

Antifouling for leisure boats in the Baltic Sea

Mapping the legal situation - National Study: Sweden



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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 Swedish Environmental Protection Agency. 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 Swedish 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 a 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. Swedish legislation is accessible at the national database <http://www.riksdagen.se/Dokument-Lagar/Lagar/Svenskforfattningssamling/>.

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1. Introduction

Boating is a central activity in many Swedes life. It is not surprising, as Sweden possesses one of the longest coastlines in the European Union and some of the largest archipelagos in the world. There are an estimated 881,000 seaworthy leisure boats (2010),¹ one of the highest amounts per capita in the world, and more than 1,500 marinas, of which 590 are registered guest marinas,² for leisure boats to moor at.³ A pressing issue for most leisure boats is biofouling - the accumulation of microorganisms, plants, algae and/or animals on the hull of the boat. Antifouling is important both for economical and environmental reasons, e.g. due to the increased fuel consumption that biofouling causes. To combat the biofouling is necessary for most, but the measure of choice has often been toxic antifouling paints, which is problematic from a marine environmental standpoint. For the Baltic Sea, forming the eastern coastal line of Sweden, the effects may be particularly devastating due to its brackish water and sensitive environment. During recent years, development of new techniques has resulted in several new methods to achieve a clean hull, some more efficient than others, but all issuing questions from legal, financial and/or environmental standpoints.

Antifouling paint has been a subject of public debate regularly during the last thirty years. In the latter part of the 1980s, the prohibition of TBT brought antifouling and its environmental effects to the public awareness. Since then there has been a continual development towards less toxic paints and of methods alternative to the paints, often covered by mainstream media. In the early 2000s, the prohibition of copper-based paints for leisure boats in the Baltic Sea was much debated and the paints re-emerged shortly thereafter. More recently, antifouling has resurfaced as a subject in national media due to alleged high-profile misuse.⁴

2. Governance structure

2.1 Summary

The Swedish Environmental Code is the foundation for all environmental legislation in Sweden. The Code contains general rules and principles applied for all activities, including punitive, compensatory and administrative rules, as well as chapters dedicated to certain types of activities. Detailed provisions are mainly provided in delegated legislative provisions termed ordinances and in regulations provided by authorities.

There are a number of authorities, both national and local, involved in the administration connected to antifouling. At the national level, mainly three agencies are involved. The Chemical Agency is responsible for authorization, information and part of the supervision in connection to the antifouling paint.

¹ Transportstyrelsen. *Båtlivsundersökningen 2010 – en undersökning om svenska fritidsbåtar och hur de används*. 2010. p. 18.

² Svenska Gästhamnar. *Välkommen till svenska gästhamnar*. n.d.

³ Maringuiden. *Fakta om båtlivet i Sverige*. n.d.

⁴ Syrén, Michael. *Åsa Romson målar med förbjuden färg*. 2014.

The Environmental Protection Agency has a coordinating, monitoring and evaluating role in the management of the environment. The Agency for Marine and Water Management is responsible for implementing the Marine Strategy Framework Directive. Local authorities include the County Administrative Boards, which of five are designated water authorities, and the municipalities. They have regional and local administrative responsibilities, including in the implementation of the Water Framework Directive and the Marine Strategy Framework Directive and an authoritative and supervisory role for most environmental activities.

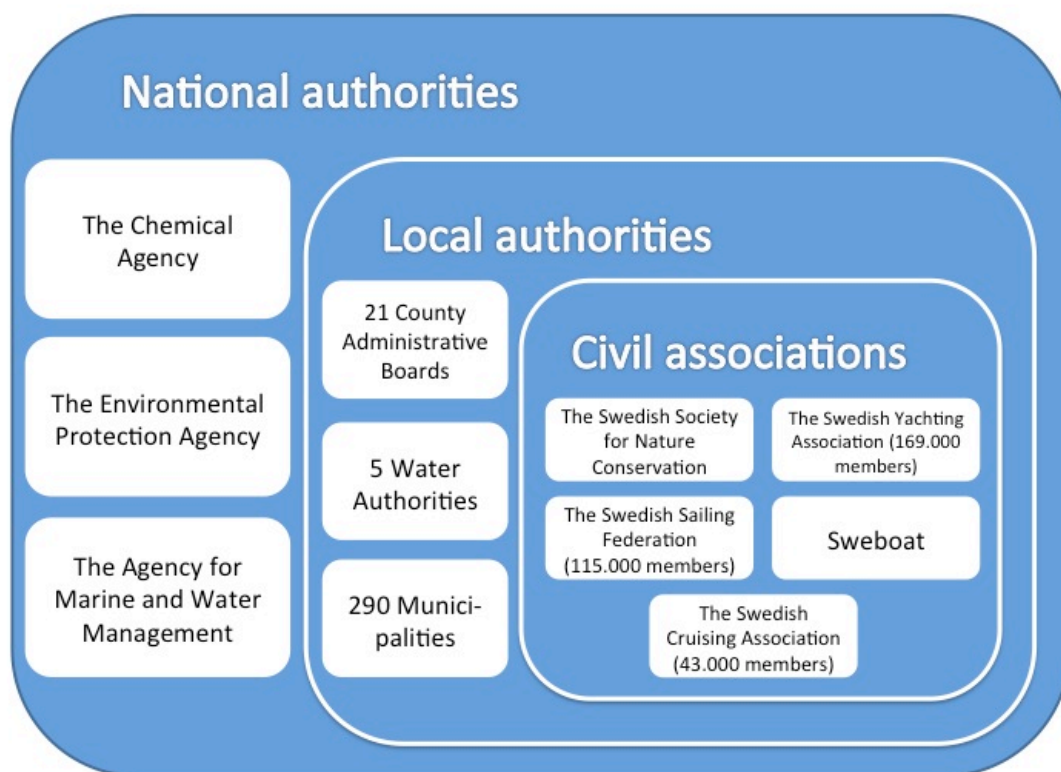


Figure 1 Simplified overall governance structure

2.2 The Swedish Environmental Code

The Swedish Environmental Code⁵ forms the fundament of Swedish environmental law and entered into force on 1 January 1999. The Environmental Code replaced 15 acts, resulting in a code of 32 chapters divided into seven parts containing more than 500 sections. It contains the fundamental environmental rules with the Government laying down more detailed provisions in delegated legislation, termed *ordinances*, or authorities providing detailed provisions in precepts, termed *regulations*.

The first part of the Code contains general provisions applicable to all activities and measures affecting the environment. It includes the general objectives of the Code, rules of consideration and the establishment of the Environmental Quality

⁵ Miljöbalk (1998:808).

Standards (EQS) and Environmental Impact Assessments (EIA). Part two contains provisions concerning nature protection and part three contains special provisions regulating certain activities. Of the latter, two chapters are of foremost interest in terms of antifouling. Chapter 9 concerns activities considered environmentally hazardous and chapter 14 concerns chemical products. The later chapters of the Code contain legislation regarding consideration of cases and matters (part four), supervision (part five), penalties (part six) and compensation (part seven).

The aim of the code is to promote sustainable development to assure a healthy and sound environment for present and future generations through the application of five foundations, including long-term good management of the use of water.⁶ Along with the Environmental Code, the parliament has established sixteen environmental quality objectives to be achieved by 2020. At least two can be applied to antifouling for leisure boats in the Baltic Sea: *A non toxic environment*, addressing the use and spread of chemicals, and *A balanced marine environment, flourishing coastal areas and archipelagos*, addressing the water quality. However, the quality objectives are not laid down in any legislation and are not legally binding, nor do they identify antifouling as a specific problem of concern.

2.3 Other legislation and responsible agencies

The environmental directives of the European Union are mainly implemented in delegated legislation from the Government. The Water Framework Directive (WFD) is implemented in the Ordinance on Water Quality Management⁷. Many authorities, including all 21 county administrative boards, share responsibility for compliance with the Water Framework Directive. However, for each of the five assigned water districts, one county administrative board has been chosen as Water Authority, primarily responsible for the administration of the water district.⁸ The other county administrative boards within each district are to assist the water authority in the work.⁹ The Agency for Marine and Water Management, the Environmental Protection Agency and the Chemical Agency have been involved in the development of documents and guidelines for the establishment of environmental quality standards, programmes of measures and monitoring programmes.¹⁰

The Environmental Protection Agency is an agency under the Ministry of the Environment and the central authority for the environmental efforts in Sweden.

⁶ Ibid., chapter 1, section 1.

⁷ Förordning (2004:660) om förvaltning av kvaliteten på vattenmiljön.

⁸ Miljöbalk (1998:808), chapter 5, section 11. In Förordning (2007:825) med länsstyrelseinstruktion, section 22, the water authorities are specified as Länsstyrelsen i Norrbottens län, Länsstyrelsen i Västernorrlands län, Länsstyrelsen i Västmanlands län, Länsstyrelsen i Kalmar län and Länsstyrelsen i Västra Götalands län.

⁹ Förordning (2007:825) med länsstyrelseinstruktion, section 27.

¹⁰ For further information on the responsibilities for and implementation of applicable environmental directives, see chapter 3.

The agency is responsible for coordinating, monitoring and evaluating the environmental efforts, including efforts by other authorities, to ensure compliance with the Environmental Code and the environmental objectives. Their work consists of compiling knowledge and documentation, aiding in the development of environmental policy and its implementation.

The Marine Strategy Framework Directive (MSFD) is implemented in the Marine Environmental Ordinance¹¹. The competent authority, chosen in accordance with article 7 of MSFD, is the Agency for Marine and Water Management.¹² The agency was established in 2011 under the Ministry of the Environment. It is responsible for implementing MSFD and developing the Swedish Marine Strategy for the marine regions, including the Baltic Sea.¹³ The assessments made and measured taken in accordance with MSFD are to be done in consultation and conjunction with concerned authorities,¹⁴ foremost the county administrative boards.¹⁵ The implementation of MSFD is closely related to the environmental objective of *A balanced marine environment, flourishing coastal areas and archipelagos*, for which the Agency for Marine and Water Management is also responsible for.

The applicable chemical legislation from the European Union is not implemented into national legislation, as both REACH¹⁶ and the Biocidal Products Regulation¹⁷ (BPR) are EU regulations, which prohibits national legislation in the same subject matter. However, several changes to the legislation have been and will be made to complement the new regulations. Both regulations require the Member States to nominate one or more authorities as national competent authorities to carry out the obligations of the regulations,¹⁸ and for both, the Swedish Chemical Agency has been chosen. The Chemical Agency, also an agency under the Ministry of the Environment, is the supervisory authority responsible for the chemicals control in Sweden, working to limit the health and environmental risks associated with chemicals. The agency is responsible for the evaluation of chemical substances in accordance with REACH and the national authorization of biocidal products in accordance with BPR. The agency keeps a register of authorised products, processes applications of biocidal products authorisation, provides support to other authorities and provides information on chemicals. The Chemical Agency is also responsible for the achievement of related national environmental quality objective of *A non-toxic environment*.

¹¹ Havsmiljöförordning (2010:1341).

¹² Ibid., section 8.

¹³ Ibid., section 9.

¹⁴ Ibid., sections 10-12.

¹⁵ Naturvårdsverket. *Steg på vägen – fördjupad utvärdering av miljömålen 2012*. Rapport 6500. 2012. p. 376.

¹⁶ Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals [REACH], establishing a European Chemicals Agency.

¹⁷ Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products [BPR].

¹⁸ REACH article 121, BPR article 81.

Additional national legislation for chemical products, including biocidal products, is found in chapter 14 of the Environmental Code. The chapter concerns e.g. use, production, import, marketing and authorization of chemical products. Detailed provisions on biocidal products are included in the Ordinance (2014:425) on Pesticides, which entered into force on 15 July 2014, and The Swedish Chemicals Agency's Pesticides Regulations (KIFS 2008:3).

The Chemical Agency is responsible for the supervision of the import and production of chemicals.¹⁹ For all other supervision of compliance with chemical legislation in relation to antifouling, the responsibility is placed on the environmental committee in each of the 290 municipalities in Sweden. This includes the supervision of e.g. boat owners, boat clubs, professional users and retailers. In practice, the supervision may vary locally as each municipality autonomously decide how to organise their work.

2.4 Non-governmental organisations

Aside from the governance structure, several non-governmental organisations play a pivotal role in boating and marine environmental interests. *Svenska Båtunionen* (the Swedish Yachting Association) is a national organisation associating Swedish yacht clubs. It has approximately 900 yacht clubs connected to the organisation and 169.000 individual members of the connected yacht clubs. Sweboat, The Swedish Marine Industries Federation, is the trade organisation representing the Swedish Marine Industry with approximately 400 companies and organisations within the industry as members. Boat owners can be members of either *Svenska Seglarförbundet* (The Swedish Sailing Federation), which has approximately 115.000 members, or *Svenska kryssarklubben* (the Swedish Cruising Association) with about 43.000 members.

Among the NGOs focused on environmental protection that are influential in the antifouling issue, *Naturskyddsföreningen* (the Swedish Society for Nature Conservation) is of particular note. During 2014 and 2015 the organisation runs, along with other associations, a project spreading information in an effort to reduce the use of toxic biocidal antifouling paints.

3. Environmental quality regulation

3.1 Summary

This chapter concerns the implementation of two European Union directives, the Water Framework Directive and the Marine Strategy Framework Directive, in Sweden. Substances formerly used in antifouling paints, such as cybutryne, diuron and tributyltin, are considered priority substances by the EU and as such by default considered when classifying chemical status for water bodies. TBT is also as an indicator in the determination of *good environmental status* for the Baltic Sea. However, most of today's antifouling paints are copper-based, but copper is not considered a priority substance and antifouling is not acknowledged as a pressure in the initial assessment.

¹⁹ Miljötillsynsförordning (2011:13), section 31.

3.2 The implementation of the Water Framework Directive

The implementation of the Water Framework Directive in Sweden is based on chapter 5 of the Swedish Environmental Code. The chapter forms a foundation for issuing environmental quality standards, programmes of measures and administration of water quality applied in secondary legislation issued by the government. The more specific provisions of the implementation are found in the Ordinance on Water Quality Management, issued by the government. The ordinance entered into force on 1 August 2004.

Sweden is divided into five river basin districts,²⁰ each assigned a water authority responsible for the administration:

- SE1: Bothnian Bay RBD (Bottenviken) administered by Norrbotten county administrative board
- SE2: Bothnian Sea RBD (Bottenhavet) administered by Västernorrlands county administrative board
- SE3: North Baltic RBD (Norra Östersjön) administered by Västmanlands county administrative board
- SE4: South Baltic RBD (Södra Östersjön) administered by Kalmar county administrative board
- SE5: Skagerrak and Kattegat RBD (Västerhavet) administered by Västra Götaland county administrative board²¹



Figure 2: RBDs in Sweden (from Vattenmyndigheterna.se)

The districts are further divided into 119 main river basins and 24,460 individual water bodies. Several of the river basins are transboundary, shared with Finland and/or Norway, thus forming international river basins.

The first river basin management plans were adopted on 15-18 December 2009 and reported to the Commission in March 2010.²² The second versions of these plans were decided upon in December 2016. The new program promotes further establishments of boat hull brush washes and designated wash down areas.²³

The environmental quality standards for priority substances are established in Annex V of WFD, last updated by EU Directive 39/2013, and contains 45

²⁰ Miljöbalk (1998:808), chapter 5, section 10 and Förordning (2004:660) om förvaltning av kvaliteten på vattenmiljön, chapter 2, section 1.

²¹ Förordning (2007:825) med länsstyrelseinstruktion, section 22.

²² European Commission. *Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC)*. SWD(2012) 379 final. 2012.

²³ Vattenmyndigheterna i samverkan. *Förslag på åtgärdsprogram för Södra Östersjöns vattendistrikt*. 2015. p. 102.

substances with maximum allowable concentration that forms the basis for assessment of chemical status. The list contains at least three substances relating to antifouling: diuron, tributyltin (TBT) and cybutryne. The monitoring of the priority substances was the subject of Report 5801 from the Environmental Protection Agency, where the monitoring programme was determined for each of the priority substances. TBT is considered as one of three substances most problematic in surface waters, thus forming a priority for continuous monitoring.²⁴ In contrast to TBT, the levels of diuron, prohibited for use since 1992, are considered very low and no continuous monitoring is considered necessary.²⁵ Cybutryne, known under the trade name Irgarol 1051, was added to the priority list in 2013 and consequently not subject to recommendations in the report. As parts of the priority substance list, all three substances are prohibited for use in antifouling products.

For substances not included in Annex V of WFD, but identified as being discharged in significant quantities into a water body, the Member States themselves are responsible to develop environmental quality standards. The EQSs for these *significant pollutants* are used when determining the ecological status and are set separately for each water body. The Chemical Agency, by instruction from the Environmental Protection Agency, developed recommendations for standards for such pollutants, some of which are related to antifouling. Most antifouling paints today are copper-based, a metal that has been identified as a significant pollutant. The Environmental Protection Agency has recommended a general maximum allowable concentration for copper in water body of 4 µg/l.²⁶ The corresponding recommendation for zinc has been set to 8 µg/l for hard water (over 24 mg CaCO₃/l) and 3 µg/l for soft water.²⁷ The EQSs and classification of all water bodies in Sweden has to be made available in the VISS database²⁸ or equivalent.²⁹

3.3 Implementation of the Marine Strategy Framework Directive

The Swedish implementation of the Marine Strategy Framework Directive resulted in the introduction of the Marine Environmental Ordinance³⁰ in 2010. The ordinance establishes the legal basis for the development of the marine strategy and the administrative responsibility of the Swedish Agency for Marine and Water Management. Due to the transboundary nature of the marine environment, regional cooperation is necessary to achieve set objectives and targets. Much of the implementation of the Directive within the Baltic Sea has

²⁴ Naturvårdsverket. *Övervakning av prioriterade miljöfarliga ämnen listade i Ramdirektivet för vatten*. Rapport 5801. 2008. pp. 2, 80.

²⁵ Ibid. p. 44.

²⁶ Naturvårdsverket. *Förslag till gränsvärden för särskilda förorenande ämnen*. Rapport 5799. 2008. p. 32.

²⁷ Ibid. p. 28.

²⁸ The VISS database is available at: <http://www.viss.lansstyrelsen.se/>.

²⁹ Förordning (2004:660) om förvaltning av kvaliteten på vattenmiljön. Chapter 2, section 15 and chapter 3, section 5.

³⁰ Havsmiljöförordning (2010:1341).

been conducted under the framework of the Baltic Sea Convention, led by the Helsinki Commission (HELCOM).

The first three tasks of the directive have been presented in two reports issued in 2012. In *God Havsmiljö del 1* (Good Marine Environment part 1), the initial assessment of the Baltic Sea is made in accordance with Article 8 of the Directive. In the second part, *God Havsmiljö del 2*, the determination of good environmental status (GES) and establishment of EQSs and indicators are made. In the initial assessment, the use of antifouling paints is identified as a pressure affecting the biodiversity due to the effects of substances such as copper, Irgarol and TBT.³¹ However, in line with the core indicators of the HELCOM CORESET project, copper and zinc are not used as indicators for descriptor 8, *concentration of contaminants in the marine environment*, while TBT is included due to its inclusion priority substances list in Annex X of WFD.³²

The monitoring programme was presented and reported to the EU commission on 15 October 2014. A new programme of measures was decided in December 2015. The programme of measures contains 32 measures with a combined cost of 2 billion SEK during 2016-2021 but with estimated benefits of 6,8 billion SEK.³³ The Environmental Protection Agency, in association with the Swedish Transport Agency, are to examine the current levels of TBT in harbours and the other marine environment and also examine the source of the pollution. Further, the current instruments of control are to be evaluated.³⁴ The CHANGE project is referred to as the regional coordination in measures concerning TBT.³⁵ The final programme of measures will be finalised and presented by the end of 2015.

4. Product regulation

4.1 Summary

The Chemical Agency is responsible for the authorisation of antifouling products in Sweden and it has currently approved 45 antifouling products of which sixteen are allowed for leisure boats with main mooring point on the east coast. All of these products are copper-based and have a relatively low concentration of copper, which may put the effectiveness of the products in doubt. The rules on retail sale, labelling and advertisement of these products are mainly harmonised at Union level.

The municipalities are legally responsible for the supervision of boating activities, but in practice the local supervision of the rules in the Environmental Code and implementation of codes of conduct performed by the boat clubs, are

³¹ Havs- och vattenmyndigheten. *God Havsmiljö 2020 - Del 1: Inledande bedömning av miljötillstånd och socioekonomisk analys*. Rapport 2012:19. p. 245.

³² Ibid. pp. 331-332.

³³ Havs- och vattenmyndigheten. *God havsmiljö 2020 - Marin strategi för Nordsjön och Östersjön - Del 4: Åtgärdsprogram för havsmiljön*. Rapport 2015:30.

³⁴ Ibid. p. 31.

³⁵ Ibid. p. 174.

both important in combating illegal antifouling use. Due to this situation, the municipalities concentrate their supervision on the boat clubs and their work rather than focusing on the boat owners.

4.2 Authorisation of antifouling products

The Biocidal Products Regulation, regulating the authorisation of antifouling products, has been in force since 1 September 2013. During a transitional period, measures in the Biocidal Products Directive are also applicable for products with *existing active substances*, nationally implemented in the fourth chapter of the Ordinance (2014:425) on Pesticides. As antifouling products are not subject to Union authorisation, the competent authority in Sweden, the Chemical Agency, must approve all products introduced to the market.

As of September 2014, the Chemical Agency has 45 products on the approval list for product-type 21 (antifouling products). Of these, 28 products are approved for use on leisure boats. Due to the qualitative difference between the waters on the east coast and the west coast of Sweden, the more toxic antifouling products are only allowed for use on boats with their main mooring point on the west coast. The boundary between the east and the west coast has been set to the municipality of Trelleborg, the southernmost town in Sweden. Of the 28 products approved for leisure boats, sixteen are approved for boats with main mooring point on the Swedish east coast, from Trelleborg to Örskär. For leisure boats with main mooring point in the Gulf of Bothnia (north of Örskär) and inland waters, there are no authorised antifouling paints. None of the currently approved antifouling products have been approved on the basis of the Biocidal Products Regulation that entered into force on 1 September 2013, but instead based upon the previous European Union legislation, the Biocidal Products Directive, and the national implementation of it.³⁶

There are other conditions that may be imposed on products. All biocidal products are issued an authorisation class. Class 1 and 2 are only for professional application, while products in class 3 may be applied by anyone. Only one product allowed for smaller vessels is categorised in class 2, but the product is only allowed for boats with main mooring point on the west coast. The product report, issued as part of the product authorisation process, generally also contains recommendations for extended use of protective gear during application and removal for professional users due to the continuous exposure. Antifouling paints are also only permitted for boats weighing at least 200 kg.

All of the nine products approved for use on leisure boats on the east coast use either copper(I) oxide or copper thiocyanate as the active substance.³⁷ Both

³⁶ List of approved substances extracted from the Swedish Biocidal Products Register, available at:

<http://webapps.kemi.se/BkmRegistret/Kemi.Spider.Web.External/>

³⁷ An antifouling paint using copper powder as the active substance has received authorisation for leisure boats with main mooring point on the west coast. For antifouling paints authorised for use on ships, another three active substances are used in authorised paints: 4,5-dichloro-2-n-octyl-4-isothiazolin-3-one

substances are considered *existing active substances* and subjects to the review programme of active substances.³⁸ The programme works to systematically examine all active substances on the market on 14 May 2000 and the substances are meanwhile subject to transitional provisions in the Biocidal Products Regulation. The weight percentage concentration for copper(I) oxide is between 6,9 and 8,5 for the products approved for use on the east coast. Comparably, products approved for west coast use may contain weight percentage concentrations up to almost 40.

Copper-based antifouling products for use on the east coast were phased-out by the Chemical Agency in the early 2000s and were to a large extent replaced by zinc-based antifouling paints. These paints were considered to only have a physical effect, in contrast to a chemical effect, on the target organisms, thus not considered a biocide by the companies marketing the products and as such not dependent on a biocidal product authorisation. Due to the leakage of zinc ions and toxicity towards several non-target organisms, the Chemical Agency declared in 2012 that authorisation was required and under the threat of fines the sales of the unauthorised paints stopped.³⁹ No zinc-based product has since received authorisation for the use on leisure boats. Instead the copper-based paints re-emerged on the market, but also other antifouling paints with physical effect, thus not subject to authorisation by the Chemical Agency, have emerged on the market. Among the non-biocidal antifouling paints are the silicone-based paints that create a very smooth and slippery surface, making it difficult for organisms to attach to the hull, and protein-based paints that create an oxygen-deficient layer around the hull.

To calculate the environmental effects in connection to a product authorisation and thus determine the allowable leaching rates for paints, the PEC/PNEC risk assessment is used.⁴⁰ To calculate the PEC for antifouling paints, the Chemical Agency and corresponding authorities around the EU use the Marine Antifoulant Model to Predict Environmental Concentrations (MAMPEC). The Agency has modified the scenarios used in the program for marinas and harbours to correspond to Swedish marine environments, both for the east coast and the west coast. For calculation of leaching rates of the antifouling paints, used to calculate the PEC, Sweden and other EU countries has accepted a method developed by the European paint manufacturer association CEPE as standard.

(DCOIT, also known under the trade name Sea-Nine), copper pyrithione and zinc pyrithione.

³⁸ Commission regulation (EC) No 1451/2007, CAS numbers 1111-67-7 (copper thiocyanate), 1317-38-0 (copper oxide)

³⁹ Kemikalieinspektionen. *KemI believes that antifouling paints with high levels of zinc oxide require approval.* 2012.

⁴⁰ The PEC value is set in contrast to the Predicted No-Effect Concentration (PNEC) value and used to determine if the product has unacceptable environmental effects (value above 1). See also European Commission Joint Research Centre; *Technical Guidance Document on Risk Assessment*, p. 99-106 and Biocidal Products Regulation (EU/528/2012), Annex VI;

It is prohibited to import biocidal products from outside the EU or the EEA and to market or use such products without authorisation from the Chemical Agency.⁴¹ The illegal placing on the market of a biocidal product, in violation of the Biocidal Product Regulation, is categorised under the penal provision of *unauthorised environmental activity*. If an offence is committed in the exercise of business activity, a corporate fine, ranging from SEK 5,000 to 10,000,000, may be issued in accordance with the Swedish Penal Code.⁴² The Chemical Agency has the supervisory responsibility of the placing on the market of biocidal products and registration of the products.⁴³

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 organotin compounds on hulls shall either be removed or sealed after 1 January 2008. In Sweden the use of TBT based antifouling products on boats under 25 m were banned already in 1989.⁴⁴

4.3 Retail sale and labelling

Retail sellers of antifouling paints have few obligations specific to the sales of biocidal products. They are obligated to follow the general regulations for retailers, e.g. the Consumer Sales Act establishing basic consumer rights, such as the right to return a defective or inadequate product. The Ordinance on pesticides obliges the sellers to inform non-professional users how to safely use the product by referring to the information on the label and other product information. This is generally accomplished by including such information on the product's label. Biocide products made available on the Swedish market must be labelled in Swedish.⁴⁵

Further requirements for the labelling of antifouling products are included in Appendix 2 of the Swedish Chemicals Agency's Pesticides Regulations (KIFS 2008:3). The requirements correspond to the requirements in Article 69 of the Biocidal Products Regulation. The mandatory labelling includes

- the identity of the active substance(s) and their concentration
- the registration number of the product issued by the Chemical Agency
- the approved area of use for the product
- the product's authorisation class

This information must be included on the label of the product. Other information listed in the appendix may instead be placed elsewhere on the product, or on a separate information sheet. If the information is included on a separate

⁴¹ Miljöbalk (1998:808), chapter 14, section 4.

⁴² See Brottsbalk (1962:700). Chapter 36, sections 7-8.

⁴³ Miljötillsynsförordning (2011:13), chapter 2, section 21.

⁴⁴ Kemikalieinspektionens föreskrifter om antifoulingprodukter KIFS 1988:3, based on Ordinance (1985:836) on pesticides.

⁴⁵ Förordning (2014:425) om bekämpningsmedel, chapter 3, section 9.

information sheet, reference must be made to the sheet on the label. This includes information on e.g. instructions of use and dosage, negative side effects and the disposal of the product and the packaging.

Retailers on the east coast are not prohibited from selling paints approved only for use on the west coast. The responsibility to follow the restriction placed on the product is instead placed on the consumer. Many retailers and manufacturers have chosen to restrict the sale of west coast paints to the west coast anyway, but some have not, offering the paints far away from the west coast due to customer demand.⁴⁶

4.4 Advertising

The 14th Chapter of the Environmental Code contains regulation on the advertisement of biocidal products that constitutes the implementation of Article 22 of the Biocidal Products Directive.⁴⁷ As the Biocidal Products Regulation entered into force on 1 September 2013, containing a corresponding article on the subject matter, the national legislation is overridden. There have been efforts to update the Environmental Code to correspond to the new regulation, removing the section altogether, but any changes have yet to be decided upon.⁴⁸

The currently applicable regulation on marketing is instead found in Article 72 of the Biocidal Products Regulation. The article prescribes that all advertisement for biocidal products must include the text: *Use biocides safely. Always read the label and product information before use.* The word *biocides* may be replaced with reference to the product-type, i.e. *antifouling products*. The advertisement must also not be misleading in respect of risks or efficacy and not include the terms *low-risk biocidal product, non-toxic, harmless, natural, environmentally friendly, animal friendly* or any other term with similar indication. Advertisement is defined in the regulation as *a means of promoting the sale or use of biocidal products by printed, electronic or other media.*⁴⁹ As such, the requirements on advertisement do not apply to the packaging and labelling of the products, unless the packaging itself is also a part of an advert. Instead, Article 69 of the regulation and the CLP regulation, where applicable, are applied.

4.5 Application and Use

Each boat owner is according to the Environmental Code responsible for not using other than approved antifouling products, taking appropriate considerations to protect the environment and human health as well as for waste management. Knowledge about the legal requirements on using antifouling products is particularly important when the boat owner is not member of a boat

⁴⁶ Gunnarsson, Jesper. *Därför säljer Jula förbjudna båtbottnfärger på ostkusten*. 2012. As of October 2014, the retailer still offers paints approved only for the west coast in stores on or near the east coast.

⁴⁷ Miljöbalk (1998:808), chapter 14, section 15.

⁴⁸ Miljödepartementet. *Promemoria – Ändringar i miljöbalken med anledning av nya EU-regler om bekämpningsmedel*. 2013. p. 39.

⁴⁹ BPR, Article 3(1)(y).

club and maybe stores the boat in his private garden. Many boat owners are however member of a boat club. These clubs establishes codes of conduct for the use of the marina, often combined with a specific environmental plan. These documents are in general similarly constructed due to nation-wide collaboration between the boat clubs, with some using more specific provisions than others. The rules often consist of an explicit prohibition for the use of unauthorised antifouling paint, an obligation to collect and manage waste from painting, washing and scraping the boat and reference to guidelines provided by the Environmental Protection Agency, the Chemical Agency or other authorities. Some boat clubs also implement environmental plans containing long-term provisions, such as the aim to eliminate the use of toxic antifouling paints altogether and continuous work towards environmentally friendly standards and practices.

To ensure compliance with the provisions and to fulfil the legal obligation of self-monitoring,⁵⁰ the boat clubs assign an environmental representative. The representative oversees the club's and its members' compliance with the environmental provisions as well as continuously monitors legislative changes and scientific progress to ensure compliance and spreads information to the member on the environmental work. The retribution for a member not following the code of conduct is similarly constructed in most boat clubs in Sweden. First offences result in a warning, while repeated offences may result in expulsion. The decision of expulsion is made in a general meeting of the boat club members, usually requiring a two-thirds majority, and has to be combined with an explanatory statement to the expelled member.

4.5.1 Penalty provisions

The penalty provisions for non-compliance with the Environmental Code, part of the specialised criminal law outside the Swedish Penal Code, are placed in the sixth part of the Code. The 29th Chapter contains the penal provisions imposable on individuals, while the 30th chapter contains the environmental sanction charges targeting the economic operator of a business activity.

Environmental offence is imposed for deliberate or negligent pollution of land, water or air of a substance that typically or in the particular case causes or is likely to cause harm to human health, fauna or flora or any other significant environmental disturbance. The penal provision is not applicable if the harm is considered to be of minor significance.⁵¹ The offence is the central provision of the penalty provisions in the Environmental Code and shall be primarily applied whenever applicable.

Environmentally hazardous handling of chemicals is another possible penal provision that may become applicable if liability cannot be imposed for the environmental offence.⁵² The offence arises out of deliberately or negligently

⁵⁰ See Miljöbalk (1998:808), chapter 26, section 19.

⁵¹ Ibid. chapter 29, section 1.

⁵² Ibid. chapter 29, section 3, paragraph 3 p. 1.

handling a chemical product without taking the proper precautions in use or choice of product based on the intrinsic properties of the product or in violation of prohibitions or regulation issued under chapter 14 or other applicable legislation listed in the section.⁵³ Hence liability may, in theory, arise out of using an environmentally harmful antifouling product when a less harmful product exists and fulfils the purpose, but is unlikely to be deemed applicable if the provisions from the Chemical Agency are followed.⁵⁴ The act must cause or threaten to cause harm for people or in the environment. If liability does not arise out of the provision, *unlawful handling of chemicals* has been introduced for lesser offences for violations of prohibitions and regulations issued under chapter 14.⁵⁵

4.5.2 Supervision

The local municipal committee is responsible for supervision of the application and use of the antifouling paints.⁵⁶ The local authority responsible for environment makes the supervision. Each municipality is autonomously organised and due to the lack of specific national rules or guidelines for marinas and boatyards, except for the substance target values for wastewater from wash down areas, the supervision and assessment may vary considerably domestically. Currently there has been established regional environmental cooperation for twelve different regions in Sweden between different local authorities and these may be used as a forum to harmonise the practice and assessment.⁵⁷

The supervision is almost exclusively targeted towards the boat clubs and marinas, presumably due to the ineffectiveness and uneconomic nature of chasing individuals. This is visible in the thorough lack of case law of the penal provisions in the Environmental Code being applied in relation to antifouling paints.

5. Waste management and other environmental requirements

5.1 Summary

The painting, scraping and washing of boat hulls result in hazardous waste that needs to be taken care of. The waste emerges in both the form of wastewater, from the wash down areas, and solid waste, such as paint rests and scrapings. The Swedish Agency for Marine and Water Management has released guidelines for the wastewater, including target values for common substances emitted from the hull. The solid waste is subject to the general legislation for hazardous waste. Marinas are also required to develop a waste management in cooperation with the municipality and as an environmentally hazardous activity; boatyards and

⁵³ Ibid. chapter 29, section 3, paragraph 2.

⁵⁴ See also Miljöbalk (1998:808), chapter 2, section 4 regarding the principle of choosing a suitable chemical product.

⁵⁵ Miljöbalk (1998:808), chapter 29, section 3 a.

⁵⁶ Miljötillsynsförordning (2011:13), chapter 2, section 31 p. 5.

⁵⁷ See www.miljosamverkan.se/Sv/om-miljosamverkan/Pages/default.aspx.

marinas have to fulfil its operator self-control requirements though not required to acquire a permit or notify authorities of its environmentally hazardous activity.

5.2 Hazardous waste

The paint rests, sludge and other assembled materials from the cleaning must be collected and due to the high concentration of hazardous substances must be treated in accordance with the rules for hazardous waste.⁵⁸ This encompasses, inter alia, the transport and disposal of the waste by an authorised company.⁵⁹ Marinas are also required to develop a waste management plan in cooperation with the municipality.⁶⁰

5.3 Wastewater

During recent years, the availability of alternatives and complements to antifouling paints have steadily increased. In 2011, more than 100 boat wash down areas and ten stationary boat hull cleaning devices using brushes had been established⁶¹ and the number has since continuously increased. The government has since 2009 allowed a grant for local water management projects⁶², including the financing of boat hull cleaning constructions.⁶³ The grant is distributed by the county administrative boards and awarded to projects undertaken by municipalities and/or non-profit associations for up to 50 % of the eligible costs.⁶⁴ In 2014, a total of 385 million SEK has been awarded to different projects nationally.⁶⁵

The use of mechanical boat hull cleaning has not been specifically regulated, but is subject to general provisions provided in the Environmental Code and other generally applicable regulations. In the Environmental Code, the rules of consideration in Chapter 2 must be taken into account, especially the use of

⁵⁸ See Miljöbalk (1998:808), chapter 15 and Avfallsförordning (2011:927) for complete regulation of hazardous waste. Definition of hazardous waste in Avfallsförordning (2011:927) sections 12-13, annex 1.

⁵⁹ See Avfallsförordning (2011:927) sections 36, 46 and 53.

⁶⁰ Sjöfartsverkets föreskrifter om mottagning av avfall från fritidsbåtar (SJÖFS 2001:13). Chapter 4, sections 1, 3, 5 for requirements on the waste management plan; see also Avfallsförordning (2011:927) sections 23-24.

⁶¹ Havs- och vattenmyndigheten. *Båtbottentvättning av fritidsbåtar – översyn av kommunernas varierande regler som rör fritidsbåtshamnar*. Rapport 2012:9. 2012. p. 6, 12.

⁶² Known as LOVA-bidrag.

⁶³ Förordning (2009:381) om statligt stöd till lokala vattenvårdsprojekt, section 2 p. 2.

⁶⁴ Förordning (2009:381) om statligt stöd till lokala vattenvårdsprojekt, sections 1, 4 and 6.

⁶⁵ The distribution of the grant by county administrative board available at: <https://www.havochvatten.se/download/18.732980de143b1b1de5347e9/1392312753343/fordelning-till-lansstyrelserna-2014.pdf> (retrieved 2014-10-01)

caution and best technique available⁶⁶ as well as the choice of a suitable site for the activity or measure taken⁶⁷.

As the mechanical cleaning comprises discharge of wastewater, it is in most cases considered an environmentally hazardous activity in accordance with the Environmental Code. The activity is not subject to the permit requirements for environmentally hazardous activities,⁶⁸ but is subject to the operator's obligation of self-monitoring.⁶⁹

For the use of designated wash down areas, the main issue is the high concentrations of hazardous substances (TBT, Irgarol) and metals (copper, zinc) in the wastewater. Despite the prohibition of TBT in 1989 and Irgarol in 2001, the boat hulls still contain the substances from the previous use and residues of old paint is released from the hulls when washing the boat hull. Paint rests and other particles are separated and the water is filtered, but the wastewater still contains high concentrations of the substances. To address the issue, the Swedish Agency for Marine and Water Management released guidelines in 2012, updated in May 2015, to provide support for the supervisory authorities. The document provided target values for the hazardous substances and metals in the wastewater of a wash down area, based not on what is biologically acceptable, but what is obtainable using the best available technique.⁷⁰ The required testing frequency of the wastewater should be determined by local conditions (i.e. more frequently on the west coast) and by the frequency of which the facility is used.⁷¹ Stationary boat hull cleaning devices using brushes are currently not recommended for use on boats with antifouling paint applied due to the high risk for leakage of contaminated water.⁷² As such, the placement of the devices is concentrated to the east coast where boats not using antifouling paints are far more common.

Target values per substance ¹	
TBT	200 ng/l
Copper	0,8 mg/l
Copper, filtered	0,4 mg/l
Irgarol	0,8 µg/l
Zinc	2,0 mg/l
Zinc, filtered	1,0 mg/l

The guideline also prescribes continuous documentation from the operator of the care and maintenance, to be reported to the supervisory authority, i.e. the municipality, upon request. To ensure the use of the best available technique, the guideline also provides a timetable for the upgrade of existing or new constructions consisting of a three-chamber septic tank and additional filtering measures, termed as *step 2*, to be installed by 2015 at latest for all boat wash areas performing 30 or more washes per year.⁷³

⁶⁶ Miljöbalk (1998:808), chapter 2, section 3.

⁶⁷ Ibid. chapter 2, section 6.

⁶⁸ See Miljöbalk (1998:808), chapter 9, section 6.

⁶⁹ Miljöbalk (1998:808), chapter 26, section 19.

⁷⁰ Havs- och vattenmyndigheten. *Båtbottentvättning av fritidsbåtar – riktlinjer, reviderad upplaga 2015*. Rapport 2012:10. 2015. p. 9.

⁷¹ Ibid.

⁷² Ibid. p. 10.

⁷³ Ibid. p. 7.

5.4 Other permit requirements

Boatyard maintenance is considered an *environmentally hazardous activity* in accordance with the 9th chapter of the Environmental Code. This means that there are certain requirements and responsibilities imposed on the activity. All activities falling into the definition *environmentally hazardous* are divided into four groups⁷⁴:

- A. Requiring a permit from the Land and Environment Court
- B. Requiring a permit from the County Administrative Board
- C. Requiring notification
- D. All other activities

The permit requirement enforces an examination of an activity's environmental impact and enables authorities to exercise control of the structuring of the activity, while the notification requirement helps to keep the supervisory authority informed and facilitates the supervision. However, boatyard maintenance is not listed as an activity required to neither have a permit or to notify.⁷⁵ This has been questioned and calls for the establishment of a notification requirement have been made during recent years.⁷⁶ Regardless of to which group the activity falls into, the requirement to follow the general rules of consideration remains the same.

The environmentally hazardous activities are subject to an operator's self-control measures comprising of the continuous planning and monitoring of the activity.⁷⁷ The operator must continuously ensure the compliance of the Environmental Code and strive for the most environmentally sound practice possible. Failure to comply with the Environmental Code or rules, judgments and/or decisions thereof may lead to issuance of injunctions and prohibitions from a supervisory authority.⁷⁸

Due to a lack of specific regulation and guidelines of boatyards the assessment of the environmental hazardous activity is instead based on the general rules of consideration in Chapter 2 of the Environmental Code. These rules include acquiring adequate knowledge to pursue the activity (section 2), taking the proper precautions and using best available technique (3), using the least harmful chemical products possible (4), economic conservative use of raw materials and energy (5) and choosing a suitable location for the activity (6). It is the operator's responsibility to prove the activity's compliance.⁷⁹ The five rules of consideration are applicable where compliance cannot be deemed

⁷⁴ See Miljöbalk (1998:808), chapter 9, Section 6, and Miljöprövningsföreläggning (2013:251), chapter 1, sections 3 and 10

⁷⁵ See Miljöprövningsföreläggning (2013:251), chapters 2-32 (list of activities required to notify or have a permit)

⁷⁶ See Eklund, Britta. *Båtuppläggningsplatser starkt förorenade av giftiga ämnen*. 2012.

⁷⁷ Miljöbalk (1998:808), chapter 26, section 19.

⁷⁸ Ibid. chapter 26, section 9.

⁷⁹ Ibid. chapter 2, section 1.

unreasonable.⁸⁰ The reasonableness is based on a cost-benefit analysis where the benefit of the protective measures and other precautions are compared to the costs of the same and the operator's capability to bear the cost.

6. Contaminated land and sediments

6.1 Summary

Due to the use of toxic antifouling paints, boat yards and marinas are highly contaminated by several hazardous substances. The legal liability for the contamination is first and foremost placed on the operator, which in most cases is considered to be the boat club. The legal liability is, however, seldom transformed into a liability in practice for the boat clubs. Instead, the government or a subsequent exploiter of the land usually carries out the remediation.

Dredging is often central in remediation of sediments, but the prohibition of dumping in Swedish waters may be a hindrance. The prohibition is subject to exemption in cases where land disposal is not a viable option for the operator. Even if dumping is the most viable option, the dredged material must still be within acceptable level of contamination. However, what the acceptable levels of copper and TBT are, unlike in our neighbouring countries, is not pre-determined and may vary from case to case, causing an uncertainty in regards to applicable law.

6.2 Introduction

The hazardous substances of antifouling paints not only contaminate the water. The use and application on land and the continuous leaching of toxic substances in the marinas lead to contaminated land and sediments also in the surrounding areas. A recent study has shown that the leisure boatyards in Sweden are highly contaminated by several metals and hazardous substances related to antifouling paints, including copper, zinc, TBT and other organotin compounds. Also, levels of the toxic compounds polyaromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) substantially exceeding the environmental qualitative guidelines were measured, connected to other sources, such as oils and exhausts from fuel combustion.⁸¹ Remediating contaminated areas is part of the environmental quality objective of *a non-toxic environment*, an effort aiming to reduce the non-naturally occurring substances close to zero for future generations.

The following sections concerns who is liable for the contaminated land and sediments and also the legal obstacles of dumping dredged materials.

⁸⁰ Ibid. chapter 2, section 7.

⁸¹ See Langlet, David, Eklund, David, Eklund, Britta. *Ansvar för förorenad mark på båtuppläggningsplatser med fokus på ideella föreningar*. ITM-rapport 222. 2014 pp. 2, 4-13.

6.3 Responsibility for remediation of contaminated land and sediments

The legal responsibility for the remedy of contaminated land and sediments is placed on the persons who pursued the activity or measure that has caused damage or detriment to the environment, referred to as *the operator*. The operator is responsible for the restoration to the extent prescribed in Chapter 10 of the Environmental Code.⁸² This follows by the *polluter pays* principle, a general principle in environmental law. The term *operator* has not been further defined in the Environmental Code, but has in case law been determined to be dependent upon on who has the factual and legal position to prevent the contamination.⁸³ In terms of antifouling paints, several different actors may become responsible for the restoration.

The boatyards are under most circumstances operated by leisure boat clubs, owned and operated by the boat owners themselves as non-profit associations. A strong support for such clubs being considered as operators is evident from case law.⁸⁴ A non-profit association is a legal person and no personal responsibility for the individual members arise from claims on the association. Hence the extent of the possible remedy is limited to the association's assets. Responsibility may, however, arise based on a member's own measures, limited to the extent of the contamination attributed to the individual member if significant in comparison to the contamination as a whole.⁸⁵ If no liable operator is found or if the operator is unable to perform or fund the restoration, the property owner has subsidiary liability.⁸⁶ The boat clubs themselves seldom owns the property used for boatyards and marinas. Instead, the municipality often owns the property.⁸⁷

Remedial action is to be carried out or paid for by the liable person to the extent reasonable. The reasonability is determined by using a two-tiered assessment. First an objective assessment of the extent of the damages and the appropriate remedial actions is made.⁸⁸ Secondly, a subjective assessment of the reasonable extent where account shall be taken of *the length of time that has elapsed since the pollution occurred, whether the person liable was obliged to prevent future damage and any other relevant circumstance*.⁸⁹

⁸² Miljöbalk (1998:808), chapter 2 section 8.

⁸³ See MÖD 2005:64 (Stockholms tingsrätt, miljödomstolen, 2005-03-18, M 502-03).

⁸⁴ Langlet, David, Eklund, David, Eklund, Britta. *Ansvar för förorenad mark på båtuppläggningsplatser med fokus på ideella föreningar*. ITM-rapport 222. 2014. p. 5.

⁸⁵ Miljöbalk (1998:808), chapter 10, section 6.

⁸⁶ Ibid. chapter 10, section 3.

⁸⁷ See Exploateringskontoret Idrottsförvaltningen. *Stadens policy för Stockholms fritidsbåtliv*. 2013. p. 11.

⁸⁸ Miljöbalk (1998:808), chapter 10, section 4, first paragraph. See also chapter 2, sections 3 and 7.

⁸⁹ Ibid. chapter 10, section 4, second paragraph. Quotation taken from the English translation of the original Swedish Environmental Code, issued by the government, available at:

For some contaminated sites, no liable person, or only a partly liable person, exists in accordance with Chapter 10. To allow for restoration of such sites, the government has issued an after-treatment programme where grants are issued for after-treatment of contaminated sites. The grants are distributed by the Environmental Protection Agency, after application from the county administrative boards, according to a priority order established in the national plan for distribution of the grants.⁹⁰ Approximately 1,300 sites have been assessed as risk class I (very high risk) and another 14,000 areas have been determined as risk class II (high risk).⁹¹ Most leisure boatyards that have been assessed have fallen within risk class II.⁹² In 2014, in total 375 million SEK was issued in grants to different after-treatment measures.⁹³ The remediation of contaminated land and sediments is also proposed as a measure in the MSFD programme of measures to be finalised in 2015.⁹⁴

In practice, restoration is also commonly made in connection to the exploitation of the property, e.g. for housing projects, and paid wholly or partly by the exploiter.⁹⁵ The close-coastal properties are valuable for housing projects and the restoration of the land and sediments may be included in the agreement between the contractor and the municipality.

6.4 Dumping of contaminated sediments

Dredging is a common method used to remediate contaminated sediments. During dredging, bottom sediments are gathered and disposed of at a different location. Due to the toxicity of the sediments, the disposal is considered environmentally hazardous and is regulated in the Swedish Environmental Code.

Dumping, including contaminated sediments, within Swedish marine territory or exclusive economic zone or by any Swedish vessel at sea is prohibited in accordance with the Swedish Environmental Code.⁹⁶ The material is instead to be disposed on land, subject to recycling or reused for other purposes. The

<http://www.government.se/content/1/c6/02/28/47/385ef12a.pdf>

⁹⁰ See Naturvårdsverket. *Nationell plan för fördelning av statliga bidrag för efterbehandling*. Rapport 6617. 2014.

⁹¹ Naturvårdsverket. *Nationell plan för fördelning av statliga bidrag för efterbehandling*. Rapport 6617. 2014. p. 6.

⁹² Langlet, David, Eklund, David, Eklund, Britta. *Ansvar för förorenad mark på båtuppläggningsplatser med fokus på ideella föreningar*. ITM-rapport 222. 2014. p. 14.

⁹³ Naturvårdsverket. *Beslut om bidrag till åtgärder*. 2014.

⁹⁴ Havs- och Vattenmyndigheten. *God havsmiljö 2020 - Marin strategi för Nordsjön och Östersjön - Del 4: Åtgärdsprogram för havsmiljön*. Rapport 2015:30. p. 174.

⁹⁵ Eklund, Britta, Eklund David. *Förorening av båtuppläggningsplatser - en sammanställning av utförda undersökningar i svenska kustkommuner*. ITM-rapport 208. 2011.

⁹⁶ Miljöbalk (1998:808), chapter 15, section 31.

prohibition however is not absolute and may be subject to exemption.⁹⁷
Exemption is granted if

- no good alternative for land disposal or recycling is available,
- the costs for those alternatives are unreasonably high, or
- land disposal could harm human health.

The County Administrative Board where the dumping is to be made is responsible for handling exemption matters.⁹⁸ If the dumping is made in the Exclusive Economic Zone of Sweden or in several locations in different counties, the Agency for Marine and Water Management is instead responsible.

Due to the difficulty of transporting contaminated sediments, dumping is usually the preferred method of disposal. To determine whether the contamination levels of the sediments are acceptable, the Environmental Protection Agency has created a classification table for organic pollutants that is used as target values.⁹⁹ However, TBT is not included as a pollutant in the table. In general, limit values used in the neighbouring countries of Finland and Norway has been used as reference when determining the conditions for dumping. In most instances the limit value has been set at 200 µg/kg dry matter content.¹⁰⁰ However, in May 2015 the Land and Environment Court of Appeal determined that a standard practice for limit values had not been established; hence each case was to be determined by the individual circumstances. Due to the current TBT values in the area and the general decrease of TBT content measured in sediments, the court set the limit value at 50 µg/kg dry matter content.¹⁰¹ National limit values for TBT in sediments are to be established during 2015.¹⁰²

Copper is also not included in the classification table from the Environmental Protection Agency. The limit value for amount of copper in the dredged material

Deviation classification - copper (mg/kg) ¹⁰³					
	Class 1	Class 2	Class 3	Class 4	Class 5
Sweden	≤ 1,0	1,0-2,0	2,0-3,3	3,3-5,3	> 5,3
West	≤ 1,0	1,0-2,0	2,0-4,0	4,0-8,0	> 8,0

must as such be set individually for each exemption and several different reference values have been used to determine the limit. In the same report from the Environmental Protection Agency, a table of comparative values has been made listing pre-industrial contents of certain metals in surface sediments (0-2

⁹⁷ Ibid. chapter 15, section 33.

⁹⁸ Avfallsförordning (2011:927), section 63.

⁹⁹ Naturvårdsverket. *Bedömningsgrunder för miljö kvalitet - kust och hav*. Rapport 4914. 1999. p. 61.

¹⁰⁰ See MÖD 2007:12 (M92-05, Miljööverdomstolen, 2007-02-22) & MÖD 2010:30 (M1866-09, Miljööverdomstolen, 2010-06-02).

¹⁰¹ M 1260-14, Svea Hovrätt, Mark- och miljööverdomstolen, 2015-05-05.

¹⁰² Havs- och vattenmyndigheten. *God havsmiljö 2020 - Marin strategi för Nordsjön och Östersjön - Del 4: Åtgärdsprogram för havsmiljön*. Rapport 2015:30. p. 68.

¹⁰³ Naturvårdsverket. *Bedömningsgrunder för miljö kvalitet - kust och hav*. Rapport 4914. 1999. p. 65.

cm) and the copper content value was set to 15 mg/kg dry matter content. Only one comparative value was set for all of Sweden. This value was then used as the base to determine deviation from the pre-industrial standard (see table). The deviation classification was divided to two different areas, a general value for Sweden and a value for the West Coast (North Sea) and the south west of the Baltic Sea. Copper content falling within class 4 (18,3-20,3 mg/kg for the Baltic Sea) is considered to have a large deviation from the standard.

In one instance, the Land and Environment Court referred to environmental quality standards from the Finnish Ministry of Environment, based on recommendations and instructions from HELCOM.¹⁰⁴ The standards consider copper content above 90 mg/kg dry matter content as contaminated and under 50 mg/kg as clean.¹⁰⁵ There is an uncertainty in regards to the allowable levels of copper, largely attributable to the levels of TBT, and not copper, in most instances being the substance of concern. No apparent limit values have been established by either national agencies or by the courts. Furthermore, consideration in regards to both TBT and copper must be taken to the environmental quality standards established by the WFD and the MSFD.

The location must also be suitable for the dumping. It must be determined if the location is the best possible location for the dumping and the specific environmental effects the dumping may have on the area. The seabed should preferably accumulate the dumped material to avoid spreading.¹⁰⁶ This is usually achieved by choosing a location with enough depth and low ambient water velocity. In a case from 2011, the Land and Environment Court of Appeal found Pukaviksbukten, a Natura 2000 area on the Swedish east coast, unsuitable for dumping due to the harmful effects on the sensible environment.¹⁰⁷ Dumping is also restricted to certain periods of time. For most areas dumping is prohibited during the period between March/April and September/October due to the increased level of recreational activities and fish reproduction. These periods are subject to local variations.¹⁰⁸

7. Conclusions and the way forward

Sweden has come a long way on the path towards biocide-free hulls on leisure boats in the Baltic Sea. The authorised biocidal paints have a low copper concentration and viable alternatives are becoming more widespread and commonly used. The issue of hazardous antifouling methods has also been surfaced in information campaigns and public debates, creating public awareness and incentives to make change. Sweden is also in a phase of change

¹⁰⁴ See M 30042-04, Stockholms tingsrätt, miljödomstolen, 2004-12-06. The case was later appealed, see MÖD 2007:12.

¹⁰⁵ Ympäristöministeriö. *Sedimenttien ruoppaus- ja läjitysohje*. 2004. p. 81.

¹⁰⁶ Naturvårdsverket. *Muddring och hantering av muddermassor – Vägledning om tillämpningen av 11 och 15 kapitlet miljöbalken*. 2010. p. 24.

¹⁰⁷ MÖD 2011:50 (M3488-10, Mark- och miljööverdomstolen, 2011-02-22).

¹⁰⁸ Naturvårdsverket. *Muddring och hantering av muddermassor – Vägledning om tillämpningen av 11 och 15 kapitlet miljöbalken*. 2010. p. 28.

with new regulation on biocidal products and on-going implementation of environmental quality directives, including the review of programme of measures and river basin management plans. The results of these efforts are yet not fully known. Nevertheless, it is still possible to recommend further steps to take to continue the path towards non-toxic antifouling.

A lack of a harmony afflicts the management of the effects of antifouling. Uncertainty exists in several different areas and local deviations, between different regions and different municipalities, in practical administration are common with local conditions giving few or no reasons for these variations. This becomes apparent in e.g. the significant variations in level and execution of supervision of boating activities between municipalities. The deviations are based on factors such as different knowledge bases, procedures and resources. Several authorities carry different responsibilities connected to the issue, but at times the division is unclear and causes confusion not only for the authorities themselves but also the boat clubs and the boat owners. The national guidelines that have been presented, in regards to the washing of boat hulls, have not taken into consideration the difference in the environmental conditions between the west coast and the east coast.

Due to accumulation in sediments and continuous release from ship and boat hulls, high levels of TBT in the marine environment continues to be problem despite the prohibition of TBT in antifouling paints many years. Going forward, the continuous implementation of the WFD and the MSFD may provide further measures. However, antifouling paint is only recognised as a pressure in regards to TBT. This leads to measures concerning management of hazardous waste and remediation of contaminated land and sediments, but it has limited effects on the use of copper-based paints. The limited impact of copper on the status classification in both WFD and MSFD may have an adverse effect on the continuous work toward biocide-free hulls in the Baltic Sea.

Based on this study following measures have been identified as important to take in order to achieve biocide-free hulls on leisure boats in the Baltic:

1. Increased central management from the Agency for Marine and Water Management. The agency is responsible for the marine and water management and as such must step up to ensure that the regional and local authorities act in a harmonised manner. The local deviations must stem from environmental differences, not differences in knowledge, information or interpretation. Such gaps may be overcome by the issuance of clearer and more comprehensive guidelines, increased information and educative measures.
2. The achievement of the objective of biocide-free hulls in the Baltic Sea is dependent upon the availability of alternatives and incentives for boat owners to use these. Firstly, the alternatives must be examined to determine the best available technique, as there are currently several different in use. Secondly, economic funds are crucial in making alternatives available. Private investments are most likely not enough to ensure that alternative techniques are readily available for each boat

- owner. Further, information of alternative methods must continually be communicated to potential users to ensure continued transition from biocidal paints to mechanical methods.
3. The recognition of copper as an indicator of environmental status and antifouling paints as a pressure in the RBMPs and marine strategies will put more focus on the copper content in paints. Even though the total contamination of copper in the entire Baltic Sea as a result of copper-based antifouling paints is low, areas in close connection to harbours and/or marinas are prone to high contamination levels of copper and the effects on the environment are clear. The recognition of the hazards of copper and antifouling as a pressure in the implementation of the directives creates an incentive to further promote the alternative, biocide-free alternatives in the Baltic Sea and lessen the use of copper-based paints.
 4. The levels of TBT in land and sediments cause a need of further remediation measures in order to reach environmentally acceptable levels. Remediation of sediments is however very costly and difficult for boat clubs and smaller boatyards to afford. Demanding remediation efforts are therefore not currently a priority. Instead the economic burden of remediation falls back on the public entities and finally on the government rather than the polluter. The establishment of limit values for TBT in sediments would be a first step towards acceptable levels.

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Appendix I – Analysis from the actors’ perspective

Actor	Responsibility	Based on legislation
Importers and retailers	<ul style="list-style-type: none"> - Cannot place biocidal products on the market unless the products are authorised by the Chemical Agency - Meet the obligations on Classification, Labelling and Packaging 	The Environmental Code (Chapter 14), REACH, The Biocidal Products Regulation, The CLP Regulation
Boat owner	Adhere to the conditions of the biocidal product (including location, boat type etc.) and to the instructions of use	The Environmental Code (Chapters 14 and 29)
	Adhere to the code of conduct of the boat club and/or marina	
Marinas, boat clubs	Shall compile a waste management plan in association with the municipality	The Environmental Code (Chapter 15) and Ordinance (2011:927) on Waste Management
	Develop a code of conduct for the application and use of biocidal paints as well as the cleaning of the boat hull	
The Agency for Marine and Water Management	<ul style="list-style-type: none"> - Responsible for the marine and water administration - Develop national guidelines in relation to marine and water environment 	
	Approve exemptions for trans-regional dumping and dumping in Sweden’s EEZ	The Environmental Code (Chapter 15), Ordinance (2011:927) on Waste Management
	Implement the MSFD	Ordinance (2010:1341) on Marine Environment
The Chemical Agency	Authorises biocidal antifouling products and exercises supervision of importers, producers and retail sellers of such products	The Environmental Code (Chapter 14), REACH and the Biocidal Products Regulation
The Environmental Protection Agency	Responsible for coordinating, monitoring and evaluating the environmental efforts	

	Examine the current levels of TBT in harbours and the other marine environment and also examine the source of the pollution	The proposed Marine Strategy Framework Directive programme of measures
The County Administrative Boards	Act as or assist the regional water authority	The Environmental Code (Chapter 5), Ordinance (2004:660) on Water Quality Management
	Approve exemptions for dumping within the region	The Environmental Code (Chapter 15), Ordinance (2011:927) on Waste Management
Municipalities	- Supervision of environmentally hazardous activities	The Environmental Code (Chapter 26-28)