Flagsø, 'Personal communication', 2015.
[52] See e.g. Hornbæk Havn, 'Ordensreglement og regler for sejlads i Hornbæk Havn', n.d.
[53] Jan Burgdorf Nielsen, 'Kortlægning af forureningsforholdene fra lystbådehavne i Københavns Kommune', 1993.

maintenance of leisure boats.[54] The core of the guidelines was use of low tech methods like vacuum cleaners for collecting dust and scrapings. The report made the basis for an agreement between the Minister of Environment and the Danish Association of Yachtsmen on an action plan on antifouling for leisure boats.[55] The guidelines were further operationalised and published by the Danish Association of Yachtsmen,[56] then followed by a campaign in 2003 established by the Environmental Protection Agency, the Danish Association of Yachtsmen and the Association of Marinas in Denmark.[57]

The campaign was followed by a survey in 2004.[58] Around half of the 350 Danish marinas participated in the survey, and almost all (97%) were familiar with the campaign. 77% of the marinas had invested in the technology, and those marinas were considered to harbour 88 % of the Danish leisure boats.

Dust and paint scrapings are considered solid mixed chemical waste (waste code 08 01 21). The municipality is the relevant authority on waste management, cf. the Environmental Protection Act. The municipality enacts a waste regulation according to § 19 of Statutory order no. 1309/2012 on waste. The waste regulation is binding for industries as well as households. It is therefore also binding for marinas as well as the boat owners.

Waste can be either collected from the households or delivered by the citizens at municipal waste facilities. It can also be handled by private waste companies assigned by the municipality, cf. §§ 20-22 of the Statutory Order no. 1309/2012 on waste. In most municipalities, chemical waste like dust and scrapings from leisure boats will have to be delivered by the boat owner (or the marina) at the municipal waste facilities.

About 80 % of the leisure boats in Denmark are considered to moor in an established marina.[59] When cleaning and maintaining a boat at home the general municipal waste regulations apply. It is however more difficult to enforce as well as monitor compliance with the waste regulation at private homes.

The general waste regulation is supplemented by regulations concerning the use of marinas. The standard regulation on the use of Danish marinas and small fishing harbours – established according to Statutory order no. on 9139/2002, include rules for the boat owner when maintaining the boat. According to § 4.3 repair work should always be done in accordance with environmental regulations, and the produced waste from the work must always be collected and disposed of in accordance with the instructions at the marina and the environmental regulations. According to § 4.6 cleaning of vessels that are painted with biocidal antifouling paints may only be done in designated areas if available. It is common, that the marinas give further guidelines on how to handle dust and scrapings on their homepages.[60] There are also examples of

[54] Jesper Højenvang, 'Afvaskning og afslibning af biocidholdig bundmaling i forbindelse med vedligeholdelse af lystbåde på land. Miljøprojekt nr. 772/2003', 2003.
[55] Dan Ibsen, 'Enighed I Bundmalingssagen', *Bådmagasinet 27/3/2003*.
[56] Dansk Sejlunion and Højenvang, 'Redegørelse om miljørigtig fjernelse og slibning af bundmaling - Retningslinjer for afrensning og vedligeholdelse af bundmaling på lystbåde', 2003.
[57] Miljøstyrelsen, 'Miljøgevinst på 7,5 tons kobber', *Miljønyt 3/3/2006*.
[58] Miljøstyrelsen, 'Flotte effekter af miljøkampagne i Havnene', *Miljønyt 14/2/2005*.
[59] Foreningen af Lystbådehavne i Danmark, 'Fakta om FLID'.
[60] See e.g. Marselisborg Havn, 'Løft, stativer, lift samt miljø & bundmaling', n.d.

marinas that strengthen the regulation for the marina concerning dust and scrapings, so only equipment and methods approved by the board of the marina are allowed.[61]

All ports – and marinas if they are not a part of a port – also have to prepare a waste management plan cf. Statutory Order no. 415/2012 on port waste facilities for ship-generated waste, on ships' waste delivery and waste management plans. However, this plan only covers ship-generated waste and not waste as scrapings and dust generated on land during maintenance of the ship. Anyhow there are several examples of marinas including handling of dust and scrapings from leisure boats in their waste management plan.[62]

5.3 Wastewater management

According to § 27 of the Environmental Protection Act, contaminants cannot be discharged into watercourses or the sea unless a permission is granted. This general ban includes both sewage water and other pollutants like substances from anti-fouling products in wastewater from cleaning of boats. It is the municipality that grants discharge permits for such wash-down areas.

If a discharge or wastewater system is not environmentally sound, the municipalities are also entitled to require the necessary improvement or renewal of the facility, and/or change the terms specified in an existing discharge permit if the previously established conditions are deemed inadequate or insufficient.

There are no general guidelines for wastewater from marinas and wash-down areas, but terms and conditions have to be set in accordance with the combined approach, where use of best available techniques always are required, and also stricter emission limit values if the application of the best available techniques is insufficient to ensure that environmental objectives and environmental quality standards of the water body in question are met.

5.4 Environmental permit requirements

Establishment of new marinas or other facilities like ramps or boatlifts on the coastline require a permit from the Coastal Directorate according to § 16a of the Act on Costal Protection. The establishment of harbours also requires a permit under the Harbour Act. An environmental impact assessment (EIA) and/or an assessment of the possible impact on Natura 2000-sites – or at least a screening – is likely to be required for such permits. Furthermore, the establishment of onshore constructions and facilities will normally require a local plan or a rural zone permit. Such permit and planning requirements mainly aim to safeguard planning, landscape as well as coastal protection interests. There is normally no requirement of an environmental permit for marinas. The general rules in the Environmental Protection Act will apply, including a permit for wastewater discharge as mentioned above and a general prohibition to place substances on the ground that may pollute soil or groundwater.

5.5 Supervision and enforcement

There has not been available information as regards supervision and enforcement of waste regulations related to antifouling paints.

[61] See Hornbæk Havn, 'Ordensreglement og regler for sejlads i Hornbæk Havn', n.d.
[62] See e.g. Mellerup Bådelag, 'Affaldshåndtering', 2014.

6 Contaminated land and sediments

6.1 Summary

Most storage areas in marinas are believed to be registered as contaminated due to the pollution with dust from boat maintenance and other activities. Also sediments in marinas are usually contaminated to some extent. When dredging, most of the sediment is dumped at sea, but heavily contaminated sediments are disposed on land. There are no general strategies developed for the management of sediments from harbours and marinas, but dumping of dredged materials is subject to a permit cf. § 26 of the Act on Protection of the Marine Environment. The permit can only be granted if the contamination is in insignificant quantities and concentrations.

Clean-up of contaminated land is a complicated issue depending not only on who can be held liable, but also on when the pollution has occurred. In principle, it should be possible to hold owners or operators of marinas liable for clean-up if the pollution has taken place after 1 January 2001.

6.2 Surveys

The problem of contamination of marinas was put on the agenda in the early 90-ies. A report on contamination of winter storage sites for leisure boats in Copenhagen area was published in 1993. The report estimated that winter storage sites older than 35 – 70 years were contaminated exceeding the limit on 500 mg copper per kg dry matter of soil.[63] Later surveys showed concentrations of diuron up to 1.8 µg per kg dry matter of soil and for irgarol 4.6 and 10 µg per kg dry matter of soil.[64]

When it comes to sediments, analyses of TBT concentrations from harbours have showed concentrations between 30 and 4950 µg TBT/kg dry weight. Irgarol have shown typical concentrations in marina sediments between 10 and 25µ g/kg dry weight. Diuron has been found in marine sediments up to 0.83 µg/l.[65]

The Environmental Protection Agency initiated in 2000 a number of projects in order to establish strategies for the management of contaminated sediments from harbours. The result was a number of reports[66] but apparently not a published strategy as such. It is, however, important to be aware, that only a part of the pollution of harbour sediments originates from anti-fouling products. A large part of the pollution seems to originate from wastewater and urban activities in the area draining to the harbour.[67]

6.3 Registration of contaminated land

The Act on Contaminated Soil regulates the identification, use and rehabilitation of contaminated land.

The regional authorities have the task of identifying and registering contaminated sites. The sites are registered according to the knowledge about the contamination. A parcel is registered at knowledge level 1 if there is evidence of activities that may have caused pollution of the soil. No actual sample or tests are needed to register an area on knowledge level 1, but only historical data on a potential polluting activity on the site. Areas, where tests show evidence of contamination are registered on knowledge level 2.

[63] Jan Burgdorf Nielsen, 'Kortlægning af forureningsforholdene fra lystbådehavne i Københavns Kommune', 1993, 21.
[64] Torben Madsen et al., 'Kortlægning og vurdering af antibegroningsmidler til lystbåde i Danmark', 1998.
[65] Ibid.
[66] Jesper Ansbæk et al., 'Nyttiggørelse, rensning og fraktionering af havneslam. Miljøprojekt Nr. 632/2001', 2001.
[67] DAKOFA, 'Notat vedr. karakteristik af sediment fra havne', 2006.

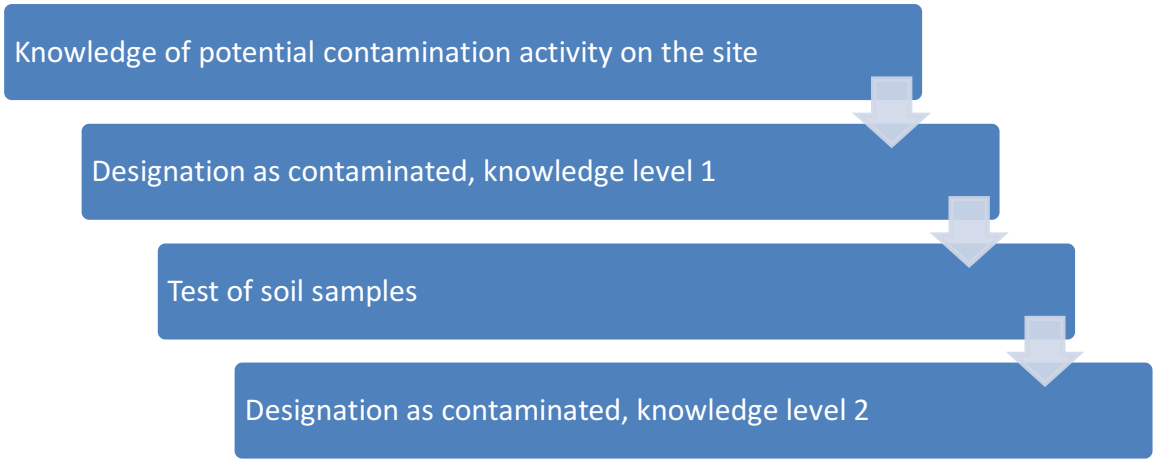

Figure 4: The process of designating contaminated sites

According to the ministerial guidance, marinas are among the sites that can be registered as contaminated at knowledge level 1.[68]

6.4 Restrictions on contaminated sites

When a marina is registered as contaminated, building and development is generally subject to an evaluation and possibly also further restrictions depending on the contamination and the intended use of the site. A permit from the municipality is needed in order to use contaminated sites for pollution sensitive purposes according to the Act on Contaminated Soil § 8. In practice this doesn't seem to pose larger problems for the marinas.

Removal of soil from the site is subject to notification of the municipality; cf. Statutory Order no. 1479/2007 on notification and documentation when moving soil.

6.5 Liability requirements

When it comes to liability for contamination of the soil in marinas, the situation can be rather complicated. One has to distinguish between the owners of the land, the operator of the marina, and the polluter. The owner of the site – e.g. the municipality – is not by default responsible for the activities carried out by the operator of the marina, and the operator – e.g. the board of the marina – is not by default responsible for the activities carried out by the individual polluters.[69]

The issue of clean-up liability concerning existing soil contamination has given rise to considerable doubt. Originally contaminated soil was managed in accordance with the Environmental Protection Act, where the courts in a number of cases ruled that liability for soil contamination was only present if negligence could be proved.[70] In January 2000, the Act on Contaminated Soil, established a strict liability for polluters or operators to clean up soil contamination.

Today the operator of a marina – being the board or municipality – will in principle be liable for the soil contamination due to activities after 1. January 2001 in the marina and can be ordered to clean-up the

[68] Miljøstyrelsen, 'Kortlægning af forurenede arealer', 2000, 108.
[69] See Peter Pagh, *Omsætning og regulering af fast ejendom* (København: Thomson Reuters, 2009), 332.
[70] See e.g. Ibid., 319 ff.

contamination. However, most contamination dates back to activities before 2001, and in that case a clean-up liability will according to case law depend on whether the marina has acted negligent or not. It seems unlikely on these grounds that a marina can be held responsible for the contamination and be ordered to rehabilitate the contaminated sites. It is unlikely that it will be possible to hold individual boat owners liable for the contamination due to scrapings throughout the years.

6.6 Sediment management

Sediment disposal and management has been on the agenda since the 1980-ies.[71] Sediment from harbours and marinas can generally be dealt with in two ways. It can either be dumped at sea or stored on land at designated dumpsites or areas where the use or storage of contaminated soil causes no risk for further contamination of soil or groundwater resources. Dumping the sediment at sea is by far the most inexpensive and the preferred solution for the marinas.

The Environmental Protection Agency initiated in 2000 a number of projects in order to establish strategies for the management of contaminated sediments from harbours.[72] Most of the published knowledge dates back to those initiatives.

There is a great variation in the figures on dredged and dumped sediments. A report from 2001 estimates that dredged sediments from harbours and marinas amount to 3.000.000 m^3 annually, and that 80 % are dumped at sea while 12 % are deposited on land.[73] The rest are used for other purposes, e.g. sand used for coastal protection where the sea erodes the coastline or as raw materials in construction or industries.[74] Other surveys estimated 800-900.000 tonnes to be dumped annually, and 230 – 425.000 tonnes to be deposited on land.[75] Figures from 2009 indicate that 2.400.000 m^3 equivalent to about 4.000.000 tonnes are dumped at sea.[76] There is a significant variation in the costs for the harbours depending on the disposal of the dredged material. Dumping at sea is generally estimated to be five times cheaper than more controlled disposals.[77]

Recently new strategies seem to emerge where the sediments are used locally for coastal protection purposes preventing the erosion of downstream harbours and marinas.[78] That might change the costs for disposal as well as the need for reducing the amount of pollutants in dredged materials from harbours.

[71] COWI-consult A/S, 'Bortskaffelse af havneslam. Miljøprojekt 158', 1990.
[72] Frank Stuer-Lauridsen et al., 'Omfang og konsekvenser af forskellige strategier for håndtering af forurende sedimenter. Arbejdsrapport fra Miljøstyrelsen nr. 34/2005', 6.
[73] Arne Jensen and Kim Gustavson, 'Havnesedimenters indhold af miljøfremmede organiske forbindelser. Kortlægning af nuværende og fremtidige behov for klapning og deponering', 2001, 9.
[74] Jesper Ansbæk et al., 'Nyttiggørelse , rensning og fraktionering af havneslam. Miljøprojekt nr. 632/1998', 35.
[75] Arne Jensen and Kim Gustavson, 'Havnesedimenters indhold af miljøfremmede organiske forbindelser. Kortlægning af nuværende og fremtidige behov for klapning og deponering', 2001, 8.
[76] Danske Havne, 'Danske havnes foretræde for Folketingets Miljø- og Planlægningsudvalg den 4. februar 2009: Håndtering af havnesediment', 2009.
[77] Frank Stuer-Lauridsen et al., 'Omfang og konsekvenser af forskellige strategier for håndtering af forurende sedimenter. Arbejdsrapport fra Miljøstyrelsen nr. 34/2005', 38.
[78] John Jensen, 'Kystfodring og sandressourcer', 2013.

6.6.2 Dredging or digging

Dredging or any other kind of digging or other works in sediments – or the sea bottom in general – normally requires a permit from the Coastal Directorate, cf. the Coastal Protection Act. A permit application should be subject to an EIA-screening and the potential effects on nearby Natura 2000 areas should be examined.

6.6.3 Dumping sediment at sea

Dumping the sediment at sea is administered according to the Act no. 963/2013 on Protection of the Marine Environment, the Statutory Order no. 32/2011 on Dumping of Sediment and the accompanying guidelines issued by the Nature Protection Agency.[79] This regulatory framework implement rules and guidelines for the dumping of dredged material in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention), the Convention for the Protection of the Baltic Sea environment (HELCOM) and the Convention for the Protection of the Marine Environment of the North Atlantic sea (OSPAR).

The relevant authority is the Danish Nature Agency. Dumping of dredged materials is subject to a permit cf. § 26 of the act on Protection of the Marine Environment. The permit can only be given if the contamination of the material is in 'insignificant quantities and concentrations'. These concepts are derived from the marine conventions.

When it comes to concentrations of polluting substances – including copper and TBT from antifouling paints, the sediments are categorised in A, B and C. Category A sediment is always suitable to dump. Category B sediment is subject to an individual evaluation, but will normally be dumped on a suitable site at sea. Category C sediment will normally have to be deposited on land.[80]

Category	A	B	C
Cu	< 20 mg/kg	20-90 mg/kg	> 90 mg/kg
TBT	< 7 ug/kg	7-200 ug/kg	> 200 ug/kg

Limit values for substances from antifouling paints in harbour sediment.

When it comes to quantities, there is a total limit on the amount of TBT and copper to be dumped from a single port or harbour. The rule of thumb is 1 kg of TBT and 200 kg of copper per year.

As dumping is considered a discharge to the aquatic environment it is also subject to an evaluation according to Directive 2008/105 on environmental quality standards in the field of water policy, as implemented by Statutory Order no. 1022/2010 on Environmental Quality Standards for Discharges to Water Courses, Lakes and the Sea.

The dumpsites are approved on a case by case basis. However, it seems that initiatives are taken to include the designation and approval of dumpsites in the river basin management planning according to the Water

[79] By- og Landskabsstyrelsen, 'Vejledning nr. 9702 af 20/10/2008 om dumpning af optaget havbundsmateriale - Klapning', 2008.
[80] Naturstyrelsen, 'Om klapning på havet', n.d.; By- og Landskabsstyrelsen, 'Vejledning nr. 9702 af 20/10/2008 om dumpning af optaget havbundsmateriale - Klapning', 2008, sektion 4.5.

Framework Directive.[81] The regulatory framework for the river basin management planning in Denmark has recently been amended, and it is not clear, how the assignment of dumpsites is to be handled in the future.

A permit cannot be granted if it itself or in combination with other plans or projects may harm a Natura 2000-site, cf. the Habitats Directive article 6(3). These rules are implemented in Denmark by Statutory Order no. 408/2007 on internationally protected nature sites. In some cases, sediments are used for coastal protection purposes and will in such cases require a permit from the Coastal Directorate.

6.6.3 Using or depositing the sediment on land

If the sediment is too polluted to be dumped, it must be deposited, recovered or used on land. It is the municipality that according to chapter 5 of the Act on Environmental Protection approves land deposits of dredged materials. Together with Statutory Order no. 719/2011 on landfills the provisions in the Environmental Protection Act implements Directive 1999/31/EC on the landfill of waste. The landfills can be located either in proximity to the harbour and only used for dredged materials or further away and used for mixed waste.

For landfills constructed as settling lagoons, the permits concerning discharge of water and percolation is given in accordance with Statutory Order no. 1022/2010 on Environmental Quality Standards for Discharges to Water Courses, Lakes and the Sea, that implements Directive 2008/105 on environmental quality standards in the field of water policy.

Depositing contaminated dredged materials is fairly expensive – as an average 3-10 times the costs of regular dumping at sea.[82] The costs are held by the marinas, and therefore the marinas have had a strong interest in enforcing the regulation on antifouling paints towards the boat owners.[83] However, antifouling substances are not the only pollutants in the sediment. Antifouling may only be contributing significantly to the content of TBT and copper. Most other pollutants come from land based activities and discharges of wastewater.[84] Reducing the use of antifouling paints does therefore not necessarily reduce the costs for removal and replacement of the sediments.

7 Conclusions and ways forward

The report shows, that there is not much awareness of the problems of current antifouling practices. The main focus has been on the prohibition of the most harmful antifouling products and on the use of illegal paints including paints with TBT, but no scientific reports or public strategy documents identifies or addresses the problems of the use of those antifouling products that are on the market.

Furthermore, from an environmental quality perspective the issue of antifouling paint has not been addressed in the analysis forming the basis for the river basin management plans and the marine strategy.

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[81] Miljøministeriets arbejdsgruppe om forståelse af vandplanernes retningslinjer og redegørelse relateret til havne slusefjorde og sejladsrelaterede aktiviteter, 'Havne, slusefjorde og sejladsrelaterede aktiviteter i vandplanerne. Arbejdspapir.', 2011.

[82] Frank Stuer-Lauridsen et al., 'Omfang og konsekvenser af forskellige strategier for håndtering af forurende sedimenter. Arbejdsrapport fra Miljøstyrelsen nr. 34/2005', 31.

[83] Jesper Højvang, 'Ulovlige bundmalinger - En rigtig dårlig ide', *Sejler 4/2007*; Lis Høy Mortensen, 'Ulovlig bundmaling kan lukke havne', *Bådnyt 421/2009*.

[84] DAKOFA, 'Notat vedr. karakteristik af sediment fra havne', 2006, 19 ff.

However, copper is among the indicators established according to the Marine Strategy Framework Directive, and the adverse effects on eelpout, mussels and snails caused among other substances by copper are also mentioned. The programmes of measures will be published in 2015 and made operational in 2016, and it is therefore yet to be seen if they will address biocides from antifouling paints. The programmes of measures under the WFD and the Danish river basin management plans have not included any measures regarding antifouling substances. It seems clear, that as long as the problems are not properly identified or recognised in these planning processes, it is unlikely that any specific initiatives from the authorities will be taken to address such problems.

Nevertheless, the ban on TBT and the initiatives to address use of illegal paints as well as the problems caused by dust and scrapings provide an illustrative example of collaboration between the authorities and civil organisations in Denmark. Such collaboration, including projects initiated in the mid 90'ies and executed from 2003 ending up with guidelines for environmentally friendly maintenance of leisure boats supported by the Danish Association of Yachtsmen may have raised awareness of antifouling concerns. It appears that the campaign established jointly by the Environmental Protection Agency, the Danish Association of Yachtsmen and the Association of Marinas in Denmark, resulted in 77% of the marinas investing in the recommended technology. This was probably strongly supported by the legal framework, where offshore dumping of heavily polluted sediment has gradually been restricted combined with the significant increase of the costs for marinas if the sediment is to be disposed on land. The timing indicates some integration of efforts and instruments, but to which extent is not documented by the report.

The collaborative approach and the close cooperation between the authorities and the organisations might on the other hand have some negative impacts on the possible development and use of alternative antifouling measures. The intended ban of additional biocidal paints containing mainly copper has been postponed several times since 2003 – presumable due to pressure from the Association of Marinas in Denmark and probably also the Danish Association of Yachtsmen.

There seems to be no active development of alternative antifouling measures in Denmark, e.g. mechanical cleaning facilities, boat scrubs etc., or even of less harmful antifouling paints or other products. In general, there appears to be no specific legal obstacles as regards the use of alternative antifouling measures. If, however, mechanical cleaning facilities are established in marinas there is likely to be certain requirements as regards handling of wastewater etc. from such facilities. Furthermore, it appears that the approval of new – possibly less harmful – antifouling paints could be influenced by the time-consuming procedures under the EU Biocidal Products Regulation as regards the assessment and approval of active substances.

As possible ways forward to we have identified the following issues distinguishing between voluntary/informative measures and direct regulation/regulatory measures:

1. Voluntary measures

- Information campaigns as regards alternative antifouling measures
- Development of codes of conduct in marinas or boat clubs

2. Regulatory measures

- Ensuring that antifouling issues are adequately dealt with in RBMPs and marine strategies, including a clear distribution of competences
- Effectuating the ban on R53 antifouling paints
- Ensure that antifouling paints are addressed in waste management plans and wastewater permits in marinas (and harbours)

8 Acknowledgement

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10 Appendix

Actor	Responsibility	Based on legislation
Importers and retailers of biocidal anti-fouling paints	Place only labelled and authorised products on the market.	Statutory order on import, sales and marketing of antifouling paints (1429/2014)
Boat owners	Comply with the restrictions on use of antifouling paints Comply with the waste regulations of the municipality and the marina when maintaining the boat.	Statutory order on import, sales and marketing of antifouling paints (1429/2014) + EU Regulation 782/2003 Statutory order no 1309/2012 on waste. Statutory order no 9139/2002 on standard regulation on the use of Danish marinas and small fishing ports Regulations established according to private law.
Marinas, boat clubs	Comply with municipal waste regulations and permits for wastewater Prepare a waste management plan (ship-generated waste)	Environmental protection act. Statutory order no 1309/2012 on waste. Statutory Order no. 415/2012 on port waste facilities for ship-generated waste
Municipalities	Enact local waste regulations and permitting wastewater discharges.	Environmental Protection Act. Statutory order no 1309/2012 on waste.
The Nature Protection Agency	Prepare river basin management plans and marine strategy. General responsibilities on the legislation on management of nature	Water Planning Act Marine Strategy Act

	and natural resources, including the Water Planning Act, the Marine Strategy Act and the Nature Protection Act. Establishment of environmental objectives and quality standards for the environment. Permits for dumping of dredged sediments at sea	The Marine Environmental Protection Act.
The Environmental Protection Agency	General responsibilities for guidelines and instructions on the legislation on waste and protection of the environment. Authorisation of biocidal products Enforcement of the rules on import, sales and use of antifouling products.	The Environmental Protection Act The Chemicals Act
Coastal Directorate	Generally permit requirement re. offshore installations, including the establishment of marinas, boatlifts etc. and dredging of sediments.	The Coastal Protection Act
The Transport Authority	Standard regulations for harbours, including marinas and approval of supplementary regulations	The Harbour Act