BALTIC ICEBREAKING MANAGEMENT

Baltic Sea Icebreaking Report 2008-2009

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FOREWORD

The winter of the last season has been again pretty warm. We can not tell so far whether this is a real global warming or a process of normal alternation of warm and cold winters. Within the limits of a separate historical period we will learn about it later.
Can anyone tell in the affirmative now «Global warming has come, and warm winters are established constantly for long times»? Can anyone assert there is a temporary period of alternation of warm and cold winters? The choice of an appropriate scenario as for a warm or a cold winter approach is certainly the right of every member State. The real problem is that there is no way to predict authentically the type of winters and ice conditions on long-term basis. We tend to consider that after the period of some warm winters there will come winters with really low temperatures.
It is essential to expect the approach of such a winter and be ready for it in advance. On the wake of some warm winters it might be easy to mistakenly cancel all the Baltic new ice-breaker building plans, send to scrape all outdated ice breakers and cut programs for navigators on sailing in ice conditions.
During the short and warm winters we actually get some additional time to get ready for approach of cold and severe winters and in advance to consider all possible forms of cooperation in our icebreaking efforts as well as to consider the possibility of installation on ice breakers some systems facilitating such a cooperation, which could be, in particular, a question of adoption IB-NET system which has been already tested for a long and has proved its own efficiency.

1. Short history of the Baltic Icebreaking Management

Baltic Icebreaking Management, **BIM** is an organisation with members from all Baltic Sea states. BIM is a development of the annual meeting between Baltic Sea States icebreaking authorities which have assembled for more than 20 years. The member countries of BIM are Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russia and Sweden.

After the difficult winter navigation season of 2002/2003 a project was started up within the framework of HELCOM, aiming at improving the safety of winter navigation in the Baltic Sea. **The Helcom – recommendation 25/7 on the safety of Winter Navigation in the Baltic Sea Area was adopted in March 2004.**

Within the EU concept Motorways of the Sea, which is one priority project in the trans-European network, the Baltic Sea countries established a working group with the aim of creating more efficient winter navigation by cooperation between the Baltic Sea

countries. The icebreaking authorities around the Baltic Sea decided in Helsinki meeting 2004 that this work shall continue within the framework of BIM, were also non EU-member states are taking part. BIM should function all year round and that its strategy should be to develop safe, reliable and efficient winter navigation between the Baltic Sea countries. The overall objective of BIM is to assure a well functioning maritime transport system in the Baltic Sea all year round by enhancing the strategic and operational cooperation between the Baltic Sea countries within the area of assistance to winter navigation.

January 10th 2007, the Joint Baltic web service on winter navigation www.baltice.org was launched, see appendix 1.

April 11th 2007, the DVD of training in ice navigation for seafarers was launched, see appendix 2.

15th November 2007, **Helcom adopted a new recommendation 28/11 Further measures to improve the safety of navigation in ice conditions in the Baltic Sea**, BIM was acting an "ice advisor" in this recommendation.

One important task of BIM is to inform stakeholders in the maritime sector and policy makers about winter navigation and icebreaking. There is a need for information about winter navigation and icebreaking that covers the whole Baltic Sea region. Several Baltic Sea countries prepare information about the winter navigation and icebreaking in their respective national waters. There has been a need to coordinate this country-specific information, improve the information and to distribute it to a wider target group by "Joint Annual Baltic Icebreaking Report" is the second of its kind.

This report gives an overview of the winter navigation season **2008/2009** for the Baltic Sea area. National reports can be found on www.baltice.org. The report will also describe organisational changes in the icebreaking authorities or changes in icebreaking resources and provide a progress report of the Baltic Sea Icebreaking cooperation and the development of BIM.

2. Overview of the icebreaking season (2008-2009) and its effect on the maritime transport system in the Baltic Sea region

According to Finnish Institute of Marine Research the Baltic Sea ice season of 2008-2009 could be classified as an extremely mild one. The maximum ice extent in 19 February.

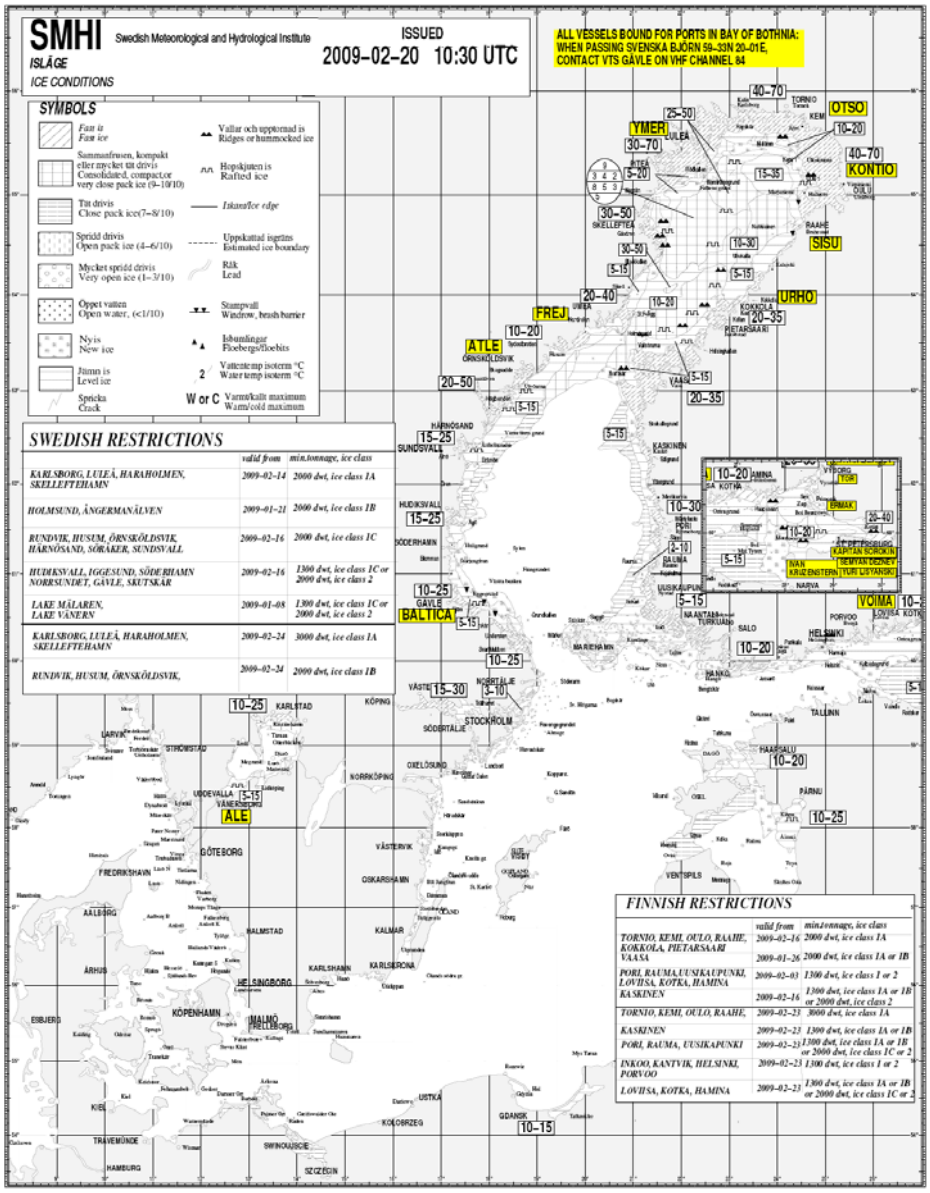


Figure 1. Ice chart from 20 February, the maximum ice extent in The 2008-2009 ice season.

October was characterized by warm weather, at times also very windy. Most of the month the sea surface temperatures (SST) generally were 0.5 – 1.5 degrees higher than average. However, from the 28 a portion of very cold air overspread all Scandinavia and surrounding waters. The cooling resulted in an SST close to the normal in Bay of Bothnia by October 31, further southwards the SST decreased to 0.5 – 1.0 degrees Celsius below the normal.

The first sea ice in the northern archipelagos of Bay of Bothnia formed in mid-November, about one week later than normal. Also in remaining part of November and in December the ice extent increased very slowly, by 15 December still limited to the archipelagos north of Piteå. In Lake Vänern and Lake Mälaren, new ice formed during a

short and intense cold period in the end of December. The first ice in easternmost part of Gulf of Finland did not form until 15 December, about six weeks later than normal.

More persistent cold weather occurred in the beginning of January, resulting in a rapid cooling of the surface water. Thin ice formed at sea off the northernmost archipelagos in Bay of Bothnia for the first time this winter and new ice formation was reported in Vaasa archipelago as well as from sheltered bays along the coasts of Sea of Bothnia and northern Baltic. Thin archipelago ice also occurred along the Swedish west coast from Gothenburg and northwards for a short period.

The ice growth in Bay of Bothnia continued but in mid-January strong southerly winds caused heavy ice northerly pressure. Brash ice barriers then formed off the inlets to Piteå, Luleå and Kemi. In the end of the month, cold northeasterly winds resulted in rapid ice formation at sea in combination with southwesterly ice drift from the Finnish side in northern Bothnian Bay. The southern ice limit then extended along latitude 65 degrees North. Same time the SST rapidly decreasing in remaining open parts of Gulf of Bothnia.

In beginning of February a widespread high pressure area with cold weather and clear skies in almost all Scandinavia was favourable for further ice formation. The first new ice at sea in the Quark was reported on 2 February, rapidly increasing to 5-10 cm close ice the following couple of days. The ice situation during the following week around Nordvalen fluctuated and fast ice west of Holmöarna was established.

Very cold air then overspread all Finnish and Swedish waters. Bay of Bothnia and the Quark was completely covered by ice on the 14. A belt of drift ice and new ice then extending along the western coast of Sea of Bothnia including Bight of Gävle and further southwards to Stockholm archipelago.

During the following days, also Archipelago Sea, i.e. east of Åland, and easternmost Sea of Bothnia was covered by thin level ice. From the 18, fronts with mild air approached southern Scandinavia but only a short impact. The high pressure in the northern waters however persisted and from the 25 the cold air returned southwards to the Baltic.
The maximum ice extent for the Baltic Sea region occurred on February 20, which is quite early. Also the ice in Gulf of Finland reached its maximum this day, the western ice edge extending from Narva to the inlet to Helsinki.

During February the ice situation in Lake Vänern remained very easy. The ice cover was limited to Vänersborgsviken (5 – 15 cm) and off Åmål and Karlstad (10 -25 cm). Lake Mälaren was completely covered by ice, but the thickness was only 15 – 30 cm.

In the beginning of March, a massive attack of mild air caused a rapidly reducing ice cover along the coasts of Sea of Bothnia. Strong southwesterly winds during the first week also compressed the ice at sea north of Vaasa archipelago. In Gulf of Finland, the ice became compacted against the Finnish coast and off Vyborg Bay.

On the 16 a coastal lead opened on the Swedish side, following days rapidly becoming wider while expanding northwards to Luleå. Same time heavy ice pressure occurred in northeastern Bay of Bothnia and numerous ridges formed in the central part.

A period with variable wind and ice drift was followed by yet another portion of cold air associated with a high pressure the 22-23, resulting in freezing of the open areas southwards approximately to latitude 63 degrees North. The ice conditions in northern waters then remained unchanged until the end of March.

In Gulf of Finland during last week of March, the ice at sea however melting and dispersing.

The beginning of April was characterized by sunny and warm weather. Hereby all ice at sea in Gulf of Finland melted as well as all ice in Lake Mälaren and Lake Vänern.
In Bay of Bothnia persisting easterly winds during the first week caused some open water on the Finnish side. In mid-April strong winds initiated an ice drift towards northeast, resulting in a wide lead along the Swedish coast past Bight of Skellefteå and Luleå and eastwards to Kemi inlet. By April 20 the Quark and southern Bay of Bothnia were almost ice free.

The ice area at sea, western ice limit extending Piteå – Kokkola, then was more or less unchanged until 10 May, however gradually rottening. The following 10 days all remaining archipelago ice melted and the ice field at sea gradually was reduced to drifting floebits and old ridges.

The ice season was closed on 25 May, which is quite normal.

Traffic restrictions 2008-09

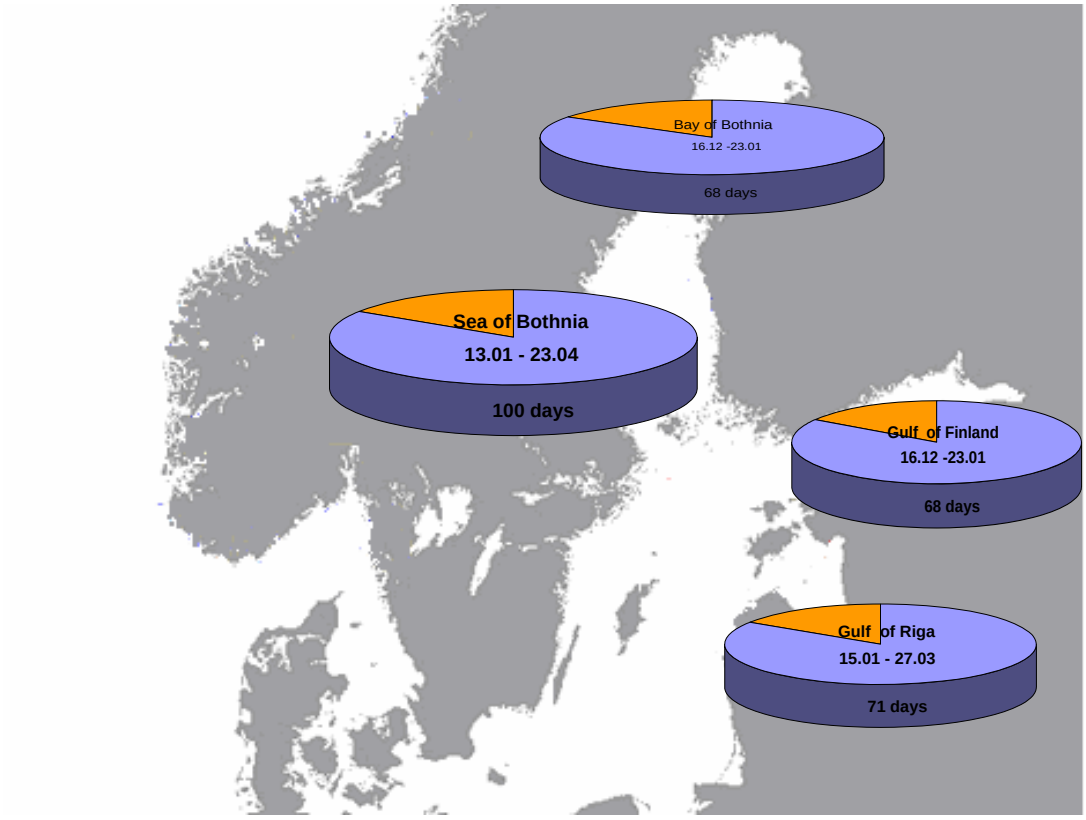


Figure 5. Dates when traffic restrictions were in force in the different areas.

For safety reasons, the Baltic Sea countries have within HELCOM agreed on a joint policy when traffic restrictions shall be issued. For efficiency reasons, the icebreaking authorities can demand a lowest limit on vessels' engine power as well.

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.

Figure 6. HELCOM recommendations for traffic restrictions.

Approximate correspondence between ice classes of Finnish-Swedish ice Classes Rules (Baltic classes) and ice Classes of other Classification Societies

Classification Society	Ice Class				
Finnish-Swedish Ice Class Rules	**IA Super**	**IA**	**IB**	**IC**	**Category II**
Russian Maritime Register of Shipping (Rules 2007)	**Arc 5**	**Arc 4**	**Ice 3**	**Ice 2**	**Ice 1**
Russian Maritime Register of Shipping (Rules 1995)	UL	L1	L2	L3	L4
Russian Maritime Register of Shipping (Rules 1999)	LU5	LU4	LU3	LU2	LU1
American Bureau of Shipping	IAA A1	IA A0	IB	IC	D0
Bureau Veritas	IA SUPER	IA	IB	IC	ID
CASPPR, 1972	A	B	C	D	E
China Classification Society	Ice Class B1*	Ice Class B1	Ice Class B2	Ice Class B3	Ice Class B
Det Norske Veritas	ICE-1A* ICE-10	ICE-1A ICE-05	ICE-1B	ICE-1C	ICE-C
Germanischer Lloyd	E4	E3	E2	E1	E
Korean Register of Shipping	ISS	IS1	IS2	IS3	IS4
Lloyd's Register of Shipping	1AS	1A	1B	1C	1D
Nippon Kaiji Kyokai	I*A Super*	I*A*	I*B*	I*C*	I*D*
Registro Italiano Navale	IAS	IA	IB	IC	ID

Figure 7. Table for corresponding ice classes.

Smaller vessels like buoy tenders and tugs with strong engines and hull are used as port icebreakers and for icebreaking mission in waters protected from drifting sea ice. In open sea areas that are affected by drifting sea ice with ridges and ice pressure, big sea icebreaker are required.

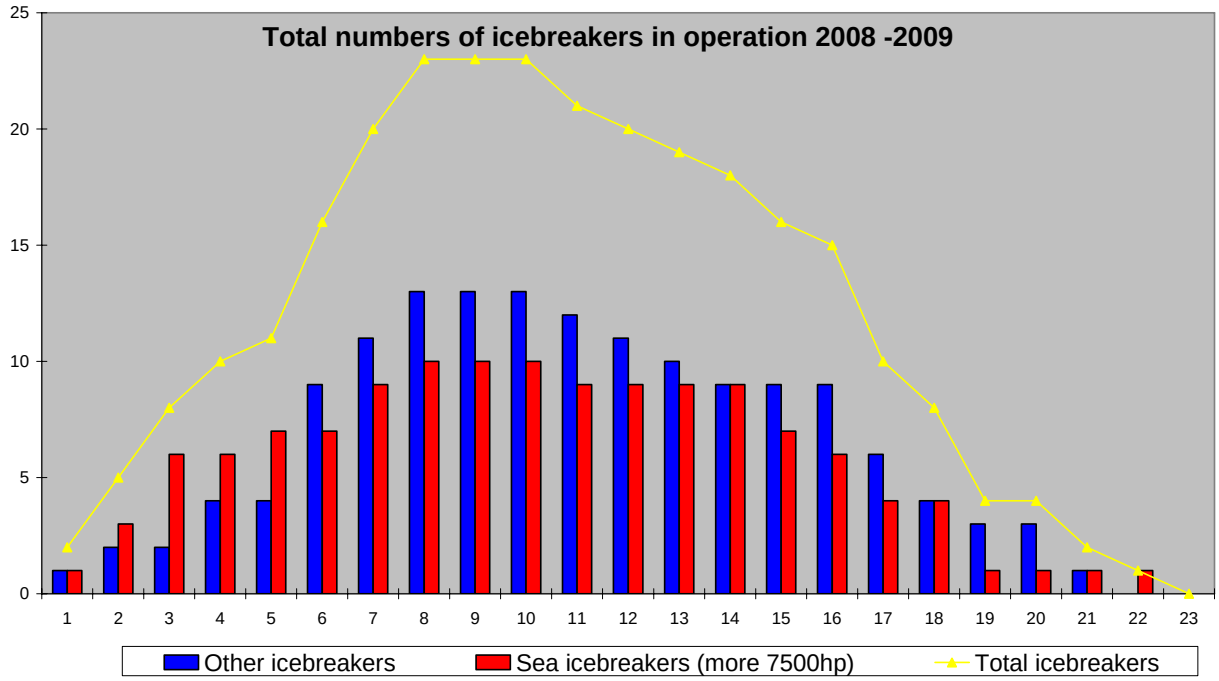


Figure 8 The total number of icebreakers in operation each week in Baltic Sea during the season 2008/2009

According to statistics from the Baltic Sea icebreaking authorities, 2432 vessels received assistance from icebreakers this season.

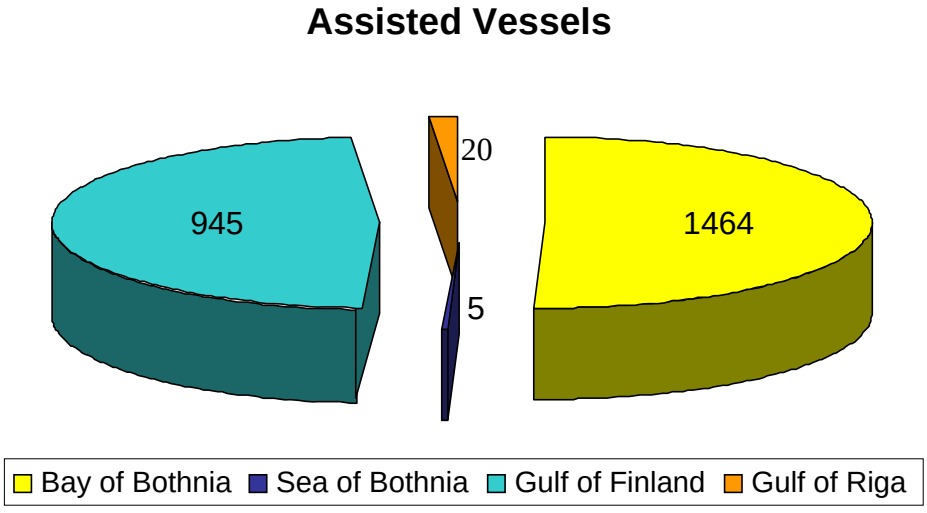


Figure 9. A total of 2432 vessels where assisted by icebreakers during the icebreaking season in the Baltic Sea.

The longest sailing distance in sea ice is to the northernmost ports in the Bay of Bothnia. But due to the big number of vessels in the shorter fairway to the easternmost ports in the Gulf of Finland, the traffic is more affected by sea ice in this area, especially during

periods with strong westerly winds when the icebreakers must tow many vessels one by one.

Maximum sailing distance in sea-ice 2008-09

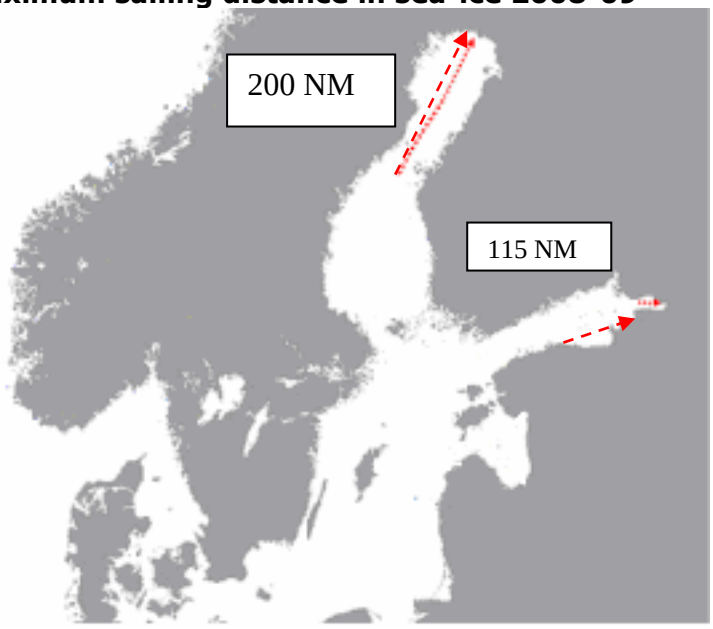


Figure 10. Sailing distance from ice edge during maximum ice extension, 24 March 2008. Kemi 200 nautical miles and St. Petersburg 115 nautical miles.

3. Accidents and incidents in sea ice

The Technical University of Helsinki collects information on accidents related to navigation in ice. Ship owners and others within winter navigation are requested to report accidents, incidents and damages that are ice-related to icedamage@tkk.fi or to:

Ice Damage Database
Helsinki University of Technology
Ship Laboratory
PL 5300
02151 TKK
FINLAND

Only some minor damages occurred to merchant vessels during assistance of the icebreakers. In comparison, about 100 vessels reported damages due to the severe ice conditions in the year 2003. Reports of accidents are difficult to get because often damages won't appear until during the next dry docking.

4. Costs of icebreaking services in the Baltic Sea

Winter conditions cause various costs for vessel traffic in the Baltic Sea. The vessels' fuel costs increase since speed is reduced by even half on average due to ice barriers when proceeding in ice at full effect, and approaching the quay can take hours. The harbour costs also increase, since the basin must be kept open by a harbour tug in order for the vessels to reach the quay.

Moreover, heating to keep equipment in working order despite outdoor temperatures below -20 ºC adds to the costs. Since it is difficult to estimate other costs, this report comprises only those related to icebreakers.

4.1 Finland

In Finland the costs of icebreakers stand-by in period 2008-2009 were near 17 million EUR. This season was mild and therefore the operational costs were about 6 million EUR and fuel costs 3 million EUR. The FMA has also contracts with private tugboat companies for minor operations. The costs of the Finnish icebreaking services vary from 22 to 32 million euros depending on winter.

4.2 Sweden

In Sweden the costs for the stand-by period amount to approximately 10 million EUR, additional operational costs to approximately 4 million EUR, and fuel costs to 2.5-9 million EUR. The cost of the Swedish icebreaking services varies from 15 to 34 million euros depending on the winters' degree.

4.3 Russia

Since January, 01st, 2008 according to the act of Federal Service on Tariffs dd 20.12.07 №552-t/1 rates of icebreaking dues in the Russian ports of the Gulf of Finland are established as follows:

Icebreaking dues:

1) Icebreaking dues are applied for incoming, outcoming or transiting the port area.

2) For the cargo ships engaged in liner services, which are officially declared, to the rates of the icebreaking dues the factor of 0.8 is applied.

3) From icebreaking dues are released:

   - vessels of ice class LU7 (according to classification of the Russian Maritime Register of Shipping or classes of other classification societies corresponding to it)
   - passenger vessels

4) Upon the announcement by the Harbour Master of winter (summer) navigation before the target date, and also after the prolongation of its duration, icebreaking dues are paid as per corresponding rates from the date of announcement to a date of completion (inclusive), corresponding to the period of winter navigation.

Rates for ships engaged in an international trade rub/1 GT

	All vessels except Ro-Ro, Ro-Flow, container ships and bulk carriers	Ro-Ro, Ro-Flow and container ships	Tankers
The summer rate from May, 1st till November, 30th	5.5	3.85	6.03
The winter rate from December, 1st till April, 30th	13,70	9,59	15,02

During the period from May, 1st till November, 30th the following vessels are released from payment of icebreaking dues:

- arriving to the port from inland waterways of Russia or from the Saimaa canal and sailing back within current year;
- arriving to the port from other Russian ports situated in the eastern part of the Gulf of Finland.

During the period from December, 1st till April, 30th the vessels with ice class LU5 and LU6 (according to classification of the Russian Maritime Register of Shipping or classes of other classification societies corresponding to it) are subject to icebreaking dues multiplied by factor 0.75.

4.4 Estonia

In Estonia, the total cost of icebreaking in the 2008-2009 season amounted to approximately 0.75 million EUR, with about 0.25 million EUR accounting for the costs in the Pärnu Bay and 0,5 million for the Gulf of Finland (annual upkeep of the IB TARMO). In the Pärnu Bay, the fuel costs during the icebreaking season of 2008-2009 were about 21 500 thousand EUR.

4.5. Denmark

In 2008 the cost of the Danish ice service was approximately € 5,3 mill. Which is more double of the cost the previous year (€ 2,6 mill.). The reason for this being due to extraordinary maintenance costs for the Icebreakers DANBJOERN and ISBJOERN. The cost covers stand by costs for the Danish Icebreakers and the running cost of the other parts of the Ice service. What the cost of the Ice service in an Ice winter will be is not known but the cost of the previous 5 ice winters was approximately € 8,7 mill. The amount has been extrapolated to 2008 level.

4.6 Latvia, Lithuania, Poland, Germany, Norway

There was no icebreaking operation in this season 2008-2009.

5. Winter navigation in the different parts of the Baltic Sea

5.1. Bay of Bothnia

The first traffic restrictions were initiated on the 16th of December and reached their highest level IA 3000 dwt, on the 23rd of January.

The first icebreaker Otso left Helsinki to start the icebreaking operations on December the 15th.

The ice growth started in the beginning of January and in the middle of February the maximum ice extension appeared.

At that time there were 7 icebreakers engaged in accordance with the joint icebreaking plan.

The icebreakers in the Bay of Bothnia assisted 1 464 merchant vessels and 175 towing operations were conducted. The average waiting time was 3 hours and 5 minutes. 85% of all port calls did not have to wait for icebreaker assistance at all, but 2,85% of the port calls had to wait more than 4 hours for icebreaker assistance (so-called long waiting).
The icebreaking season in the Bay of Bothnia ended on the 25th of May.

5.2. Sea of Bothnia

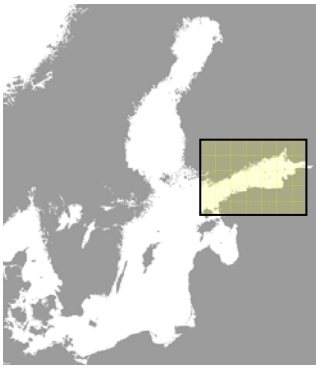
The first traffic restrictions in the northern part of Sea of Bothnia were initiated on the 13th of January and in the southern part there were restrictions during one month from the middle of February to the middle of March. The highest level IA and IB 2000 dwt was in force from the beginning of February until the beginning of April.

The maximum number of icebreakers engaged in the Sea of Bothnia was 2 large and one bouytender vessel.

The icebreaker Frej has jointly been used by the Finnish and Swedish Administrations in the Northern Quark for about one month.

The icebreaking activities in the Sea of Bothnia ended in the end of April and the traffic restrictions was lifted on the 23rd of April

5.3 Gulf of Finland



Winter was light and only in the eastern part of Gulf of Finland occurred some ice formation.

The first traffic restrictions were initiated 05 January in St. Petersburg. These were also the strictest restrictions being only

requirement 2000 kW in horsepower. The restrictions were cancelled 6 April

All 945 of the vessels which needed icebreaker assistance were bound for Russian ports. During the largest ice cover the Russians had 3 sea icebreakers and 8 minor icebreakers in use. The icebreaking season lasted from 19 December to 21 April in the Russian territorial water.

Ice conditions in the eastern part of the Gulf of Finland in 2008-2009

The ice formation processes in the winter of 2008/2009 were those of a typical mild winter. Warm weather with frequent thaws prevailed during the season. The average monthly air temperatures exceeded the norm by 3.5–4.5^{0}C in December, by 4–5^{0}C in January, by 2–4^{0}C in February, and by 1–2^{0}C in March; in April, the temperature was within the standard values. The total amount of cold degree-days was 298 also indicates the mild nature of the winter. The trends of the average daily air temperature variation in cold degree-days according to St. Petersburg Weather Forecast Bureau in the period under review as compared to long-term values (period of 1961-1990).

The stable transition of the average daily air temperature of 0^{0}C towards the minus values was recorded on December 8, which is nearly one month later than the norm. Ice formation in the coastal zone of the Nevskaya Guba started on December 11, and in the Gulf of Vyborg, on December 17. The dates of first ice occurrence are on the average one month later than the norm. From December 18, shuga being carried-out into the Nevskaya Guba started down the Neva River from the Bay of Petrokrepost. Later on, ice formation was recorded as slow but continuous. A stable ice cover set at once, but this happened approximately three weeks later than the norm. By the end of December, compact ice 5–10 cm thick was observed in the water area of the Nevskaya Guba and on the Sestroretsk shallows. In top of the Gulf of Vyborg, 5-15 cm thick fast ice was formed on December 30, which is four weeks later than the norm. Beyond the fast ice boundary, compact ice 5 to 10 cm thick and new ice were observed.

In the first ten days of January, intense ice formation was noticed. In the Nevskaya Guba, fast ice 10 to 20 cm thick was formed on January 4, which is three to four weeks later than the norm. By the end of the ten-day period, the thickness of fixed ice grew up to 15–30 cm. The edge of drift ice 10–15 cm thick reached the longitude of the Shepelevsky light-house. Fast ice remained in place in the Gulf of Vyborg, its thickness reaching 15–30 cm by the end of the ten-day period. In the Bjorkesund passage, new ice occurrence was recorded on January 8, but the ice kept for four days only. The first occurrence of ice for that point was four weeks later than the norm. During the second and third ten-day periods, no ice formation was observed, and slow ice destruction was noticed here and there. On January 13, the fast ice in the navigable channel in the Nevskaya Guba and in the bay's southern part was partly fractured. Till the end of the

month, drift ice 15 to 30 cm thick was observed in that area. Due to wind impacts, more open ice was observed in the navigable fairways part up to the longitude of Petrodvorets. In the Bjorkesund passage, repeated ice formation was recorded on January 18. Ice formation started again by the end of the month. Fast ice 15 to 30 cm thick kept in the Gulf of Vyborg. The edge of drift ice 10 to 20 cm thick and new ice reached the Seskar Island – Nerva light-house line. In the Luzhskaya and Koporskaya Guba, there was a short-term formation of new ice throughout the month.

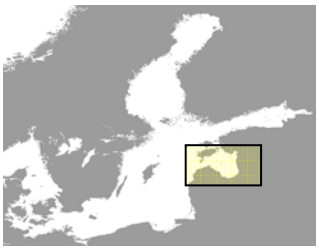
During February, moderate ice formation was recorded, with short-term periods of more intense formation. In the Nevskaya Guba, the final freezing was recorded on February 4, which is one month or one and a half months later than the average annual dates. Later on, the fast ice kept during the whole month. The fast ice also remained in place in the area of Zelenogorsk and the Sestroretsk shallows. The ice thickness in the bay increased gradually, to reach 30–45 cm in the Nevskaya Guba and 35–50 cm on the Sestroretsk shallows by the end of the month. Very close drift ice was observed beyond the fast ice boundary, which was 15–30 cm thick earlier in that month, and 20–35 cm at the end of the month. In the second half of the month, weak compressions were observed in drift ice. The drift ice edge was gradually moving westward. By February 5, the edge reached the longitude of the Moschny Island, by February 17, the longitude of the island of Hogland, and on February 20, the ice edge reached its maximum for this winter, i.e. the longitude of the Mohni Island (see Fig. 1.2.3). In the maximum development period, the ice situation met 80% of the probability value for this period. Early in the second ten-day period, ice-holes filled with slush were formed in the navigable fairway parts from Kotlin to the Ustinsky light-house, from the islands of Moschny and Seskar and up to the Estonian coast. By February 25, the ice-holes were frozen. Fast ice remained in the Gulf of Vyborg, the thickness of which reached 30-45 cm by the end of the month. In the Bjorkesund passage, compact drift ice up to 15 cm thick was observed, and from February 16 on, fast ice 10 to 20 cm thick was formed. By the end of that month, the fast ice thickness increased to 15-30 cm. In the Luzhskaya and the Koporskaya Guba, new ice was observed early in February, then the ice became compact, and fast ice 10 to 15 cm thick was formed on February 16. On February 24, fast ice was formed also on the approaches to the Luzhskaya Guba up to the islands of Moschny and Seskar. The fast ice thickness reached 10 to 25 cm by the end of the month. In the Koporskaya Guba, a vast ice-hole with new ice was observed beyond the fast ice boundary from the beginning of the month's second ten-day period.

In early March, weak ice formation was noticed. Due to winds of western directions, the ice edge was retreating eastward, and the amount of ice was gradually decreasing. Fast ice remained in place in the Nevskaya Guba's northern part, while drift ice was observed in its southern part. The thickness of fast and drift ice was 30–45 cm. The gulf's

maximum ice thickness was observed on the Sestroretsk shallows at 35–50 cm. West of Kotlin Island's longitude, very close drift ice up to 35 cm thick was observed in the first ten-day period. A vast ice-hole was formed between the islands of Kotlin and Seskar from March 6. The ice-hole was filled with open/very open ice, or even with open water subject to the ice drift. West of Seskar Island's longitude, drift ice up to 30 cm thick was observed; its concentration was 7 to 9 points. In the first half of the month, weak pressures were observed in drift ice. From March 7 on, a vast ice-hole was formed north-west of the island of Hogland in area of the Tiskeri light-house. By the middle of the month, the ice edge moved to the island of Hogland. In the second half of the month, ice redistribution over the eastern part of the gulf was observed: the ice concentration was reducing, and its quantity decreasing. Fast ice remained in place in the Gulf of Vyborg and in the Bjorkesund passage for the whole month. The thickness was 30–45 cm in the gulf and 15–30 cm in the passage. In the Luzhskaya Guba and on approaches thereto, up to the islands of Moschny and Seskar, and in the coastal zone of the Koporskaya Guba, fast ice existed in the early days of the month. The ice thickness was 10 to 25 cm. On March 8, the fast ice was fractured on the approaches to the Luzhskaya Guba, and on March 18, in the Luzhskaya Guba itself. The average monthly temperature exceeded 0^0C on March 28, which is five days earlier than the average annual values, and the processes of springtime ice cover destruction started developing in the gulf.

During April, warm weather was observed, with the average monthly temperature within the standard values. The ice cover in the Gulf of Finland was slowly destructing. In early April, the drift ice was concentrated in the northern half of the eastern part of the Gulf of Finland. The thickness of fast and drift ice was gradually decreasing. The destruction of ice was increasing. The fast ice in the northern part of the Nevskaya Guba was broken on April 3, which is one week earlier than the average annual dates. In the second half of the month, the destruction of the ice cover accelerated. The Nevskaya Guba, as well as all the main navigable fairways, became completely free of ice on April 19. In the Bjorkesund passage, the fast ice was broken on April 18, and the channel to the port of Primorsk cleared on April 23. In the Lushskaya and the Koporskaya Guba, just a few open waters were observed in the first ten-day period. In the third ten-day period, a small amount of rotten ice only kept in top of the Gulf of Vyborg and in the area of the Sestroretsk shallows. The fast ice in the Gulf of Vyborg was broken on April 26, which is slightly later than the norm, and the gulf was free of ice in three days. The complete clarification from ice over the Gulf of Finland was complete on April 30-. On the average, the gulf became clear of ice within dates close to the average annual values.

5.4 Gulf of Riga



The Estonian Meteorological and Hydrological Institute assessed the winter of 2008/2009 as moderate. The traffic restrictions were initiated 15 January being IC-1600 kW in Pärnu and were cancelled 27 March. The icebreaking season lasted from 9 January to 27 March and 20 ships were assisted.

5.5. Central Baltic

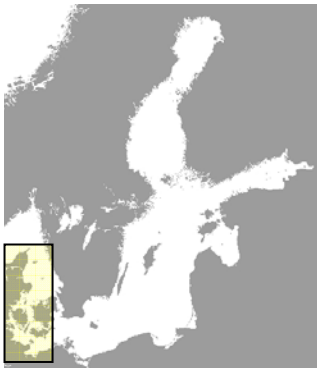
There were no ice obstacles for the winter navigation in the Central Baltic this winter.

5.6 South Baltic Coastline

The ice season on the Baltic Sea South coast did not cause difficulties to merchant shipping. In Germany, very local restrictions were set only in sheltered inner waters, but there were no restrictions for seagoing vessels. The icebreaking service was not in force.

There was no typical ice-breaker available on East Coast area of Poland. Tugs with ice class are in use for ice breaking service. Air and sea water temperatures were above average through all the winter season. No ice formation was noted. No difficulties to the traffic were reported during whole winter season 2008/2009. It was no necessity to use ice-breakers during whole season.

5.7 Western Baltic, Danish waters



The winter 2008 – 2009 was mild although slightly colder than the previous winter. The Icebreaking service was on readiness from December 15th. By the end of February the water temperatures was such that were no prospect of any ice development in Danish waters. The readiness of Icebreaking was subsequently ended as of March 6th.

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6. Description of organisations and icebreakers engaged during the season 2008/2009

6.1 Finland

The Finnish Maritime Administration (FMA) is the national authority responsible for the assistance of winter navigation, its coordination, development and management nation-wide. The actual icebreaking services have been contracted out.

The FMA develops Finland's icebreaking policy, taking into account the requirements of its clients (mainly the Finnish industry). Essential for the industry are as short waiting times as possible for traffic. The FMA decides on the length of the assistance period, exemptions and traffic restrictions. On inland waterways, the authority and the right to arrange services have been delegated to the FMA Gulf of Finland Traffic Division.

The traffic restrictions are normally made more stringent at a faster pace than the minimum HELCOM safety recommendations, as the objective is to assure an efficient maritime traffic flow. Only vessels fulfilling the criteria of daily traffic restrictions are given assistance.

In 2004 the icebreaking services were purchased from the Finnish State Shipping Enterprise (Finstaship) based on a contract. During a three-year transition period, the FMA has started opening up competition in the field, which will be completely free by the end of the year 2006.

Finstaship is responsible for the management and daily operation of the icebreaking services to all 23 winter ports. The demands as to the standard of service are included in the freight contract. The main requirement is that vessels should not have to wait for an icebreaker for more than 4 hours on an average. Another goal for the Finnish icebreaker service standard is that 90 % to 95 % of vessels navigating in the ice field could get through without delay.

In Finland no special fee is collected for the icebreaker service. All ships pay fairway fees based on ship size and ice class. The fairway dues are used to cover the costs of fairway maintenance and icebreaking services.

Icebreakers engaged by the Finnish Maritime Administration 2008/2009:

Name	Type	Engine power
FENNICA	Multi-Purpose Icebreaker	21 000 KW

NORDICA	Multi-Purpose Icebreaker	21 000 KW
FREJ	Icebreaker	18 400 KW
KONTIO	Icebreaker	21 800 KW
OTSO	Icebreaker	21 800 KW
SISU	Icebreaker	18 400 KW
URHO	Icebreaker	18 400 KW
VOIMA	Icebreaker	12 800 KW

Icebreaker Frej was a short period of 27 days in joint chartering with SMA and FMA. Due to mild winter was Nordica in off-shore operation.

6.2 Sweden

Icebreaking operations are managed by the Icebreaking Division of the Swedish Maritime Administration in Gothenburg and are based on the Swedish icebreaking regulation (2000:1149). It allocates icebreakers to work areas, issues traffic restrictions, monitors the operational situation and informs the shipping stakeholders of ice conditions and the traffic situation. Sweden controls eight icebreakers, of which the Swedish Maritime Administration owns five and has three on long-term charter from a private shipowner. All icebreakers are manned by a private shipping management company.

Sweden and Finland use a jointly developed IT based on-line system, IB-Net (IceBreaker Net) for coordination of the joint icebreaking operations. IBNet contains information about the weather, ice conditions and traffic situation, and transmits the information between the different connected units (icebreakers, coordination centres, VTS etc.)

In addition to the icebreakers, ice strengthened buoy tenders of the Swedish Maritime Administration and private tugboats are also engaged in the icebreaking service. Helicopters are chartered and used for ice reconnaissance and personnel transport in order to reduce time expenditure for icebreakers. Cooperation with the tugboats in ports is common around the coastline.

The governmental fairway dues cover the costs for the icebreaking operations and no vessel that receives assistance from icebreaker is charged.

Icebreakers engaged by the Swedish icebreaking service 2008/2009:

Name	**Type**	**Engine power**
ALE	Icebreaker	3500 KW

ATLE	Icebreaker	18400 KW
FREJ	Icebreaker	18400 KW
YMER	Icebreaker	18400 KW
BALTICA	Bouytender	2610 KW
SCANDICA	Bouytender	2610 KW

6.3 Russia

The icebreaker assistance in the eastern part of the Gulf of Finland is regulated by the Harbour Master of the Port of St. Petersburg (according to Direction of Ministry of Transport BP-113-p, 30.11.2001). The Harbour Master of the Port of St. Petersburg has the power to impose any shipping restrictions in the area for the traffic bound to or from Russian ports, based on actual ice conditions (according to article Nos. 74 & 76, Russian Federal Law No. 81-FZ, Russian Merchant Marine Code, 30.04.1999).

The ice navigation assistance is conducted by the state-owned or state-chartered icebreakers and covers the ports of St. Petersburg (including merchant cargo-handling areas in Kronstadt, Lomonosov and Vasileostrovsky cargo area), Primorsk, Vyborg, Vysotsk and Ust-Luga. The state-owned icebreakers assist the inland transit navigation via Symens canal both ways.

The ice-breaker fleet consists of the following ice-breakers:

Name	**Type**	**Engine power**
CAPTAIN SOROKIN	Icebreaker	18 300 KW
MOSKVA	Icebreaker	16 000 KW
ERMAK	Icebreaker	30 400 KW
SEMION DEZHNEV	Icebreaker	4 000 KW
IVAN KRUZENSTERN	Icebreaker	4 000 KW
CAPITAN M. IZMAILOV	Icebreaker	3 940 KW
CAPTAIN ZARUBIN	Icebreaker	4 650 KW
MUDYUG	Icebreaker	9 100 KW
KARU	Icebreaker	6 450KW
TOR	Icebreaker	10 000KW
YURI LISYANSKY	Icebreaker	4 000 KW
CAPTAIN PLAKHIN	Icebreaker	4 650 KW

The icebreaker assistance, as a rule, is conducted as follows:

1. Individual icebreaker assistance behind an icebreaker
2. Icebreaker assistance in a convoy

3. Independent ice navigation following icebreaker recommendations and strictly under her supervision

Icebreaker assistance is given to the ships which do not fall under the acting restrictions in the ports of their destination. Icebreaker assistance for the traffic coming from the sea is conducted from the point where the convoy is formed to the inner road of the port, and the ships leaving the port are assisted from the inner road to the area next to the convoy forming point (CFP).

All the ships coming from the sea are prohibited from entering the ice east of the convoy forming point (CFP) without permission of the icebreaker. The Masters of the ships sailing independently upon receiving the permission of the icebreaker are to report to the icebreaker while passing the established control points of the recommended route and inform of the ice situation in the area. If such a ship gets stuck, the icebreakers are to release them and correct their recommended route or get them in the convoy for further motion. The Masters of the ships are not recommended to rely on data regarding recommended routes received from other ships and not confirmed by the Master of the icebreaker.

When the ice thickness over the approach fairways leading to Russian ports in the eastern part of the Gulf of Finland becomes considerable, the Harbour Master of St. Petersburg imposes restrictions on ships the ice class and the main engine capacity of which are not sufficient for navigation under prevailing circumstances.

The permission to enter the port or the icebreaker assistance to ships under restrictions due to their ice class is granted in exceptional cases, after detailed study of their ice certificates ("Ice passport" or "Provisional recommendations on ice safety") issued by a recognized institution. The permission to enter the port or icebreaker assistance to a ship under restrictions due to her main engine capacity may be granted in case her ice class meets the requirements. The ships whose age exceeds 20 years, as a rule, are not permitted entry in case they are under restrictions.

In case such permission is granted to a ship falling under one of the restrictions established, a particular icebreaker is allocated for her assistance and the Master of that icebreaker has the authority to determine the best way to render such assistance.

6.4 Estonia

The responsible organization for icebreaking in Estonia is the Estonian Maritime Administration. The Director-General of the Estonian Maritime Administration decides on traffic restrictions and directives on winter navigation. The icebreaking coordination

center consisted of 13 members in 2008, chaired by the Head of the Maritime Safety Division of the Maritime Administration, and acts as an advisory board for the Director-General in icebreaking issues.

Ports that are serviced by state ice-breakers are Muuga Harbour, harbours of Tallinn and Kopli Bay, Paldiski North Harbour, Paldiski South Harbour, Kunda Harbour, Sillamäe Harbour and Pärnu Harbour.

Currently, Estonia has one icebreaker, TARMO, to operate in the Gulf of Finland area, and the multi-purpose vessel EVA 316 to operate in the Pärnu Bay. Icebreaking to the port of Pärnu was carried out by multi-purpose vessel EVA 316.

Icebreakers engaged by the Estonian Maritime Administration 2008/2009:

Name	**Type**	**Engine power**
TARMO	Icebreaker	10 000KW
EVA 316	Multi-Purpose Vessel	3 x 1 717 KW

6.5 Latvia

Latvia has three international sea ports: Riga, Ventspils and Liepaja. There is one icebreaker, the VARMA, which is owned and operated by the Port of Riga, for approximately 10 years. VARMA mainly operates in the Irbe Strait. The icebreaking in Ventspils and Liepaja is carried out by tugboats. There are plans to replace the VARMA with a new icebreaker.

The estuary to the Port of Riga is affected by silting and maintenance dredging is essential to keep the depth in the fairway. A combined icebreaker/dredger should be a good solution when such investment is useful every year.

Name	**Type**	**Engine power**
VARMA	Icebreaker	10 165 KW

6.6 Lithuania

The port of Klaipeda is the northernmost ice-free port in the eastern Baltic coast. Klaipeda State Seaport Authority (KSSA) is the responsible organisation for icebreaking in Klaipeda harbour waters. The Lithuanian fairways are open all year round.

There are no demand and necessity for icebreaking service in the Lithuanian coastal waters, to the border to the port area or in Butinge Terminal. During severe winters,

private tugboats carry out icebreaking. In total, 11 tugboats operate in the port of Klaipeda.

6.7 Poland

ICE BRAKING OPERATION ON THE EAST COAST AREA OF POLAND DURING WINTER SEASON 2008/2009

There were no typical ice-beaker available on East Coast area of Poland. Tugs with ice class are in use for ice breaking service.

Public procurement for Ice Breaking Service in The East Coast of Poland was announced in August 2008.

On beginning of November 2008 contracts were signed with two towing Companies for ice breaking service for next three winter seasons to cover the roads and approach channels for ports of Gdansk, Gdynia and Hel. Both Companies are equipped with the tugs able to break ice up to 25 centimetres thickness. No Company was found to cover ice breaking service for the port of Wladyslawowo due to not availability of low draught ice breakers.

Therefore decided, in case of necessity, to employ for port of Wladyslawowo any other tugs with ice class and low enough draught.

On 15th September 2008 letters to all interested parties were send in order to report all information about available ice-braking tugs for winter season 2008/2009. Ice-breakers should be ready for service from 10th of November 2008.

At the same time all Harbour Masters on the East Coast were informed that following ports will not be protected by the ice-breakers: Jastarnia, Puck, Gorki Zachodnie and Swibno. All vessels (mainly fishing vessels) should be ready to move to the following ports: Hel, Władysławowo, Gdansk and Gdynia which will be protected by the ice-breakers.

By the 15th of November information about availability of ice-breakers were collected. Also contact list of responsible parties and cooperation parties were prepared and were sent to all interested parties.

1. On 26.09.2008 Harbour Master of the port of Szczecin began the procedure for public procurement for Ice Breaking. As there were no companies applying for this public procurement, Maritime Office in Szczecin could order icebreakers in commercial way in

case of any ice breaking necessity. Therefore in December 2008 Harbour Master sent official enquiries about ice breaking service rates to two Towage Companies which operate in the port of Szczecin. In the response on December 2008 we obtained the ice breaking rates for winter season 2008/2009.

2. Maintaining the list of phone/mobile numbers and VHF channels and distributing it among involved parties.

The Rules of co-operation with The Institute of Meteorology and Water Administration was established.
The buoyage was partly removed and partly replaced by special winter buoys on the approach to Swinoujście and on the main fairway Swinoujscie –Szczecin shortly before winter season.

II. Winter season 2008/2009

The months of winter season in Poland usually are November, December, January and February.

November was rather warm, the mean temperature was **+7,1° C** and during the nights temperatures were a little less, only twice it dropped up to zero.

On **December** the first two decades were warm with the mean temperature **+4,5° C** , but the last few days were cold with the mean temperature **+0,7° C** and the lowest was **minus 3,5° C**.

January 2009 began with low temperatures and the first half was cold with mean temperature **minus 1,1°** C; there were few very cold days up to **minus 10,6°** C. And second part was rather warm with mean temperature **+ 1,5° C**.
February was warmer than **January,** however there were some nights with a frost – up to **minus 3,6° C.** The first two decades were colder than third and mean temperature in colder part was **+ 1° C**, and in the warmer **+ 4° C**.

The minus temperatures in the third decade of December 2008 caused in the last days of a year a thin ice floe in the small ports like Wolin, Stepnica, Nowe Warpno, Trzebiez and Dziwnów. And on 02 January 2009 ice appeared on the river Odra, in the port docks of Szczecin and Swinoujscie, in Zalew Szczecinski. It was fresh ice **of thickness 3 cm** and percentage of ice cover was from 20% to 40 %.

In the next few days ice formation developed and on **6 January 2009** there were ice in Zalew Szczecinski, and small ports of it, ports of Szczecin and Swinoujscie, and on the river Odra. This ice cover was up to 100 % and thickness up to 15 cm. Owing the constant navigation this ice was crushed. Additionally there was floating ice which was coming from the Odra River upper current. Due to the floating ice and relatively low temperature ice was being ridged in some places. As usually the worst ice situation was between the Gates No 1 and No 2 and No 3 in Zalew Szczecinski, where only navigable channel, wide enough, was leading through the crushed and ridged ice.

And on15 January 2009 thickness of ice cover was 20 cm and more, where ice was ridged. From 21 January 2009 ridged ice disappeared, due to higher temperatures, but there was constant floating ice coming from upper current of river Odra. From the beginning of February ice cover and its thickness actually started getting smaller. But between Gates No 1 and 2 and 3 the floating ice fields with thickness of few centimeters appeared which covered 40% of area. These fields disappeared on 14 February 2009 and only ice floats and crushed ice floats remained in the ports of Szczecin and Swinoujscie and on the water fairways. Every next day this ice formation was getting smaller and on **3 March 2009** definitively disappeared.

III. Actions taken

As the first ice formation had appeared, on 31 December 2008 VTS Szczecin started **publishing in internet the ice statements** for regions: Zatoka Pomorska, Swinoujscie, Dziwnow, Zalew Szczecinski and small ports of Zalew Szcecinski and port of Szczecin. These "ice news" contained:

- percentage of ice covering
- thickness / rafting of ice
- ice restriction, if were any, put into force by Harbour Master of port of Swinoujście/ Szczecin in their area of responsibility.

The end of publishing ice news was on 5 March 2009.

Putting into force the **ice restrictions** by Harbour Master of Swinoujscie / Szczecin, in their area of responsibility.

- The first restriction was published on **2 January 2009** and it was said that the main fairway Swinoujście - Szczecin and small port of Swinoujście and Trzebiez were not available for wooden and laminate crafts, on **7 January 2009** this restriction ranged the inland navigation vessels, this restriction expired 28 February 2009.

6.8 Germany

In Germany the Ice Service is under the responsibility of the Waterways and Shipping Administration on behalf of the Ministry of Traffic, Building and Housing. The German Ice Service is divided into two parts, ice information and icebreaking.

The German hydrographical office BSH deals with ice observation and information service, and the Waterways and Shipping Directorate North organises the icebreaking service for the harbours, coastal and sea regions in the German part of the Baltic Sea.

The German ice service plan is set up annually by the responsible authority, listing all available vessels which are able to break ice, giving information on the respective areas of icebreaking service, the expected ice situation, etc.

For missions of icebreaking on the coastal and sea area different vessels are available:

Name	Type	Engine power
NEUWERK	Multi-Purpose Vessel	8 400 KW
MELLUM	Multi-Purpose Vessel	6 620 KW
ARKONA	Multi-Purpose Vessel	3 700 KW
BÜLK	Emergency Tug	2 320 KW

In addition to that, a number of smaller tugboats and river-icebreakers are available for the inner coastal waters and harbours.

Because the ice situation in Germany does not call for icebreaker assistance every year, the operation of multifunction vessels capable of icebreaking is most useful. With "Neuwerk", "Mellum" and the new multifunction vessel "Arkona", Germany has a good combination between effective environmental protection and icebreaking during the wintertime along the coast and the affected international waterways.

6.9 Denmark

In 2008 the cost of the Danish ice service was approximately € 5,3 mill. Which is more double of the cost the previous year (€ 2,6 mill.). The reason for this being due to extraordinary maintenance costs for the Icebreakers DANBJOERN and ISBJOERN. The cost covers stand by costs for the Danish Icebreakers and the running cost of the other parts of the Ice service. What the cost of the Ice service in an Ice winter will be is not known but the cost of the previous 5 ice winters was approximately € 8,7 mill. The amount has been extrapolated to 2008 level.

The Danish Navy presently operates 3 icebreakers referred to as navy icebreakers as follows:

Name	Built	Engine Power
DANBJØRN	1965	8 700 KW
ISBJØRN	1966	8 700 KW
THORBJØRN	1980	4 700 KW

DANBJØRN and ISBJØRN are expected to be in service until 2015, while THORBJØRN is expected to be in service until 2010. Apart from its own icebreakers the Ice Service also makes use of tug boats which are hired on a case to case basis. For icebreaking on the Limfjorden west of Aalborg the Ice Service has an agreement with a Danish tug boat company who keeps a tug boat on 24-hour notice during the period from 15 December to 31 March. Each winter period from 15 December to 31 March 1 navy Icebreaker are kept on 48-hour alert. The other 2 navy icebreakers are kept on 5 days alert. Apart from a small maintenance crew the navy icebreakers are not fully manned continuously. If they are activated they will be crewed by naval personnel from other services within the navy.
The winter 2008 – 2009 was mild although slightly colder than the previous winter, the Icebreaking service was not activated.

7.0 Norway

In Norway the government, by Norwegian Coastal Administration, is responsible for the icebreaking in open waters and main fairways along the coast. In the fjords and the approaches to the ports, the harbour/port is responsible for the icebreaking.

The Norwegian Coastal Administration operates only 2 buoy tenders that can be used for minor icebreaking operations:

Name	Type	Engine power
VILLA	Motor Vessel	Total Bhp 1.250. Total Kw 920 Kw
HEKKINGEN	Motor Vessel	Total Bhp 1.250. Total Kw 920 Kw

The ports operate tugboats which are used as icebreakers in the harbour and their approaches. These tugs are old and we don’t see any renewal of the icebreaking equipment.

The Norwegian Navy has one ice going coastguard vessel, “SVALBARD”, operating in the north. The winter 2008/2009 was mild and ice coverage less than normal. Norwegian Coastal Administration did not perform any icebreaking by own or hired icebreakers.

ANNEX 1

PRESS RELEASE
10.1.2007
For immediate release

Joint Baltic web service on winter navigation www.baltice.org launched

A joint web service on winter navigation in the Baltic Sea area has been launched on January 10th. The purpose of the web service is to provide seafarers and the whole shipping industry with information on winter navigation and the conditions prevailing in the Baltic Sea in winter. The capability of vessels to navigate in ice has constantly improved but, due to lack of experience, the know-how of ship's crews has decreased. Furthermore, traffic volumes have increased. The aim of the free website is to give the best conceivable information on winter conditions in the Baltic Sea in order to prevent accidents and damage to vessels and to enable vessels to manage as far as possible without icebreaker assistance. The information presented on the website was formerly difficult to access as it was scattered on the websites of various organisations.

The web service contains ice reports, an up-to-date ice chart, an ice thickness chart, reporting instructions for vessels, information on traffic restrictions, icebreaker operating areas and ice navigation courses for seafarers. Data is collected from the organisations responsible for winter navigation in the Baltic Sea area.

The idea to create an ice data portal originates from Baltic Icebreaking Management (BIM) and is part of the Baltic Sea Winter Motorways project, which is led by the Finnish Maritime Administration. BIM, which was founded in 2004, consists of the icebreaker managements of the Baltic Sea countries, i.e. Finland, Sweden, Denmark, Norway, Germany, Poland, Estonia, Latvia, Lithuania and Russia. The whole project was carried out in Finland and Finland will continue to coordinate it in the future. Moreover, Baltic Icebreaking Management will be chaired by the Finnish Maritime Administration for the next two years. The project has been financed by Finland, Sweden, Denmark, Estonia, Russia and the EU.

AffectoGenimap has been in charge of the technical implementation of the project. During the website's first year of existence, ice information will be provided by the Ice service of the Finnish Institute of Marine Research.

The address of the website is www.baltice.org.

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ANNEX 2

PRESS RELEASE
11.4.2007
For immediate release

Training in ice navigation for seafarers

The Baltic Sea states wish to enhance safety and the efficiency of vessel traffic also by means of instruction. The video guide "Ice Navigation and Baltic Ice Conditions", which has only just been released, is intended especially for those seafarers who lack experience in ice navigation.

Traffic in the Baltic is constantly increasing. Although ships' capability of navigating in ice has improved, know how on board has deteriorated owing to lack of experience. This is why it was felt that there was a need for a winter navigation guidance video. Training material of this kind has not been available before. The English language video deals with matters crucial to winter navigation: the ice situation and the various types of ice, ships' capability of navigating in ice, means of avoiding icing of ships and equipment, voyage planning and operation in ice. The video can be watched free-of-charge at www.baltice.org (Ice Training Movie).

The project has been financed by the Finnish Maritime Administration and the European Union, the Swedish and Estonian Maritime Administrations, the Danish Ministry of Defence and St. Petersburg Port Authority, which all distribute the video on DVD in their own countries. In Finland, copies of the DVD have been sent to the maritime colleges. The Finnish Maritime Administration has been responsible for the realization of the whole project.

Guidance for seafarers is also provided by the joint Baltic Sea web service www.baltice.org, which was launched in January this year. Both the web service and the video have been produced by Baltic Icebreaking Management (BIM), a board for various joint projects realized by the icebreaking authorities of the Baltic Sea states.

The web service and the video are part of a EU financed project called Baltic sea Winter Motorways. A third project included is the report 'Study on frequent lines – Differences in running costs between an icebreaking cargo vessel and a vessel that needs icebreaker assistance', which has been published by the Finnish Maritime Administration (Merenkulkulaitoksen julkaisuja 7/2006).

Further information:

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