AMSA Chapter 7 ~ Current Infrastructure in the Baltic Sea Area

A. Introduction

The Baltic Sea area encompasses a number of regional sea areas such as the Gulf of Bothnia, the Quark, the Bothnian Sea, the Gulf of Finland, the Gulf of Riga, the Baltic Proper, the Kattegat, Belt Sea and Sound.

The Baltic Sea is a globally unique and sensitive northern brackish-water ecosystem. It is geologically young, semi-enclosed and shallow. The exchange of water with the North Sea is, due to geomorphological and

climatological reasons, limited and slow, resulting in long residence time of water as well as low and varying levels of salinity. The climate ranges from sub-arctic to temperate and large parts of the Baltic Sea can annually be ice-covered. All these factors have resulted in a marine environment with low biodiversity. Despite the low number of marine species, the Baltic Sea hosts a unique mix of marine, freshwater and few true brackish water species specially adapted to brackish conditions. The Baltic marine and coastal areas consist of globally important breeding grounds, nurseries, shelters and food sources for coastal birds and waterfowl. The diversity of coastal biotopes is high and is characterized by many threatened aquatic and terrestrial species. The disappearance of single-key species could seriously impede the functioning of the whole system. Hence, the Baltic marine ecosystem is considered as particularly vulnerable to man-made disturbances.

Ice conditions in the Baltic Sea area

The Baltic Sea being a comparatively cold sea, has a mean temperature of 5 degrees C. Large parts are normally ice-covered during the winter, and the ice conditions are strongly related to the severity of the winters. In the northern parts the average duration of the ice coverage is four to six months, whereas in the southern part the ice coverage may be less than a month. The actual ice conditions in the Baltic Sea vary rather substantially, see Appendix 1. The Bothnian Bay and the eastern Gulf of Finland freeze every year. Ice starts forming in the bayheads of the Bothnian Bay and the Gulf of Finland during November. Once a decade there might be a winter where only a small area in the Southern Baltic remains ice-free. At its widest, the annual ice cover ranges from 52 000 km^2 to 420 000 km^2, which is equivalent to 12-100 % of the surface area of the Baltic Sea, The Kattegat and Skagerrak. On average, a 218 000 km^2 area is covered by ice. The annual ice cover is at its most extensive between January and March, usually in late February, early March. The break-up of the ice starts in the south and progresses to the north. The northern Baltic Sea first opens at the beginning of April. By the beginning of May, ice exists only in the Bothnian Bay, where the last ice melts during the first half of June at the latest.

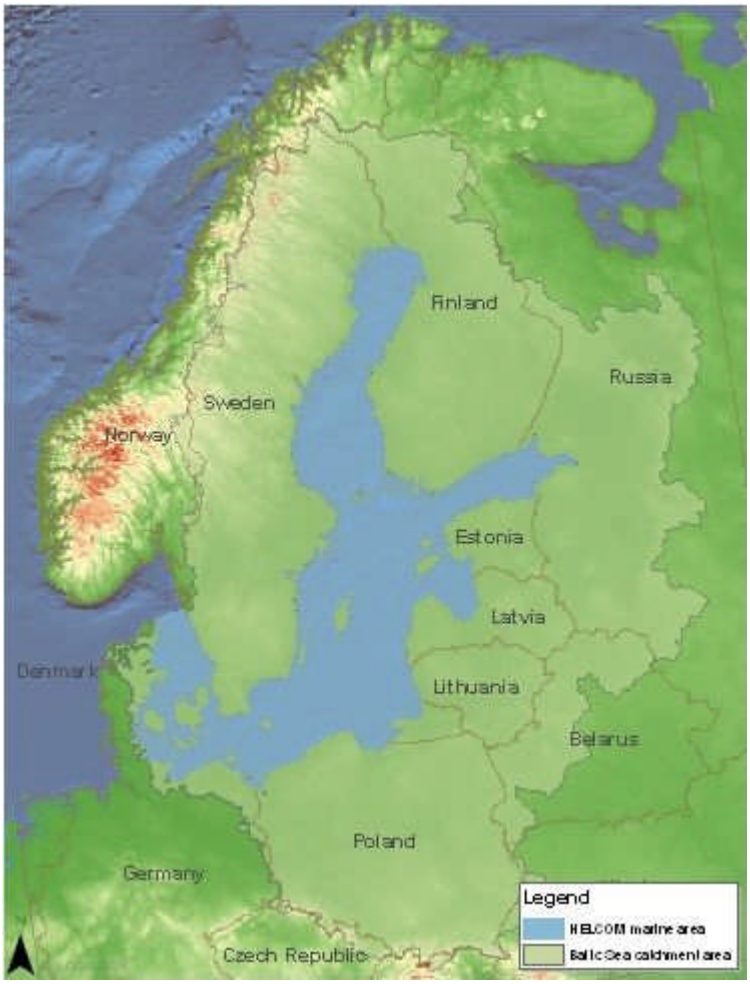
The ice in the Baltic Sea occurs as fast ice and drift ice. As its name implies, fast ice is stationary attached to islands, rocks or shoals. It is found in coastal and archipelago areas where the water depth is less than 15 metres. Fast ice forms early in the season and remains stationary until it melts. Sea ice in the open sea occurs as drift ice propelled by the force of the winds and currents. Drift ice can be level, rafted or ridged with a 0-100 % coverage. Drift ice can be very dynamic. On a stormy day, a field of thin drift ice can easily move 20 - 30 km. The motion results in an uneven and broken ice field with distinct floes up to several kilometres in diameter, leads and cracks, slush and jammed brash barriers, rafted ice and ridges. The ridges and jammed brash barriers are the most significant obstructions to navigation in the Baltic Sea. Powerful, ice strengthened vessels can break through level ice up to 80 cm thick, but they are not capable of navigating through ridges and thick brash ice barriers without icebreaker assistance. The intense pressure of the ice field can be

hazardous to vessels and, at minimum, can delay merchant vessels for days at a time.

B. Intergovernmental co-operation of the Baltic Sea States

The Helsinki Commission, or HELCOM, works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental co-operation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.

HELCOM is the governing body of the "Convention on the Protection of the Marine Environment of the Baltic Sea Area" - more usually known as the Helsinki Convention. The Convention covers the whole of the Baltic Sea area, including inland waters as well as the water of the sea itself and the sea-bed. Measures are also taken in the whole catchment area (see the figure below) of the Baltic Sea to reduce land-based pollution.



HELCOM's vision for the future is a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities.

In pursuing this objective and vision the riparian countries have jointly pooled their efforts in HELCOM, which is works as:

an **environmental policy maker** for the Baltic Sea area by developing common environmental objectives and actions;

an **environmental focal point** providing information about (i) the state of/trends in the marine environment; (ii) the efficiency of measures to protect it and (iii) common initiatives and positions which can form the basis for decision-making in other international fora;

a **body** for developing, according to the specific needs of the Baltic Sea, Recommendations of its own and Recommendations supplementary to measures imposed by other international organisations;

a **supervisory body** dedicated to ensuring that HELCOM environmental standards are fully implemented by all parties throughout the Baltic Sea and its catchment area; and

a **co-ordinating body**, ascertaining multilateral response in case of major maritime incidents.

For three decades HELCOM has been working to protect the marine environment of the Baltic Sea. This work has been driven by the specific environmental, economic and social situation in the Baltic region and the specific sensitivity of the Baltic Sea.

Protective measures

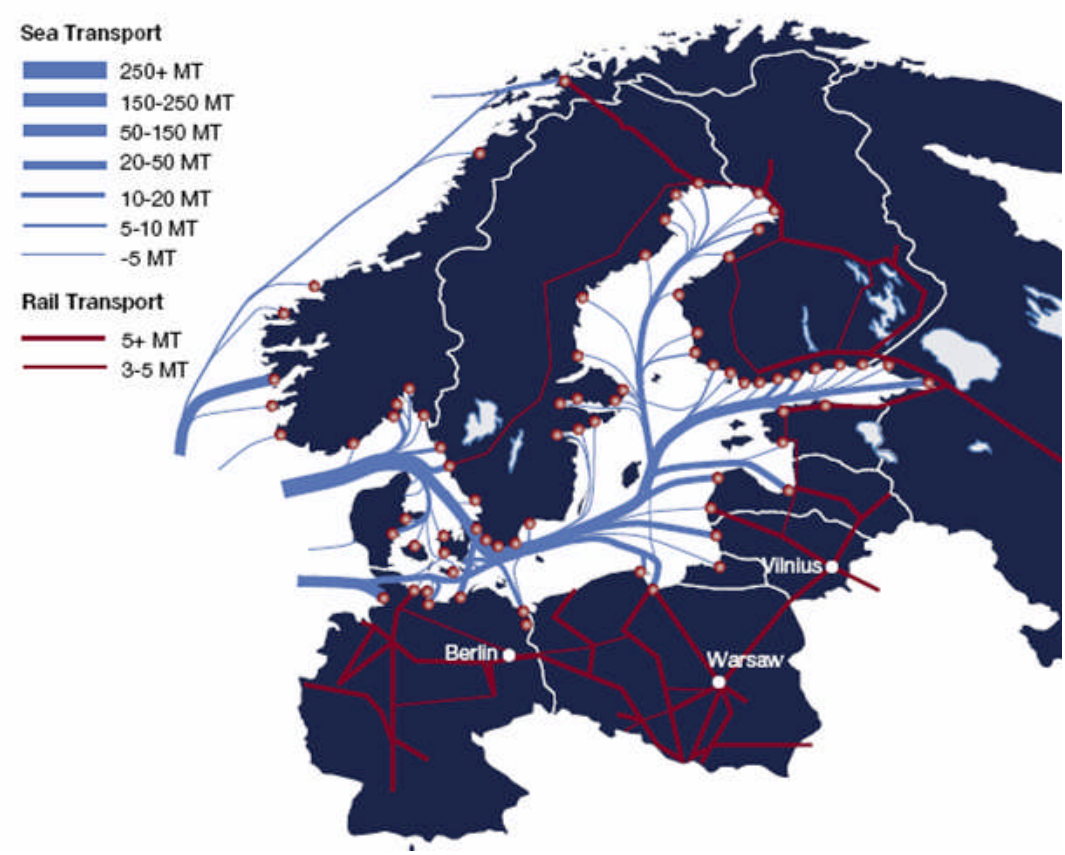
The Baltic Sea area is a sensitive marine ecosystem which needs comprehensive nature conservation and protection measures. Since long the Baltic Sea states within the framework of HELCOM have designated 62 areas as Baltic Sea Protected Areas (BSPAs) on the basis of their significance for marine nature conservation and protection of habitat and species. It is still under consideration to designate another 24 offshore areas as BSPAs. In order to harmonise the approaches and implementation process for marine protected areas (MPAs) in the Northeast Atlantic and the Baltic Sea, HELCOM and the OSPAR Commission have developed a detailed work programme on marine protective areas closely linked to the European Union (EU) network for the protection of European fauna and flora, the so-called NATURA 2000 network.

The Baltic Sea States are dependent upon safe, secure and sustainable sea transports. The maritime traffic in the Baltic Sea area is dense and has increased notably since the beginning of the 1990ies. The annual turnover for

oil and oil products in the Baltic Sea is calculated to be approximately 160 million tonnes. On top of that, 500 million tonnes of other goods is annually transported by ships within the Baltic Sea area. Therefore an extensive regime of protective measures consisting of both international and national regulations is in place inside and adjacent to this semi-enclosed sea; examples of relevant measures are compulsory reporting and traffic surveillance, routing systems, compulsory pilotage and the designation of the area as a Special area under Annexes I, II and V and as a SOx Emission Control Area under Annex VI of MARPOL 73/78 Convention.

C. Navigation Systems and Ship Operations

The Baltic Sea has some of the densest maritime traffic in the world. Depending on the season, about 1900 to 2400 ships are en route in the Baltic on an average day, not including ferries, smaller fishing boats or leisure craft. Among those ships, around 200 are oil tankers with a cargo up to 150 000 tons. The main sea routes in the Baltic Sea area are shown in the figure below.



Several ferry lines connect the states in the Baltic proper. Some of the worlds biggest ferries are transporting goods and people between Sweden and Finland and there are several other ferry lines i.e. between Sweden and Germany, Denmark and Germany and between Denmark and Sweden. Most of the year intensive fishing for herring, cod and salmon takes place, sometimes in close vicinity to the major shipping lanes. Incidents are not rare considering that up to 2000 fishing boats could be at sea on an average day. In summertime large numbers of cruising ships from all over the world enter the Baltic Sea area to visit the many coastal cities of cultural interest, such as Helsinki, St. Petersburg, Tallinn, Riga, Gdansk, Rostock, Lübeck, Copenhagen, Visby and Stockholm. Also numerous leisure craft are sailing between the more than 500 ports or between different archipelago areas in the Baltic Sea. Oil and gas activities are for the time being few but are expected to grow in the southern Baltic Sea area.

Compulsory reporting and traffic surveillance

When ships enter the Baltic Sea they have to go through the Kattegat and the Great Belt or the Sound. There is an intense traffic in the northern part of the area, where an extensive part of the traffic goes to and from Denmark as well as to and from the Baltic Sea. Large vessels follow the traffic lane “Route T”.

It is recommended that all ships of 20,000 tons gross tonnage and above navigating Route T should participate in the radio reporting service SHIPPOS together with all ships with a draught of 11 metres and more, loaded oil-, gas- and chemical tankers of 1.600 tons gross tonnage and above and all ships carrying radioactive cargoes. The system provides beneficial information to ships about other ship movements in the area. IMO has adopted a mandatory ship reporting system in the Great Belt Traffic Area. Ships with a gross tonnage equal to or exceeding 50 gross tonnes and all ships with an air draught of 15 metres or more are required to submit a ship report to the VTS Centre. Mandatory ship reporting systems have also been established nationally by the Baltic Sea States in approaches to oil terminals and other ports. Article 4 of the EU directive 2002/59/EC of 27 June 2002 establishing a Community vessel traffic monitoring and information system states that the operator, agent or master of a ship bound to a port of a Member State shall report information to the port authority at least 24 hours in advance or in certain cases earlier. The information is: ship identification, port of destination, estimated time of arrival etc.

A mandatory ship reporting system in the Gulf of Finland (GOFREP) was introduced in 2004. The system was established and is operated in cooperation by Finland, Estonia and Russia. System collects ship reports, provides vessel traffic with information related to navigational safety, monitors and reports contraventions on the International Regulations for Avoiding Collisions at Sea (COLREGS) and notifies vessel traffic of the developing dangerous traffic situations. This reporting system allows partially automatic reporting with AIS.

IMO resolution MSC.138(76) recommends masters to use new and improved navigation equipment including Electronic Chart Display and Information System (ECDIS) onboard ships navigating Route T with a draught of 11 metres or more and ships carrying a shipment of irradiated nuclear fuel, plutonium and high level radioactive wastes (INF cargoes) irrespective of size; oil tankers navigating the Sound with a draught of 7 metres or more; chemical tankers; gas carriers and ships carrying a shipment of irradiated nuclear fuel, plutonium and high level radioactive wastes (INF cargoes) irrespective of size. ECDIS supports plotting and automatically monitoring ships positions throughout their voyage. The risk of collisions and groundings will be reduced by superimposing AIS and radar information on the electronic chart display.

Routeing systems

A transit route (Route T) through the Kattegat, the Great Belt and the Western Baltic has been established for big draught ships. Routeing systems have been established for ships navigating the Sound. A Deep Water route (DW) from Bornholm, south of the Hoburgen bank and up to the boarder with the Estonian Economic zone fulfilling the IHO S44 standard for hydrographic surveying has been established. With a clearance of 10 nautical miles to the banks, this will allow a ship with for example an engine failure, ample time for speed reduction to be able to drop anchor.

Seventeen traffic separation schemes are established and adopted by IMO in eight parts of the Baltic Sea Area. Two schemes are established in Samsø Belt/Great Belt, two in the Sound, one off Kiel lighthouse, one south of Gedser, one in north of Rügen, one in Bornholmsgat, one south of Öland Island, one south of Gotland Island, two in the entrance to the Gulf of Finland and five in the Gulf of Finland.

Two new traffic separation schemes and adjacent DW routes to the Åland Sea have been submitted in 2008 for IMO approval by Finland and Sweden. New TSSs and DW routes are proposed to be implemented on the 1.1.2010.

Pilotage

Pilotage services are established locally by the port States and are normally compulsory for ships over certain sizes.

Due to the Copenhagen treaty ships sailing to or from the North Sea to the Baltic Sea are not required to use pilots. IMO resolution MSC.138(76), however, recommends that when navigating the entrances to the Baltic Sea, local pilotage services should be used by every ship with a draught of 11 metres or more, loaded oil tankers with a draught of 7 metres or more in the Sound, loaded chemical tankers and gas carriers irrespective of size; and ships carrying a shipment of irradiated nuclear fuel, plutonium and high level radioactive wastes (INF cargoes) irrespective of size. Certified pilots for the entrances to the Baltic Sea are available in Denmark and, for ships passing through the Sound, in Sweden. Certified Baltic Sea deep-sea pilots are available in all Baltic Sea States.

Pilotage is also available for ship navigation in ice conditions. For example Ice Advisors Ltd, see http://www.iceadvisors.fi, assist shipmasters on vessels navigating the icy conditions of the Baltic Sea with the aim of ensuring the safest and most efficient route to the port of destination and back out to the open seas.

Winter Navigation

All nine Baltic Sea States (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden) have agreed on HELCOM Recommendation 25/7, "Safety of Winter Navigation in the Baltic Sea Area", see www.helcom.fi . The HELCOM Recommendation contains Guidelines for the safety of winter navigation in the Baltic Sea area. These guidelines are intended to give instructions for the Contracting Parties to the Helsinki Convention for establishing adequate ice surveillance systems, establishing equivalence of ice classification rules, establishing safety requirements for ships sailing in ice conditions, and to give guidelines for operational matters related to winter navigation in the Baltic Sea area.

Equivalence of ice classification rules
The equivalence of the ice classes of different Classification Societies with the Finnish-Swedish Ice Class Rules is based on the comparison of hull structural requirements. Equivalence is estimated on the condition that the hull structural strength given by the rules of a classification society is on a similar level as the hull structural strength obtained by applying the Finnish-Swedish Ice Class Rules. At the same time, the requirements of the Finnish-Swedish Ice Class Rules regarding the power of the main engines should be fulfilled.

Alternatively, the ship should have sufficient power for possible independent movement at a minimum steady speed of 1-2 knots through level ice of a thickness indicated in the Guidelines, depending on the ice class of the ship. An equivalence table indicating the equivalence of the ice class rules of the Classification Societies with the Finnish-Swedish Ice Class Rules is attached to these Guidelines.

Safety requirements for ships sailing in ice conditions
The Administrations of the Contracting Parties should set traffic restrictions based on safety aspects for ships sailing in ice conditions. The traffic restrictions may be based on the measured level ice thickness, or the calculated level ice thickness in the coastal area. Level ice thickness can be calculated e.g. in accordance with the formula of Zubov:

$$h^2_{ice} + 50\, h_{ice} = 8R,$$

where h_{ice} is the level ice thickness in cm and R is cumulative freezing degree days (FDD) based on 0^oC. The temperature measurements should be obtained from official meteorological stations located along the coastline. The calculation of freezing degree days has to be started only from the freeze-up

date for each location. A freeze-up date is established when the mean ice concentration reaches 80 to 100%.

The traffic restrictions should be set as follows:

When the thickness of level ice is in the range of 10-15 cm, and the weather forecast predicts continuing low temperature, a minimum ice class LU1 or equivalent should be required for ships entering the ports of a Contracting Party.

When the thickness of level ice is in the range of 15-30 cm, and the weather forecast predicts continuing low temperature, a minimum ice class IC or LU2 or equivalent should be required for ships entering the ports of a Contracting Party.

When the thickness of level ice is in the range of 30-50 cm, a minimum ice class IB or LU3 or equivalent should be required for ships entering the ports of a Contracting Party.

When the thickness of level ice exceeds 50 cm, a minimum ice class IA or LU4 or equivalent should be required for ships entering the ports of a Contracting Party.

The traffic restrictions can be lightened and finally removed after the melting period of ice has started in spring and the strength of the level ice fields has started to decrease.

Guidelines for operational matters related to winter navigation in the Baltic Sea area

Ice conditions set special requirements for the Vessel Traffic Management and Information System. In winter conditions the most important task of the Ship Reporting System (SRS) is to provide information on way points for ships sailing in the area. The organization responsible for defining and giving information on way points should be agreed on in each country. Only one organization should be authorized for this purpose. The national SRS Centres should create clear procedures for the distribution of information on way points to ships, to national Vessel Traffic Service (VTS) Centres and to other SRS Centres.

The Administrations of the Contracting Parties should set operational instructions for ships sailing in ice covered waters. Such instructions should contain the following: instructions for sailing alone in ice, instructions for sailing in ice under icebreaker supervision, and instructions for sailing assisted by an icebreaker: escorting, in towing, and sailing in a convoy headed by an icebreaker.

Baltic Icebreaker management

Baltic Icebreaking Management, BIM, is an organisation with members from all the Baltic Sea states and Norway. The overall objective of BIM is to ensure

a well functioning, year-round maritime transport system in the Baltic Sea through enhancing the strategic and operational cooperation between the Baltic Sea countries in the area of winter navigation assistance.

Denmark has three icebreakers, Estonia two icebreakers, Finland eight icebreakers, Latvia one icebreaker, Russia 11 icebreakers and Sweden eight icebreakers. In total there are 33 icebreakers available for assistance of cargo vessels in winter in the Baltic Sea area. More details about the Baltic icebreaker fleet can be found in Appendix 2.

D. Ice, Weather, Waves, Monitoring (Information) Systems

Weather and wave monitoring and information systems

Weather and wave monitoring and information systems have been established by the Baltic Sea States in the Baltic Sea area. Weather and wave information is available for seafarers at all times.

Ice monitoring system

Baltice.org is a single access point to reliable and up to date information related to winter navigation in the Baltic Sea area. The aim of the site is to extend the knowledge of winter navigation and prevailing conditions in the area during ice season.

Website is commissioned and financed by BIM, and co-financed by the European Commission through the programme for trans-European transport network. This site gathers information and instructions from icebreaking authorities from all the Baltic Sea countries. Information is available free of charge and meant for users of winter navigation information at the Baltic Sea.

Daily updated ice chart of the whole Baltic Sea area is available in pdf format. Ice chart data is also viewable in Ice Map -window, where it is possible to move, zoom in and out, and measure distances and directions on the ice map. The data is viewable in different WMO styles.

E. Protection of People and Property: Incident Response & Overall Coordination

SAR at sea means saving and protecting lives of persons in distress in sea area. This includes many different duties like assisting vessels and boats in distress at sea, preventing disasters, searching missing people and performing medical transport in the archipelago and sea area. The basis for carrying out these duties is enacted in international treaties and decrees. All authorities operating in the Baltic Sea area carry out SAR at sea. Also merchant shipping and voluntary organisations participate in it. For example in Finland the Border Guard is responsible for SAR service at sea and the

Maritime Rescue Coordination Centre (MRCC Turku) and maritime rescue sub-centres lead SAR operations. When the persons or environment are no longer in danger, commercial companies carry out the salvage of vessels and cargo.

F. Protection of the Environment: Hazardous, Oil and Other Spills & Response

The increasing density of shipping and the rapidly rising amounts of oil being transported by sea mean that the risk of an accident involving serious oil pollution will increase correspondingly, unless counteractive measures are implemented. Forecasts indicate that by 2015 more than 130 million tonnes of oil will be transported on the Baltic Sea every year. It has been estimated that this could raise the risk of a large oil-spill involving over 10,000 tonnes of oil by 35% for the whole of the Baltic Sea, and 100% for the Gulf of Finland.

The co-operation in combatting spillages of oil and other harmful substances in the Baltic Sea area is based on the Helsinki Convention and HELCOM Recommendations on combatting matters, adopted by the Helsinki Commission.

In accordance with the Helsinki Convention the Contracting Parties shall maintain ability to respond to spillages of oil and other harmful substances into the sea threatening the marine environment of the Baltic Sea area. This ability shall include adequate equipment, ships and manpower prepared for operations in coastal waters as well as on the high seas.

According to the Helsinki Convention the Contracting Parties shall agree bilaterally or multilaterally on those regions of the Baltic Sea Area, in which they should conduct aerial surveillance and take action for combatting or salvage activities whenever a significant spillage of oil or other harmful substance or any incident causing or likely to cause pollution within the Baltic Sea area has occurred or is likely to occur.

In cases where a Contracting Party is not able to cope with a spillage by the sole use of its personnel and equipment, the Contracting Party in question can request combatting assistance from other Contracting Parties starting with those who seem likely also to be affected by the spillage.

The Contracting Parties are advised in addition to this Manual to use the Bonn Agreement Manual on Securing Evidence on Discharges from Ships "Oil Pollution at Sea", as it contains a lot of valuable information for the detection, identification and quantification of oil slicks. Furthermore, reference is made to HELCOM Recommendation 19/16 concerning “Co-operation in investigating violations or suspected violations of discharge and related regulations for ships, dumping and incineration regulations” and to the HELCOM “Guidelines on Ensuring Successful Convictions of Offenders of Anti-pollution Regulations at Sea” (Baltic Sea Environment Proceedings No. 78), describing the co-operation between the Contracting States in the investigation of suspected

violations with the overall aim to ensure and enhance the successful conviction of offenders. In addition, the identification of the polluter is of high interest for the responsible operation control authority in case of compensation for expensive clean-up costs and/or serious damage to the marine environment.

The Baltic Sea States work:

- to ensure swift national and international response to maritime pollution incidents
- to ensure that in case of an accident the right equipment is available and routines are in place to respond immediately in co-operation with neighbouring states
- to analyse developments in maritime transportation around the Baltic and investigate possible impacts on international cooperation with regard to pollution response
- to coordinate the aerial surveillance of maritime shipping routes to provide a complete picture of sea-based pollution around the Baltic, and to help identify suspected polluters

The Baltic Sea States arrange two joint aerial surveillance flights a year as well as other operational exercises to combat pollution. They also work closely with other relevant international bodies including BONN Agreement, and the IMO, to ensure international measures are suitably applied and implemented in the Baltic.

G. Monitoring / Enforcing Compliance with Marine Regulation

Port State Control

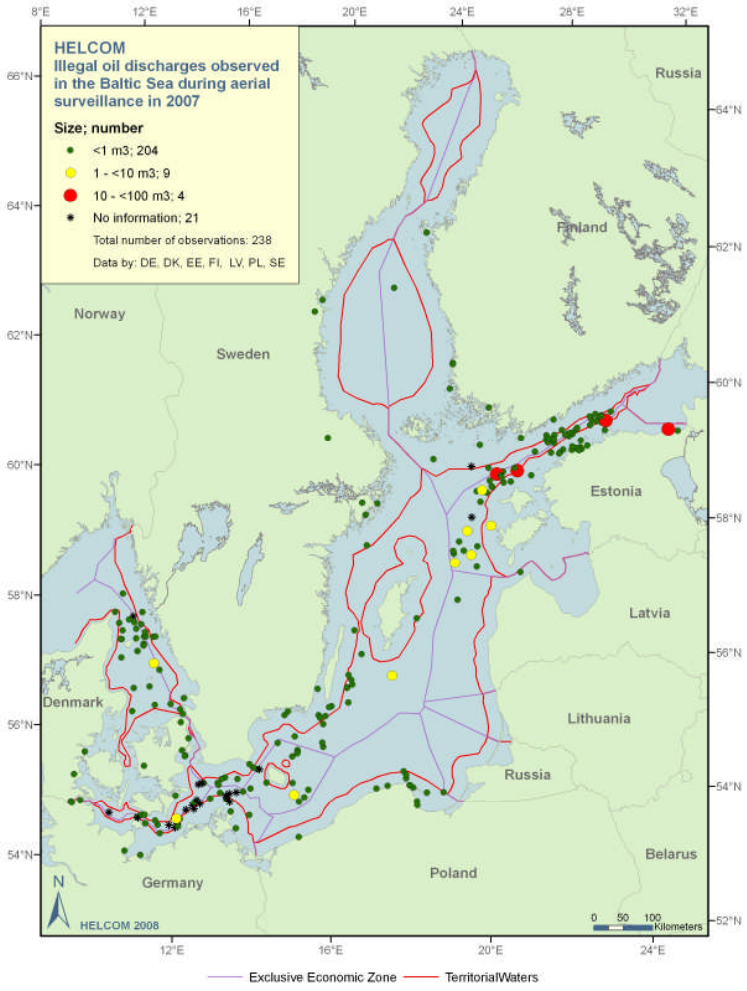
Port State Control systems have been established by the Baltic Sea States in all Baltic Sea ports in accordance with Paris Memorandum of Understanding.

Aerial surveillance

By international law, any release of oily wastes or oily water from ships is prohibited in the Baltic Sea, where oil pollution can affect sensitive ecosystems for long periods. But ships persist in making illegal discharges, despite improvements in port reception facilities, and a harbour fee system which means there is no financial gain to be had from polluting the sea. Every year national surveillance aircraft detect several hundred illegal oil discharges in the Baltic Sea. The actual number of illegal discharges is probably much higher than this. In fact, during most years more oil is released on purpose around the Baltic Sea than is spilled accidentally.

Internationally co-ordinated surveillance flights

The HELCOM States endeavour to fly - as a minimum - twice per week over regular traffic zones including approaches to major sea ports as well as in regions with regular offshore activities and once per week over the regions with sporadic traffic and fishing activities.



Twice a year, several Baltic Sea states jointly organize surveillance flights (24 to 36-hours) - one covering the southern part of the Baltic Sea, and another flight over waters further north. HELCOM facilitates these CEPCO flights (Co-ordinated Extended Pollution Control Operation) in order to:

- assess the amounts of oil being discharged into the Baltic Sea

- give aircrafts and crews of different nationalities experience working together, which could be valuable in the event of a major accident

- find illegal spills of oil or other substances and possibly identify the polluting ships

Data on illegal discharges observed during national aerial surveillance activities of the coastal states in the Baltic Sea area are complied by HELCOM on annual basis. Location of the oil spills observed in the Baltic Sea area in 2007 are shown in the figure above.

H. Arctic Maritime Training

Maritime training in ice conditions is arranged by private companies in the Baltic Sea area. For example Marstal Navigationsskole arranges in 2008 two 4 day courses in Denmark for deck officers on navigating in ice with emphasis on the Baltic region. Greenland and Canadian conditions can be included in the courses.

The contents of the courses includes ice characteristics and ice classifications, ice charts, ice classes, winterization, ship operations in ice, independent navigation in ice, icebreaker operations and ice navigation in convoy. Training of ship manoeuvring in ice is done in full-mission simulator

Appendix 1. Ice conditions in the Baltic Sea area

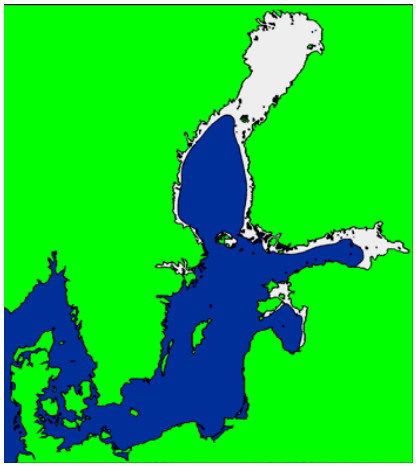


Figure 1. Extremely mild winter of 1991/92, max. extent of ice cover 66 000 km².

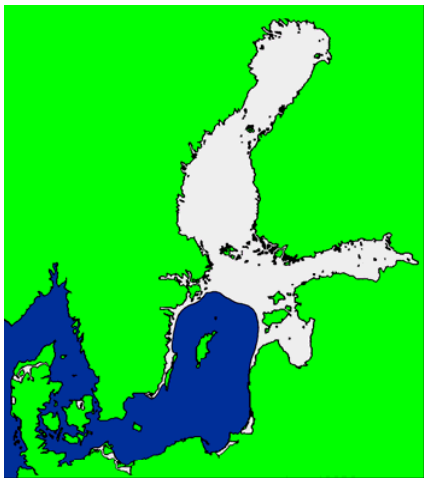


Figure 2. Average winter 1961-1990, max. extent of ice cover 204 000 km². Winter 2002/03 was close to an average winter, the maximum extent of ice cover was 232 000 km² in early March 2003.

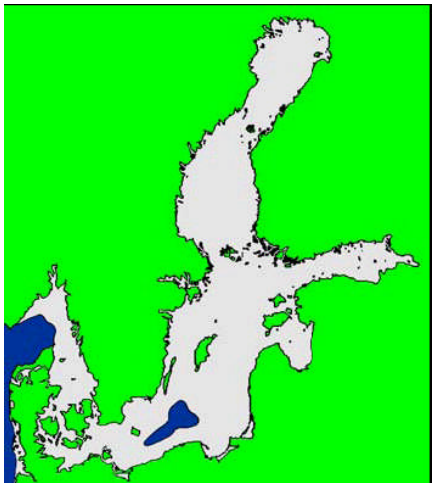


Figure 3. Extremely severe winter of 1986/87, max. extent of ice cover 405 000 km².

Appendix 2. The Baltic Icebreaker fleet

Icebreaker name	Country	Built	Output [kW]	Beam [m]	Draught [m]
Danbjoern	Denmark	1965	8700	17.3	6
Isbjoern	Denmark	1966	8700	17.3	6
Thorbjoern	Denmark	1980	4700	12	4.9
EVA-316	Estonia	1980	5151	12.2	3.8
Tarmo	Estonia	1963	10120	21.2	7.4
Botnica	Finland	1998	10000	24.0	8.5
Fennica	Finland	1993	15000	26.0	8.4
Kontio	Finland	1987	15000	24.2	8.0
Nordica	Finland	1994	15000	26.0	8.4
Otso	Finland	1986	15000	24.2	8.0
Sisu	Finland	1976	16200	23.8	8.3
Urho	Finland	1975	16200	23.8	8.3
Voima	Finland	1954	10200	19.4	7.0
Varma	Latvia	1968	10120	21.2	7.4
Ivan Kruzenshtern	Russia	1964	3940	18.28	6.05
Kapitan Dranitsyn	Russia	1980	16200	26.5	8.5
Kapitan M. Izmaylov	Russia	1976	2550	16.0	4.5
Kapitan Plakhin	Russia	1977	3300	16.3	3.5
Kapitan Sorokin	Russia	1977	18000	30.5	8.5
Kapitan Zarubin	Russia	1978	3300	16.3	3.5
Karu	Russia	1958	5500	17.4	6.4
Mudyug	Russia	1982	7300	22.2	6.8
Semen Dezhnev	Russia	1971	3940	18.28	6.05
Tor	Russia	1964	10120	21.3	6.2
Yuriy Lisyanskiy	Russia	1965	3800	18.06	6.05
Ale	Sweden	1973	3500	13	5,0
Atle	Sweden	1974	16200	23,8	8,3
Balder Viking	Sweden	2000	13440	18,00	6,00
Frej	Sweden	1975	16200	23,8	8,3
Oden	Sweden	1989	18000	31.2	8.5
Tor Viking II	Sweden	2000	13440	18,00	6,00
Vidar Viking	Sweden	2001	13440	18,00	6,00
Ymer	Sweden	1977	16200	23,8	8,3