STYRELSEN FÖR

VINTERSJÖFARTSFORSKNING

WINTER NAVIGATION RESEARCH BOARD

Research Report No 114

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EEDI AND THE NEED FOR ICEBREAKER ASSISTANCE

Finnish Transport and Communications Agency
Finnish Transport Infrastructure Agency
Finland

Swedish Maritime Administration
Swedish Transport Agency
Sweden

Talvimerenkulun tutkimusraportit — Winter Navigation Research Reports
ISSN 2342-4303
ISBN 978-952-311-747-1

FOREWORD

In this report no 114, the Winter Navigation Research Board presents the results of research project EEDIAssistance. Ice-going characteristics of different EEDI-compliant vessels are investigated using port call data, including data concerning icebreaker assistance and ship characteristics available from the IHS database. A clear correlation between lower power-to-deadweight ratios and greater assistance need is observed.

The Winter Navigation Research Board warmly thanks Teemu Heinonen for this report.

Helsinki

March 2021

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EEDI AND THE NEED FOR ICEBREAKER ASSISTANCE FOR FINNISH TRANSPORT AND COMMUCATIONS AGENCY

Name of document: EEDI and the need for icebreaker assistance			
Document Responsible: Heinonen Teemu		**Document Reviewer(s):** Mattsson Tom	
Document Approver: Heinonen Teemu			
Report number / Revision: K381 / A		**Status / Status Date:** Approved / **5.6.2019**	
Client: Finnish Transport and Commucations Agency / Lauri Kuuliala			
Revision remarks:			

Summary:

The ice-going performance of different EEDI-category vessels has been investigated in this report.

Based on this data set, there seems to be a clear correlation between the power-deadweight ratio of the merchant vessel and the need for icebreaker assistance and towing. The need for icebreaker assistance increases as the power-deadweight ratio decreases. As the power-deadweight ratio is smaller for new ships, it is expected that more icebreaker assistance and towing is needed in the future.

In addition, there seems to be a trend that for the EEDI-compliant vessels the assistance and towing times and distances are longer, and speeds are lower compared to non-compliant vessels.

All the above factors could result that more icebreaker capacity is needed in the future. However, as there are only very few actual EEDI vessels in service, it is not possible to draw very definite conclusions. It is recommended that similar research is done also for following winters in order to have more data and information about the performance of the new vessels which have been built according to the EEDI regulations.

Keywords: EEDI; Ice Class			
Client reference: W18-11 EEDIAssistance		**Project number:** 30383	**Language:** English
Pages, total: 98	**Attachments:** 4	**Distribution list:**	**Confidentiality:** Public

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NOMECLATURE & ABBREVIATIONS

AE	Auxiliary engine
B	Breadth
C_F	Carbon factor
CO_2	Carbon dioxide
DWT	Deadweight
EEDI	Energy efficiency design index
f_j	Correction factor for general cargo ships
f_{iCb}	Correction factor for improved ice-going capability
f_{jRoRo}	Ship specific correction factor for ro-ro ships
f_l	Correction factor for the loss of deadweight
GT	Gross tonnage
HFO	Heavy fuel oil
IMO	International maritime organization
LNG	Liquified natural gas
L_{pp}	Length between perpendiculars
ME	Main engine
MEPC	Marine Environment Protection Committee
P	Power
Ro-Ro	Roll on – roll off
SFC	Specific fuel consumption
T	Draught
∇	Displacement

1 INTRODUCTION

The energy efficiency design index (EEDI) will reduce the propulsion power of merchant ships in order to reduce harmful CO_2 -emissions. On the other hand, it is possible that the reduced propulsion power and unconventional bowshapes, which are highly optimized for open-water, could affect negatively to the ice-going capability of the merchant vessels. This study aims to provide statistical information regarding how new EEDI compliant vessels are performing in the actual winter conditions compared to older, more powerful vessels. From this information it is possible to investigate how much icebreaker assistance the EEDI compliant vessels need and what are the assistance speeds with EEDI compliant vessels compared to non-EEDI compliant vessels. These factors can influence on the size of the future icebreaker fleet.

The objective is to gather statistics of all the vessels entering the ports of the northern Baltic Sea ports during the icebreaking season and also to gather statistical information of the icebreakers' assistance events during the season. The EEDI compliant vessels will be distinguished from this data and compared to other vessels.

2 ENERGY EFFICIENCY DESIGN INDEX

The energy efficiency index is mandatory for new vessels of certain ship types and sizes (Table 2-1). The index is not described in detail in this report as the focus is in the effects EEDI. However, a short summary of the EEDI is presented below.

The energy efficiency index basically represents the amount of CO_2-emissions related to the carried cargo:

$$EEDI = \frac{CO_2 \text{ emission}}{\text{transport work}} \quad = \quad \text{EEDI} = \frac{\text{Engine power x SFC x } C_F}{\text{DWT x speed}} \ (gCO_2/\text{ton-mile})$$

In practice the formula used to calculate the EEDI-index is more complicated taking into account ship specific design elements with different type of correction factors (IMO resolution MEPC.308(73):

$$\frac{\left(\prod_{j=1}^{n} f_j\right)\left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}*\right) + \left(\left(\prod_{j=1}^{n} f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)}\right) C_{FAE} \cdot SFC_{AE}\right) - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}**\right)}{f_i \cdot f_c \cdot f_l \cdot Capacity \cdot f_w \cdot V_{ref}}$$

The vessels which are part of the EEDI regulations must attain a smaller EEDI value than the required EEDI related to their specific vessel type and size. The required EEDI is calculated based on ship type specific reference line which represents the EEDI as a function of ship size. Reduction factors are applied to the reference EEDI depending on the order date of the vessel.

Currently, some ships built in accordance with Phase 0 and Phase 1 requirements of EEDI are already sailing in the Northern Baltic Sea area.

Table 2-1: Ship types which are affected by the EEDI regulations, EEDI implementation phases, cut-off limits and reduction factors.

Ship Type	Size	Phase 0 1 Jan 2013 – 31 Dec 2014	Phase 1 1 Jan 2015 – 31 Dec 2019	Phase 2 1 Jan 2020 – 31 Dec 2024	Phase 3 1 Jan 2025 and onwards
Bulk carrier	20,000 DWT and above	0	10	20	30
	10,000 – 20,000 DWT	n/a	0-10*	0-20*	0-30*
Gas carrier	10,000 DWT and above	0	10	20	30
	2,000 – 10,000 DWT	n/a	0-10*	0-20*	0-30*
Tanker	20,000 DWT and above	0	10	20	30
	4,000 – 20,000 DWT	n/a	0-10*	0-20*	0-30*
Container ship	15,000 DWT and above	0	10	20	30
	10,000 – 15,000 DWT	n/a	0-10*	0-20*	0-30*
General Cargo ships	15,000 DWT and above	0	10	15	30
	3,000 – 15,000 DWT	n/a	0-10*	0-15*	0-30*
Refrigerated cargo carrier	5,000 DWT and above	0	10	15	30
	3,000 – 5,000 DWT	n/a	0-10*	0-15*	0-30*
Combination carrier	20,000 DWT and above	0	10	20	30
	4,000 – 20,000 DWT	n/a	0-10*	0-20*	0-30*
LNG carrier***	10,000 DWT and above	n/a	10**	20	30
Ro-ro cargo ship (vehicle carrier)***	10,000 DWT and above	n/a	5**	15	30
Ro-ro cargo ship***	2,000 DWT and above	n/a	5**	20	30
	1,000 – 2,000 DWT	n/a	0-5*,**	0-20*	0-30*
Ro-ro passenger ship***	1000 DWT and above	n/a	5**	20	30
	250 – 1,000 DWT	n/a	0-5*,**	0-20*	0-30*
Cruise passenger ship*** having non-conventional propulsion	85,000 GT and above	n/a	5**	20	30
	25,000 – 85,000 GT	n/a	0-5*,**	0-20*	0-30*

Note: n/a means that no required EEDI applies.

* Reduction factor to be linearly interpolated between the two values dependent upon ship size. The lower value of the reduction factor is to be applied to the smaller ship size.

** Phase 1 commences for those ships on 1 September 2015.

*** Reduction factor applies to those ships delivered on or after 1 September 2019, as defined in paragraph 43 of regulation 2.

2.1 CALCULATING EEDI

As there is only limited number of vessels in service which have been built to comply with the EEDI regulations, the EEDI is calculated also for older vessels which are not part of the EEDI regulations based on their age. This allows to have more data to compare the performance of the EEDI compliant and non-compliant vessels.

The EEDI calculations are done based on the IMO resolution MEPC.308(73). However, following simplifications, limitations and differences as listed in the next chapters should be noted.

2.2 REDUCTION FACTOR

Phase 1 reduction factors are used to calculate the EEDI for old vessels as it is the current EEDI phase. This means that the older vessels are compared whether they are compliant to Phase 1 regulations.

2.3 ICE CLASS CORRECTION FACTORS

The ice class correction factors are used as presented in MEPC.308(73) which have replaced the old correction factors given in MEPC.245(66). The new correction factors are related to the vessel's deadweight instead of its length. The ice class correction factors take the additional engine power, steel weight and lower block coefficient of an ice class ship when compared to an open-water ship into account.

2.4 CARGO-RELATED GEAR OF GENERAL CARGO VESSELS

It is not possible to attain information regarding the cargo-related gear (cranes, side loaders, Ro-Ro ramps) of general cargo ships and therefore it is not possible to calculate correction factor f_l, which takes the loss of deadweight into account for general cargo ships (MEPC.308(73), Annex 5, chapter 2.14). However, the error is assumed to be insignificant.

2.5 DISPLACEMENT

Displacement data is not available for all vessels. Displacement is needed for following corrections:

- Ice class related capacity correction for improved ice-going capability f_{iCb}. This correction is used only for tankers, bulkers and general cargo ships (MEPC.308(73), Annex 5, Chapter 2.2.11.1).
- Ship specific correction factor f_{jRoRo} for ro-ro cargo ships and ro-ro passenger ships (MEPC.308(73), Annex 5, chapter 2.2.8.3).
- Ship specific correction factor f_j for general cargo ships (MEPC.308(73), Annex 5, chapter 2.2.8.4).

The correction factors f_{iCb} and f_j for general cargo ships are assumed to be 1 if the displacement data is missing. These correction factors are close to 1 or exactly 1 in most cases and therefore the error due to missing displacement is assumed to be small.

On the other hand, for Ro-Ro vessels it is almost impossible to fulfil the EEDI requirement without the correction factor f_{jRoRo}. Therefore, the missing displacement is approximated with following formulas in order to calculate the correction factor:

- $\nabla_{roro,cargo} = 1.6926 * DWT - 24.12$
- $\nabla_{roro,passenger} = 0.38548 * GT + 5256.1$

These approximations are based on the data of ro-ro ships present in the port call data of 2017-2018 winter.

2.6 SHAFT GENERATORS OR MOTORS

The effect of shaft generators and motors or other energy efficient technologies are not taken into account in the EEDI calculations as the data of these devices is not available.

2.7 SPECIFIC FUEL CONSUMPTION

For the sake of simplicity, the specific fuel consumption of each vessel is estimated based on the engine type. The official reference EEDI lines have been calculated with constant 190 g/kWh consumption for main engines and 215 g/kWh for auxiliary engines and similar values are also used in this study.

Following values for specific fuel consumption are used when calculating the EEDI:

- 4-stroke diesel engine = 190 g/kWh
- 2-stroke diesel engine = 175 g/kWh
- 4-stroke dual-fuel engine running on LNG = 160 g/kWh (+ 6 g/kWh for pilot fuel)
- 2-stroke dual-fuel engine running on LNG = 147 g/kWh (+ 6 g/kWh for pilot fuel)
- Auxiliary engines = 215 g/kWh

Different values are used depending on the stroke type of the engine. The reason for this is that two-stroke engines are larger and heavier compared to 4-stroke engines. This affects to the ship parameters and therefore is taken into account in the calculations.

Following carbon content C_F values are used in the calculations:

- LNG = 2.750
- HFO = 3.114

3 DATA

The study is based on two sets of data:

- Port call data of the Finnish and Swedish ports
- Vessel data from IHS Seaweb database

The vessel data and port call data are combined based on the IMO number of the vessels.

The two data sets are described in more detail in the following chapters.

3.1 PORT CALL DATA

Port call data contains the port call data of the Finnish and Swedish ports including icebreaker assistance information during the periods when there have been traffic restrictions due to ice conditions. The data is available for winters 2017-2018, 2016-2017 and 2015-2016. Data is provided by the Finnish Transport Agency. The data contains following information (information both for arrival & departure):

- IMO number
- Name of the vessel
- Ice class
- Ship type
- Did the vessel need icebreaker assistance during its visit?
- Distance assisted
- Duration of the assistance
- Was the vessel towed?
- Distance of towing
- Duration of towing

Only the ports of the northern Baltic Sea are included in the research. The ports are categorized into port groups based on their geographical position:

- Finland:
    - Area 1 (FIN_1): North of Raahe
    - Area 2 (FIN_2): Raahe – Vaasa
    - Area 3 (FIN_3): Vaasa – Rauma

- Area 4 (FIN_4): Rauma – Hanko
- Area 5 (FIN_5): Hanko – Kotka
- Area 6 (FIN_6): East of Kotka

- Sweden:
  - Area 1 (SWE_1): North of Haraholmen
  - Area 2 (SWE_2): Haraholmen – Umeå
  - Area 3 (SWE_3): Umeå – Söderhamn
  - Area: 4 (SWE_4): Söderhamn – Stockholm

The geographical locations of the port groups are presented in. Figure 3-1. A detail list of the ports in each port group is presented in Appendix 1.

All the vessels which are discussed in the following chapters refer to ships which have visited the ports listed above during winters 2015-2016 to 2017-2018.

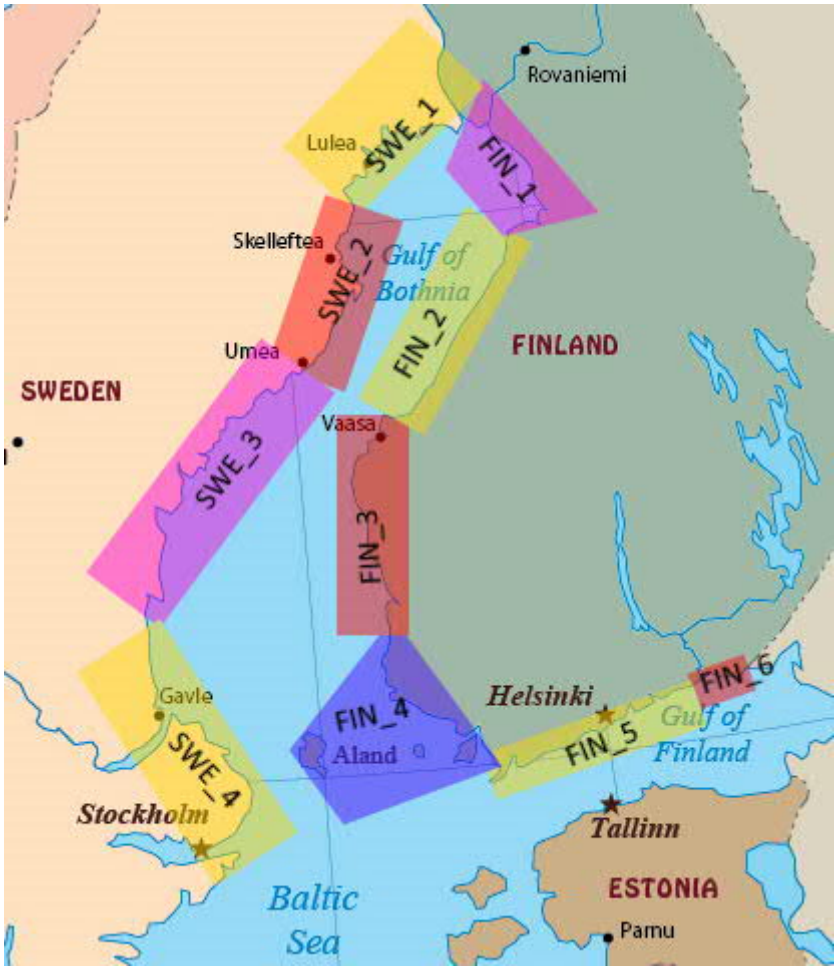


Figure 3-1: A schematic presentation of the geographical locations of the different port groups.

3.2 VESSEL DATA

Vessel data is acquired from IHS Maritime Seaweb database. This data is used to calculate the EEDI index and other ship parameters of all vessels listed in the port call data. Following information is gathered:

- IMO number
- Vessel name
- Order Date
- Ship type
- Main particulars: L_{pp}, B, T
- Deadweight
- Gross Tonnage
- Displacement
- Cargo tank volume
- Service speed
- Main engine power
- Engine stroke type
- Fuel type

The ships are divided into following categories based on their EEDI compliance:

- **Phase 0 & 1**: new vessels which have been built according to the EEDI regulations.
- **EEDI-compliant:** old vessels which do not need to comply the EEDI regulations based on their age but fulfil the required EEDI (Phase 1).
- **Non-compliant**: old vessels which do not need to comply the EEDI regulations and have larger attained EEDI value than the required EEDI (Phase 1).
- **N/A**: ships which are not part of the EEDI regulations due to their size (cut-off limits) or type.

Only ice classes IA Super, IA, IB, IC are included in the data set and analysis. In addition, only vessels which have visited the ports listed in the previous chapter are included in the analysis. The calculated EEDI values for different vessel types of the data set are presented in Figure 3-2 through Figure 3-9.
In Figure 3-10 to Figure 3-15 is presented summaries of the EEDI-compliancy of the different vessels and how the port calls are divided based on the EEDI-compliancy on different winters. In Figure 3-16 to Figure 3-21 is presented how different ship types are represented.

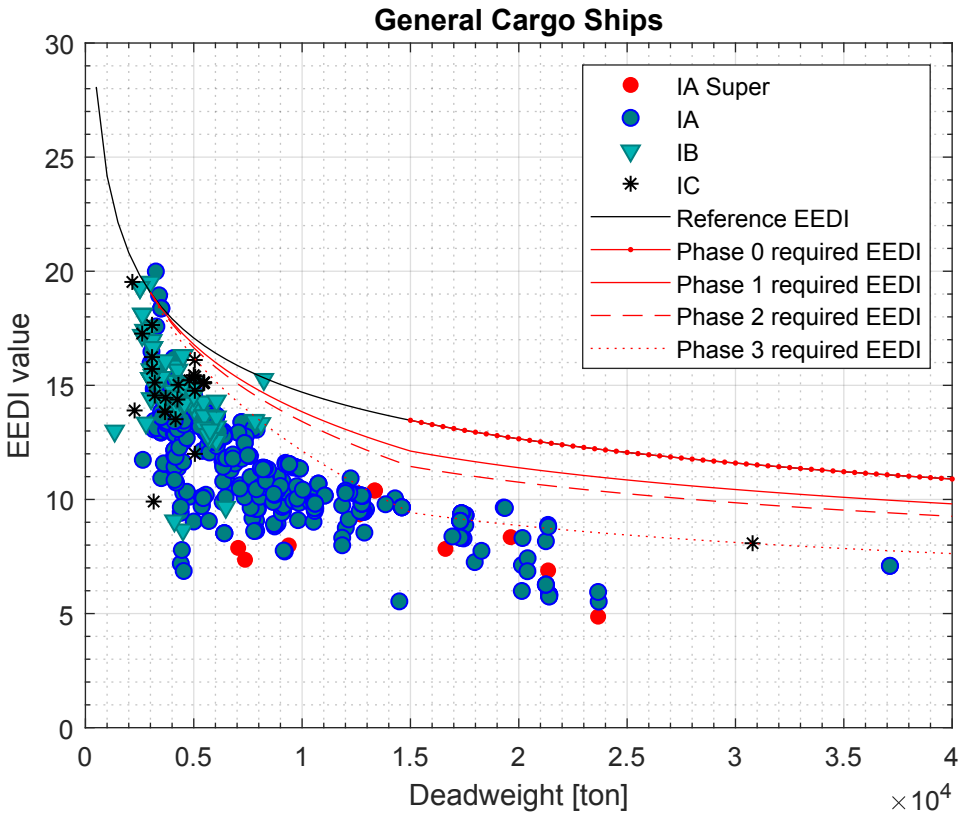


Figure 3-2: Calculated EEDI values of the general cargo ships in the data set.

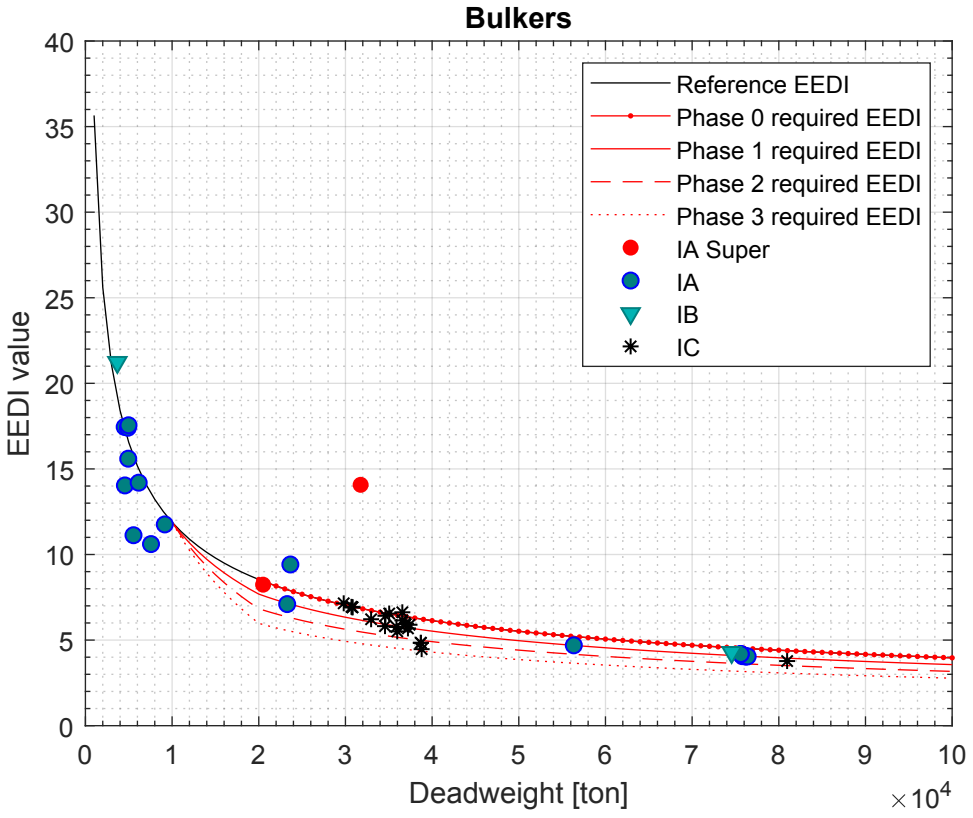


Figure 3-3: Calculated EEDI values of the bulkers in the data set.

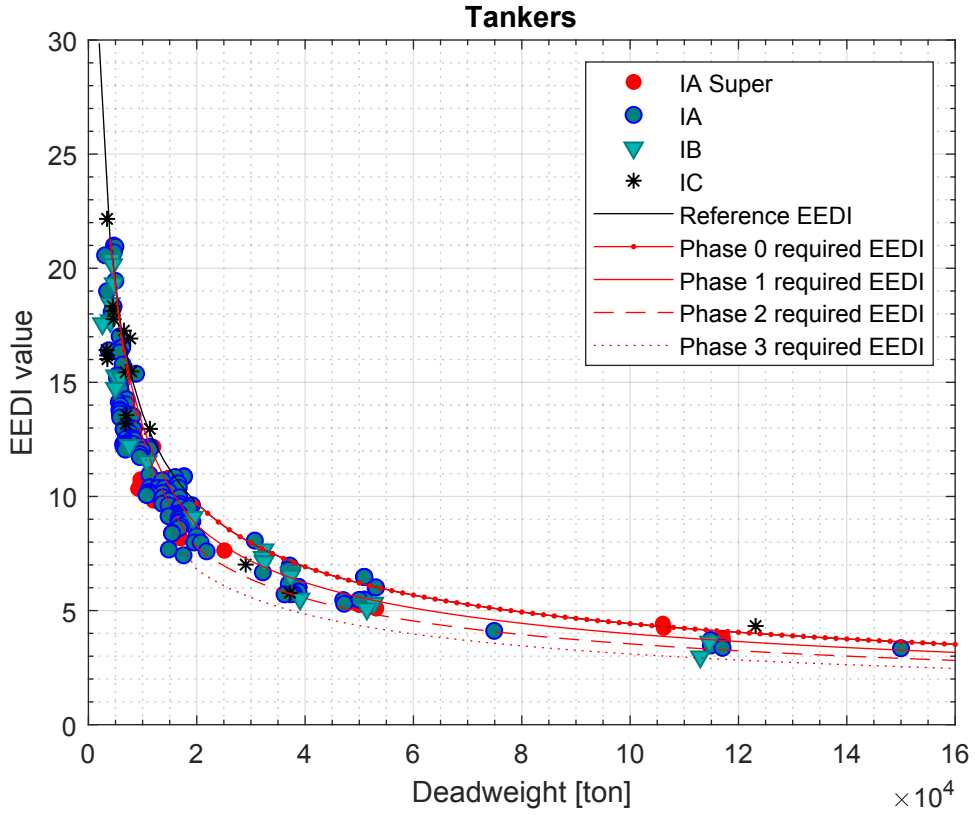


Figure 3-4: Calculated EEDI values of the tankers in the data set.

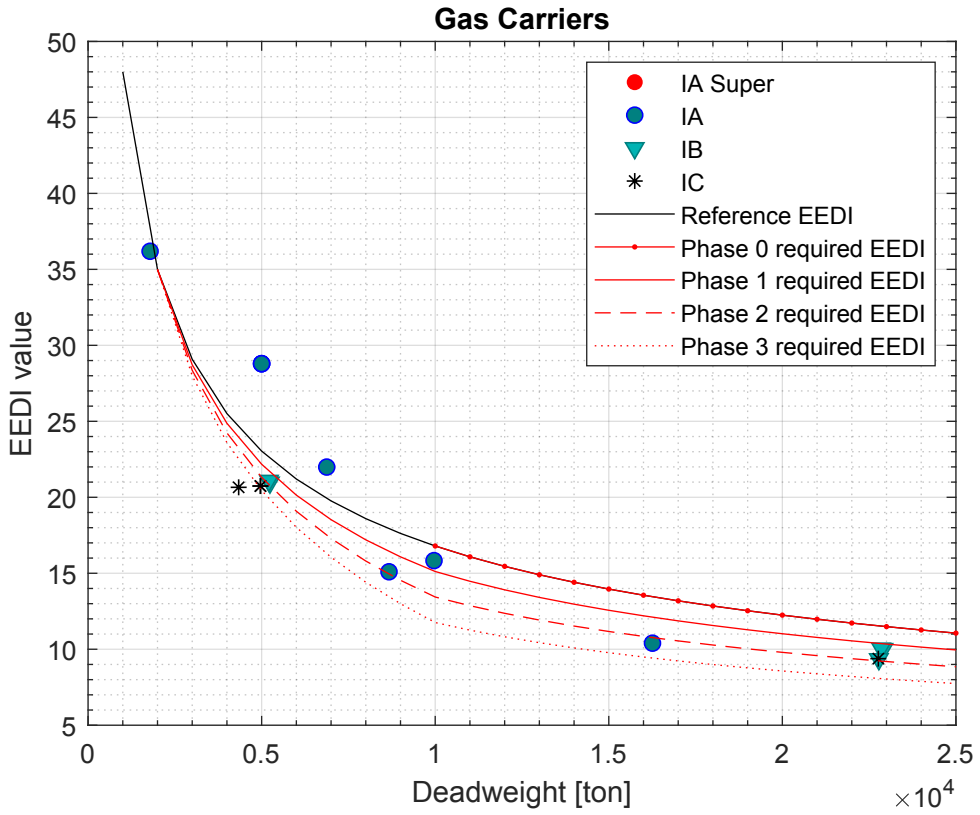


Figure 3-5: Calculated EEDI values of the gas carriers in the data set.

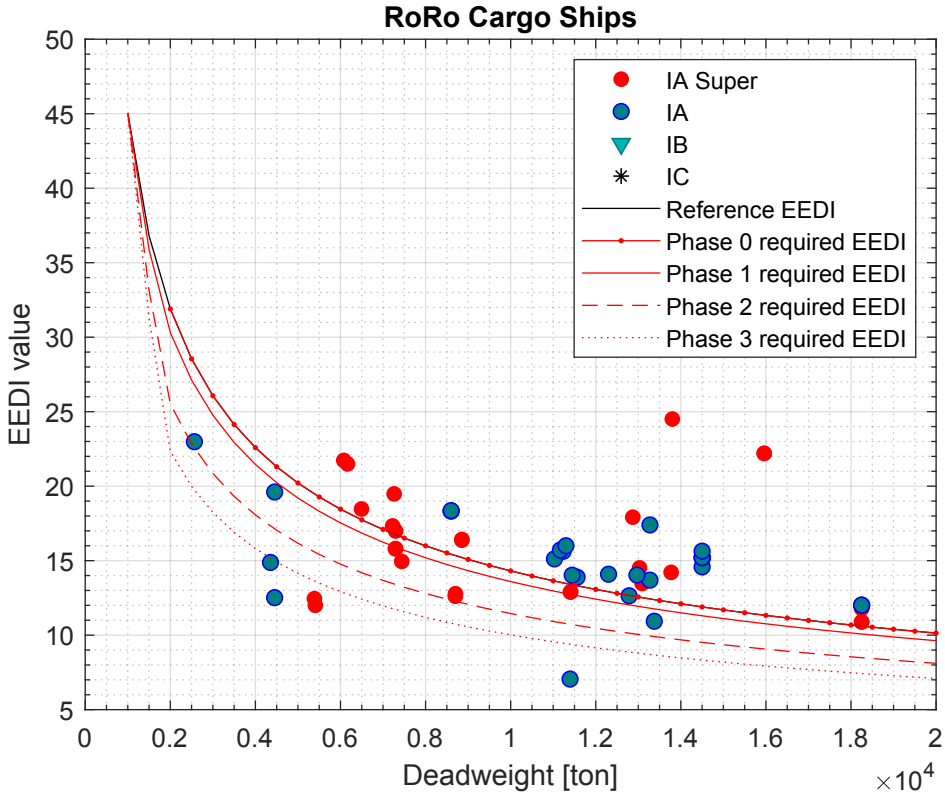


Figure 3-6: Calculated EEDI values of the RoRo cargo ships in the data set.

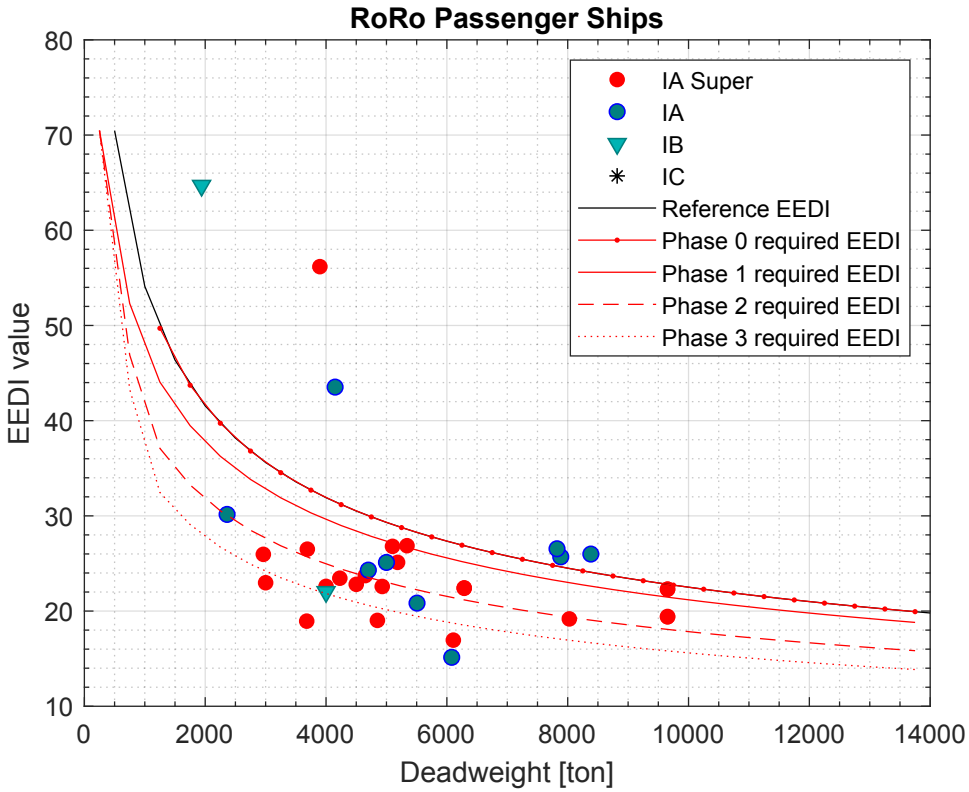


Figure 3-7: Calculated EEDI values of the RoRo passenger ships in the data set The three vessels with clearly higher EEDI value are built in the 1970's.

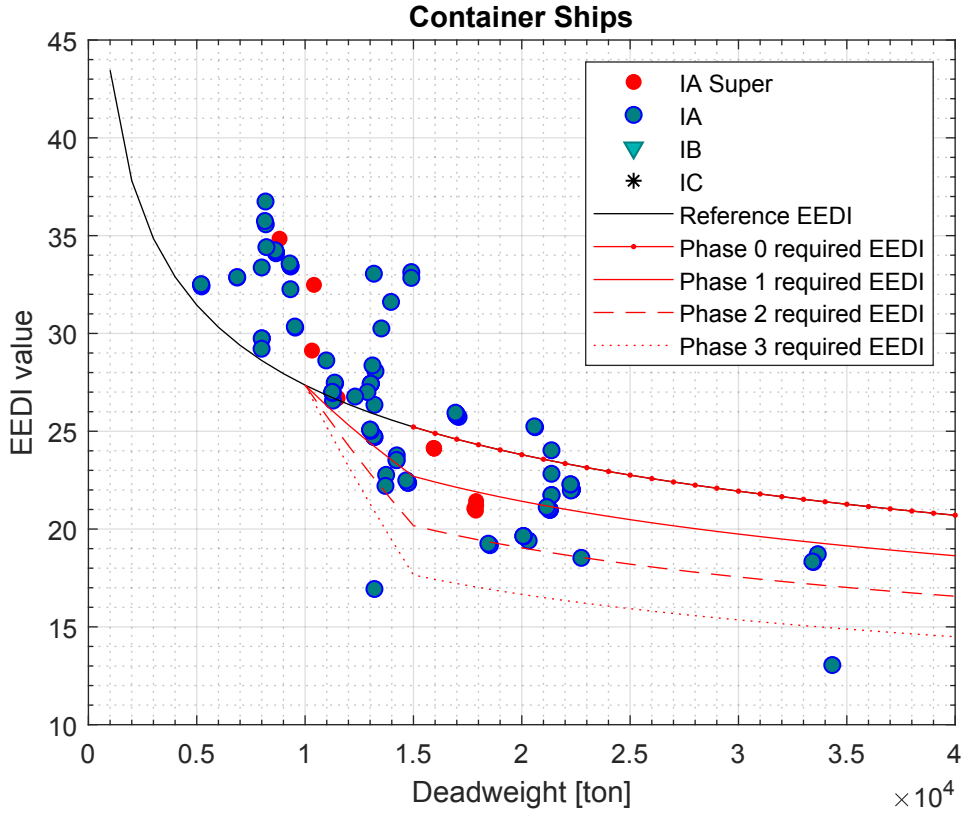


Figure 3-8: Calculated EEDI values of the container ships in the data set.

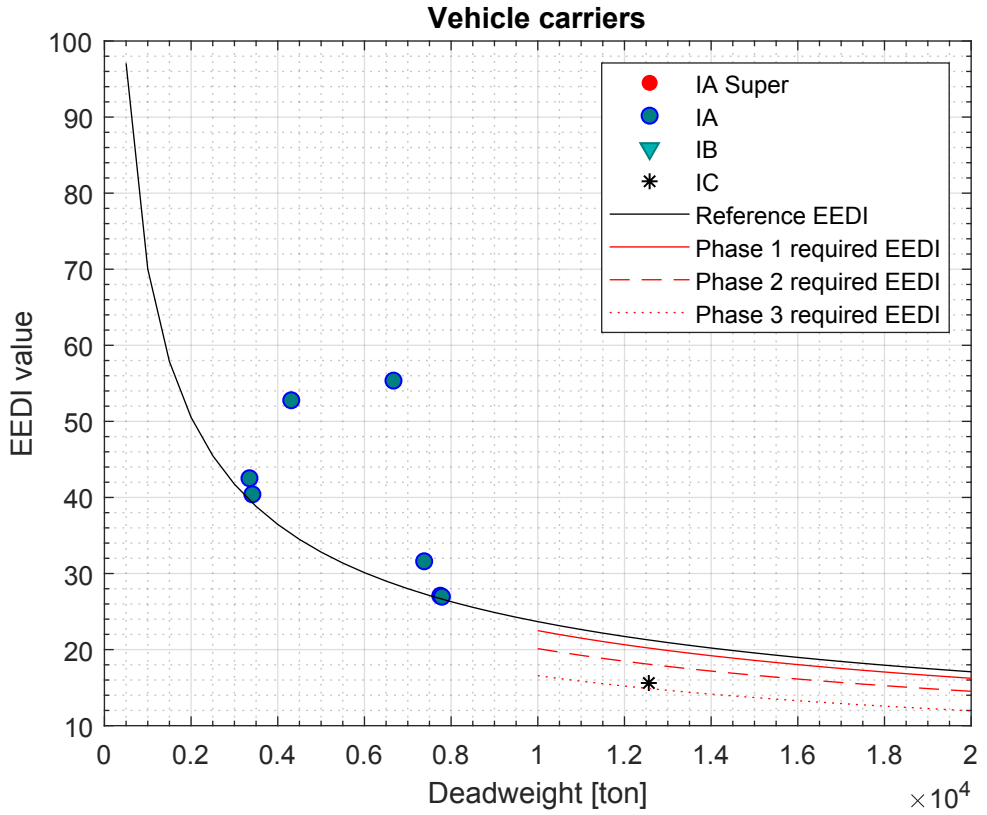


Figure 3-9: Calculated EEDI values of the vehicle carriers in the data set. Only vessels with DWT/GT<0.3 presented.

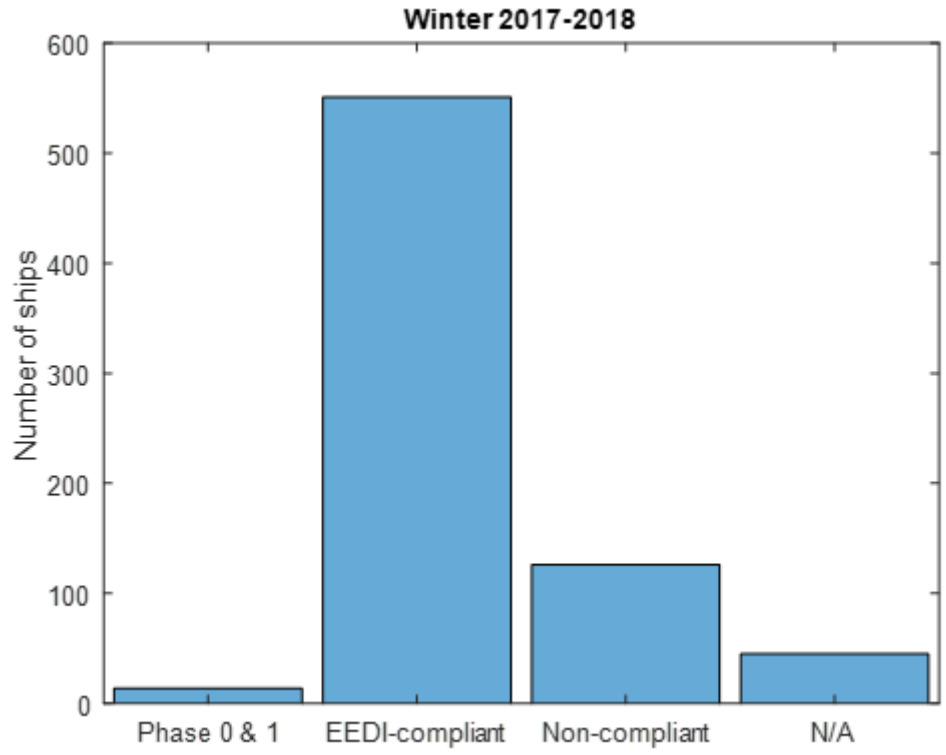


Figure 3-10: Histogram of the EEDI-compliancy of different vessels observed during winter 2017-2018.

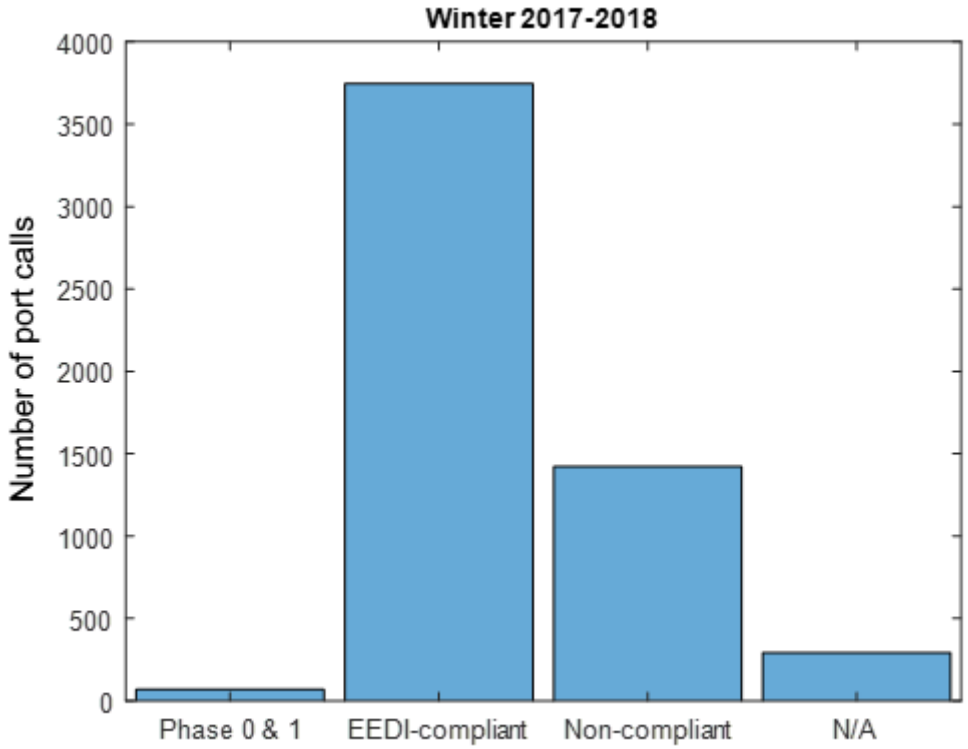


Figure 3-11: Summary on how the port calls are divided based on the EEDI-compliancy on winter 2018-2017.

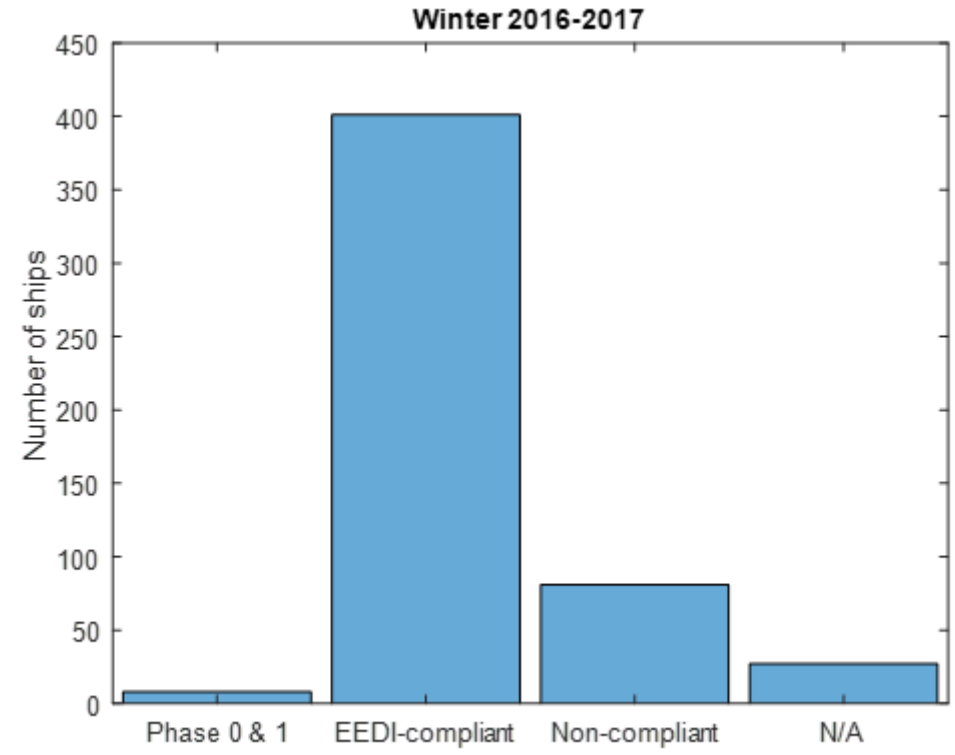


Figure 3-12: Histogram of the EEDI-compliancy of different vessels observed during winter 2016-2017.

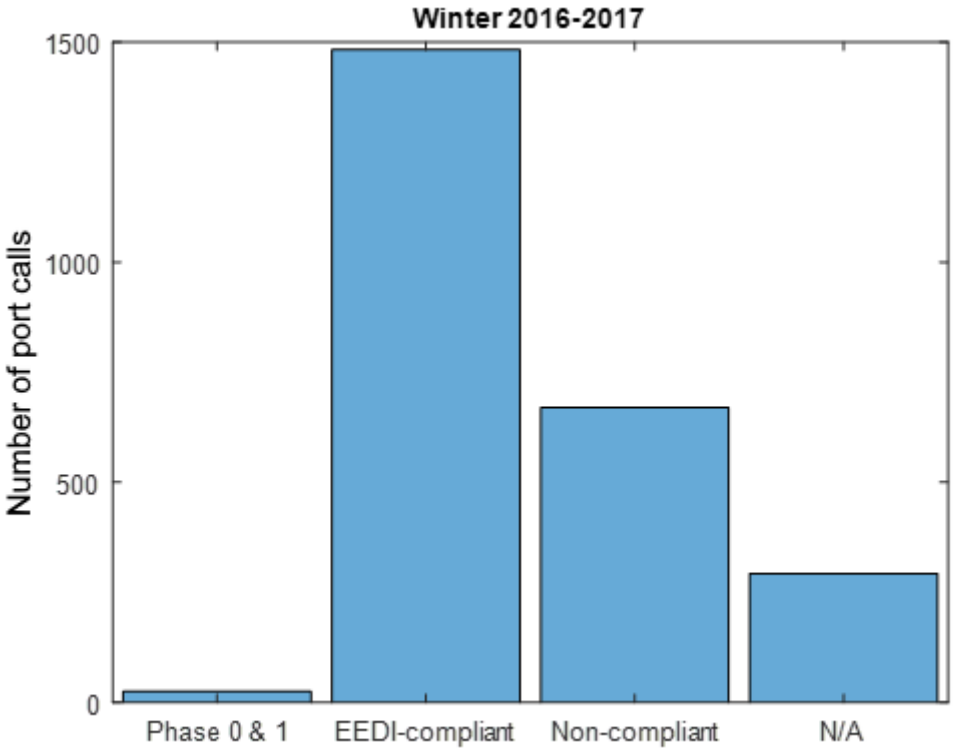


Figure 3-13: Summary on how the port calls are divided based on the EEDI-compliancy on winter 2016-2017.

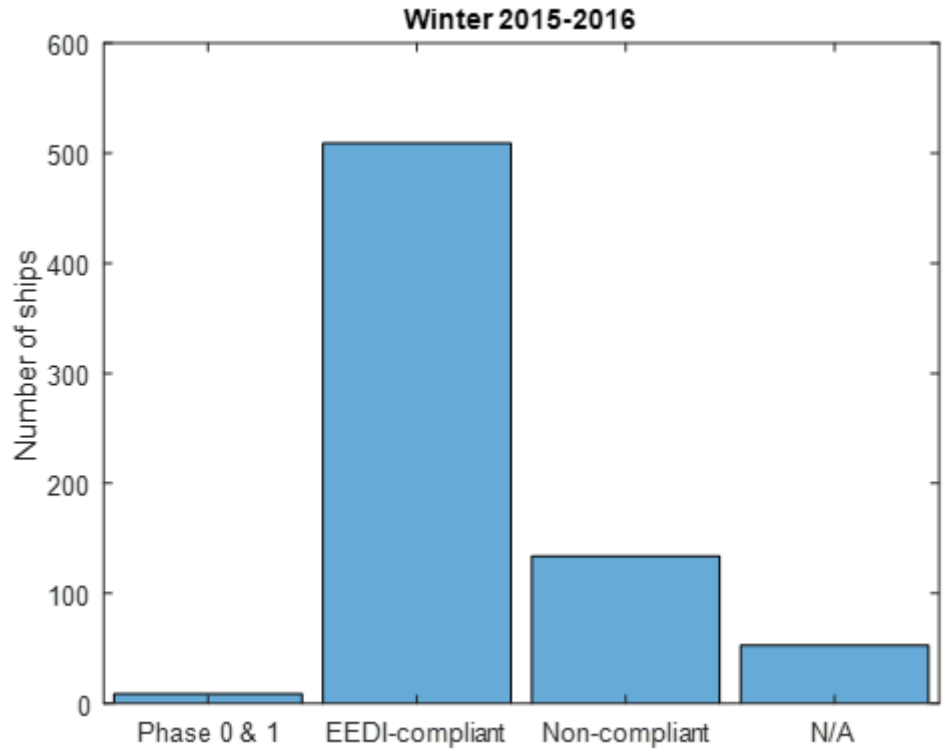


Figure 3-14: Histogram of the EEDI-compliancy of different vessels observed during winter 2015-2016.

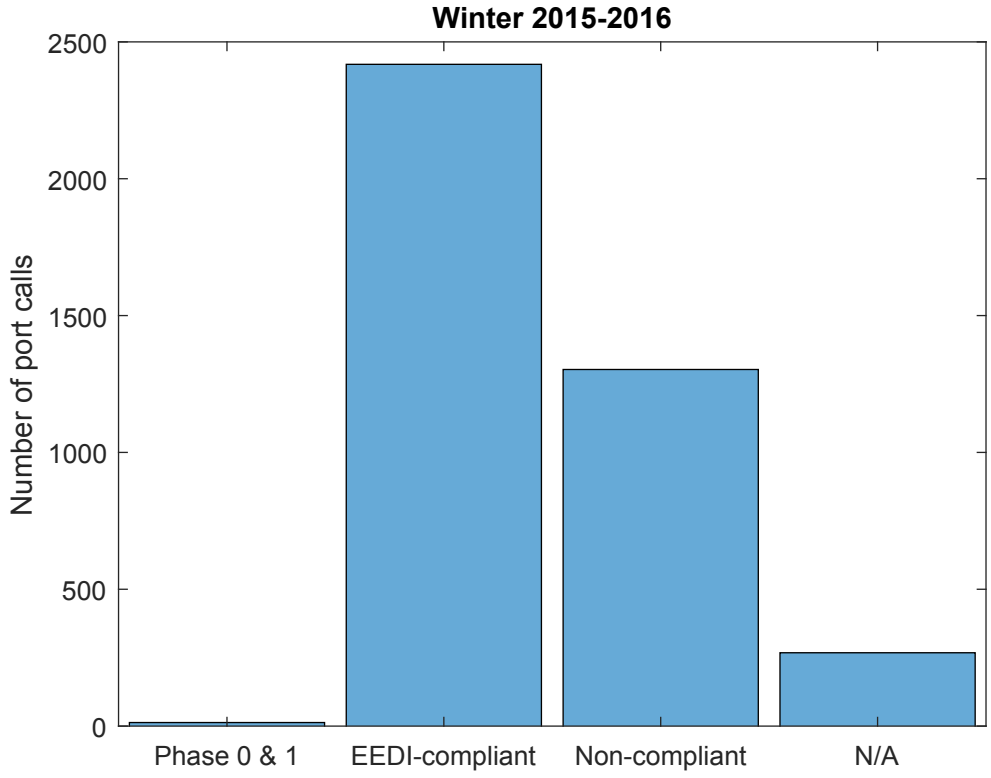


Figure 3-15: Summary on how the port calls are divided based on the EEDI-compliancy on winter 2015-2016.

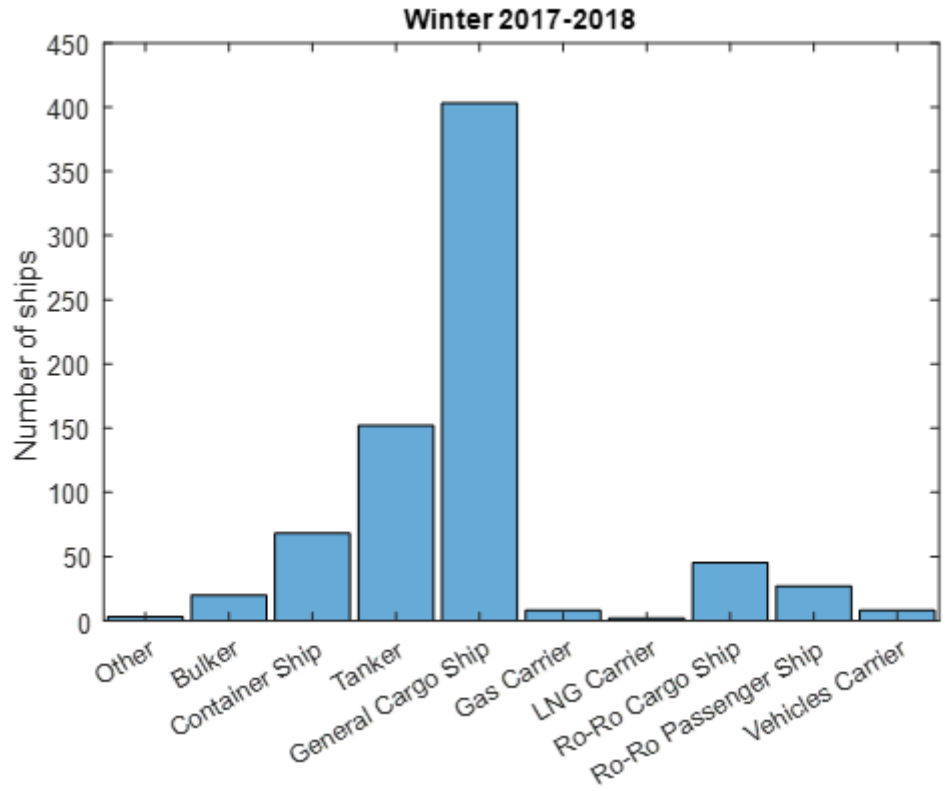


Figure 3-16: Summary of the ship type of different vessels observed during winter 2017-2018.

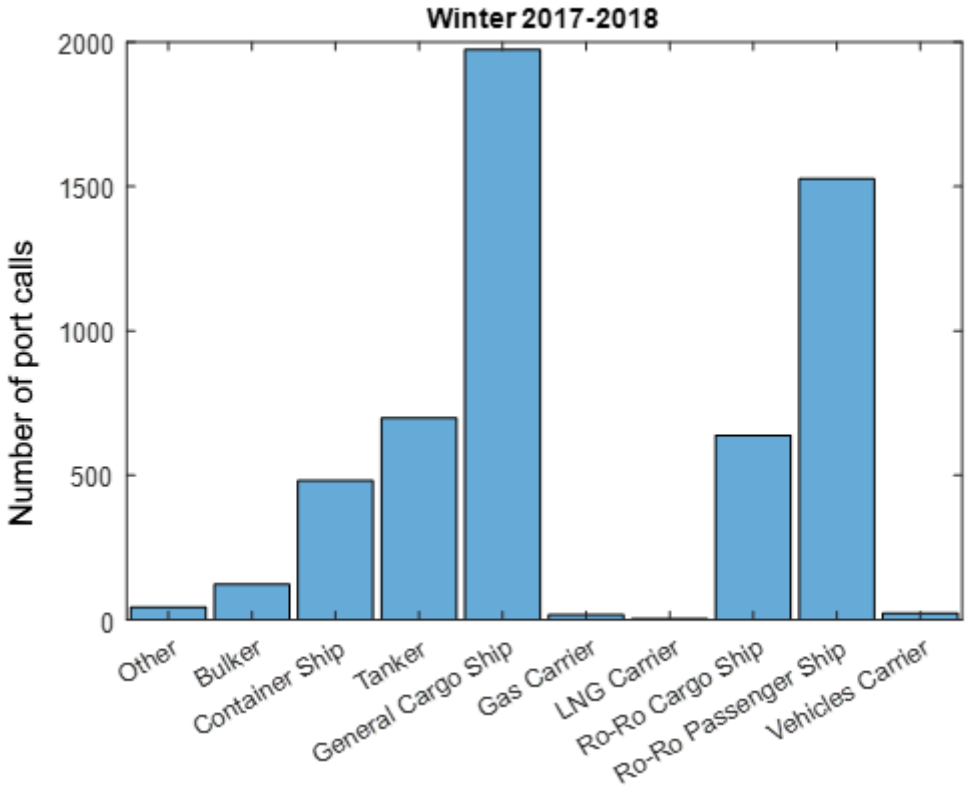


Figure 3-17: Summary on how the port calls are divided based on the ship type on winter 2017-2018.

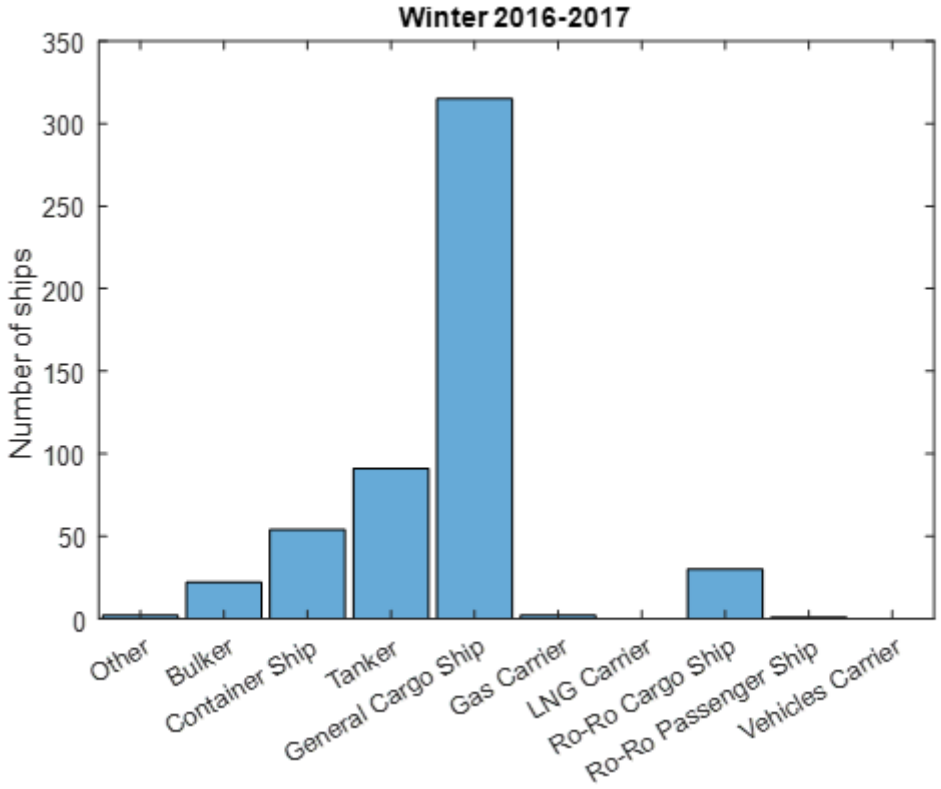


Figure 3-18: Summary of the ship type of different vessels observed during winter 2016-2017.

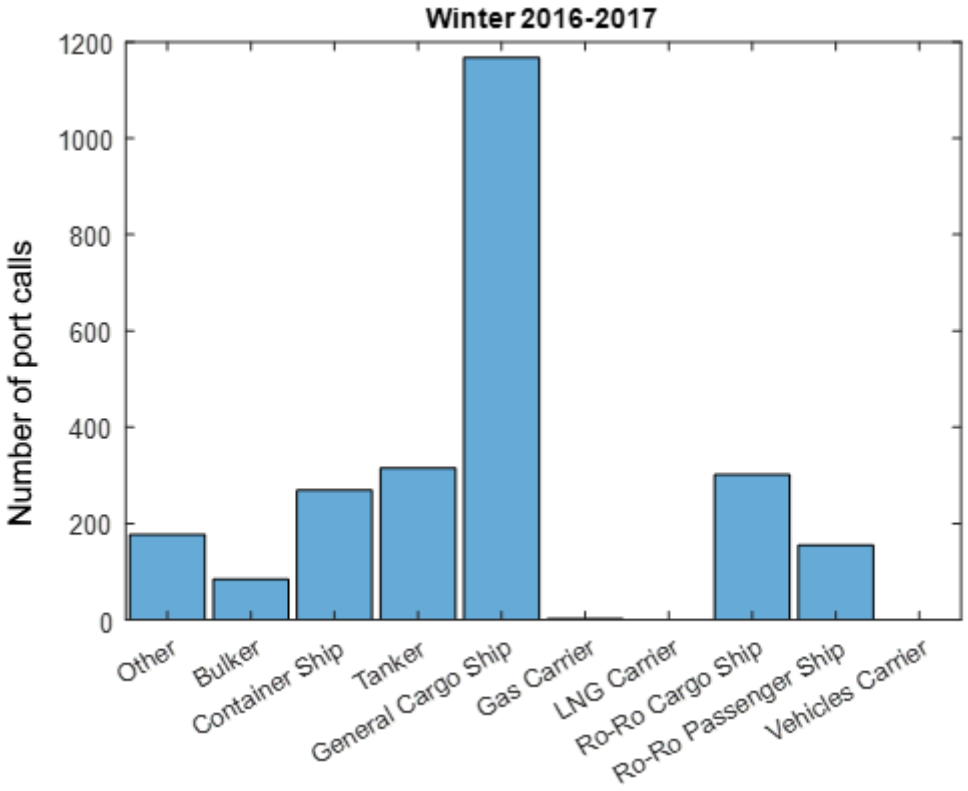


Figure 3-19: Summary on how the port calls are divided based on the ship type on winter 2016-2017.

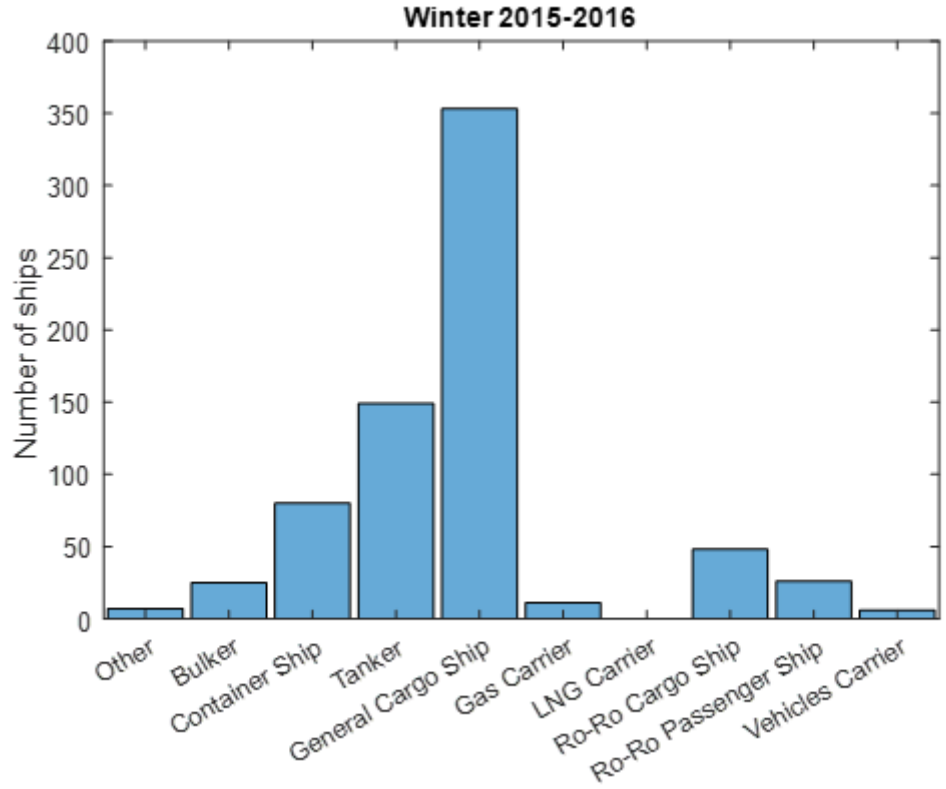


Figure 3-20: Summary of the ship type of different vessels observed during winter 2015-2016.

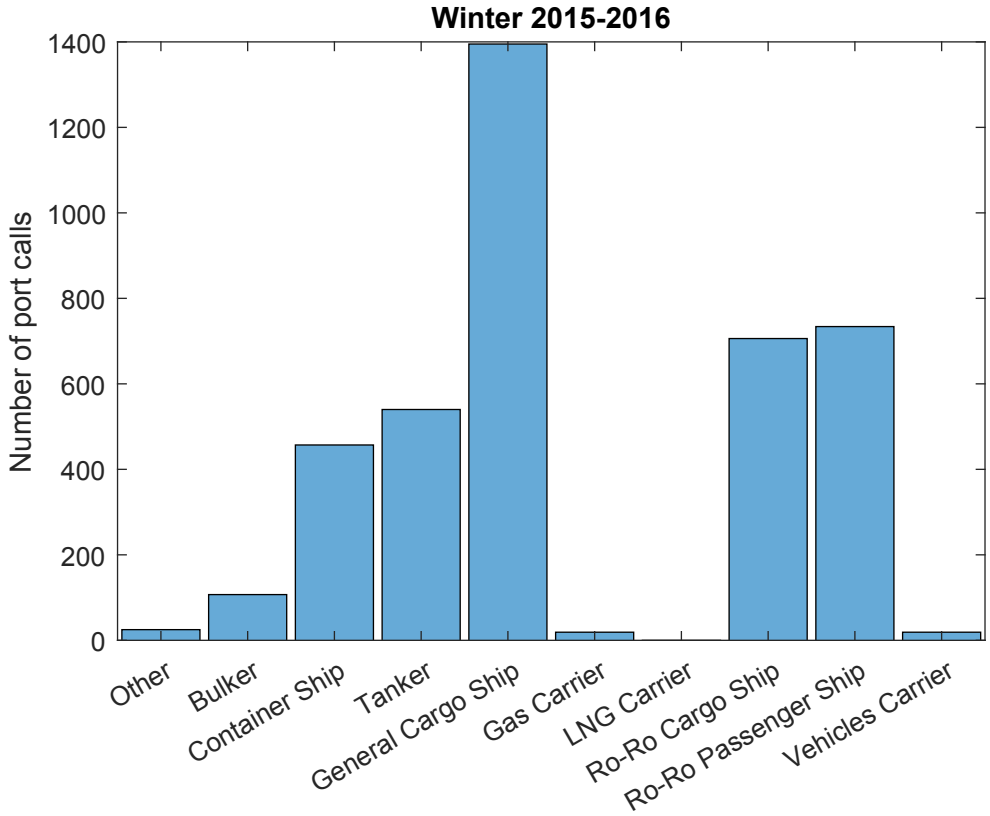


Figure 3-21: Summary on how the port calls are divided based on the ship type on winter 2015-2016.

It is interesting to observe that majority of the old vessels would fulfil required EEDI value (Phase 1) related their ship type and size.

Summary of the size (deadweight) of all different ships which have visited ports during winters 2015-2016 to 2017-2018 is presented Figure 3-22. It can be seen that the majority of the vessels are relatively small, typically less than 10 000 DWT.
From Figure 3-16 to Figure 3-21 it is clearly visible that majority of the port calls are made by general cargo ships. In Figure 3-23 is presented a histogram of the size of the different general cargo ships which have been observed during the past three winters.

A typical vessel during the observed winters has been a general cargo ship with deadweight between 4000 - 6000 tons. This is close to the cut-off limit (3000 DWT), making it probably easier to fulfil the EEDI requirements. This most likely explains the big number of EEDI compliant old vessels.

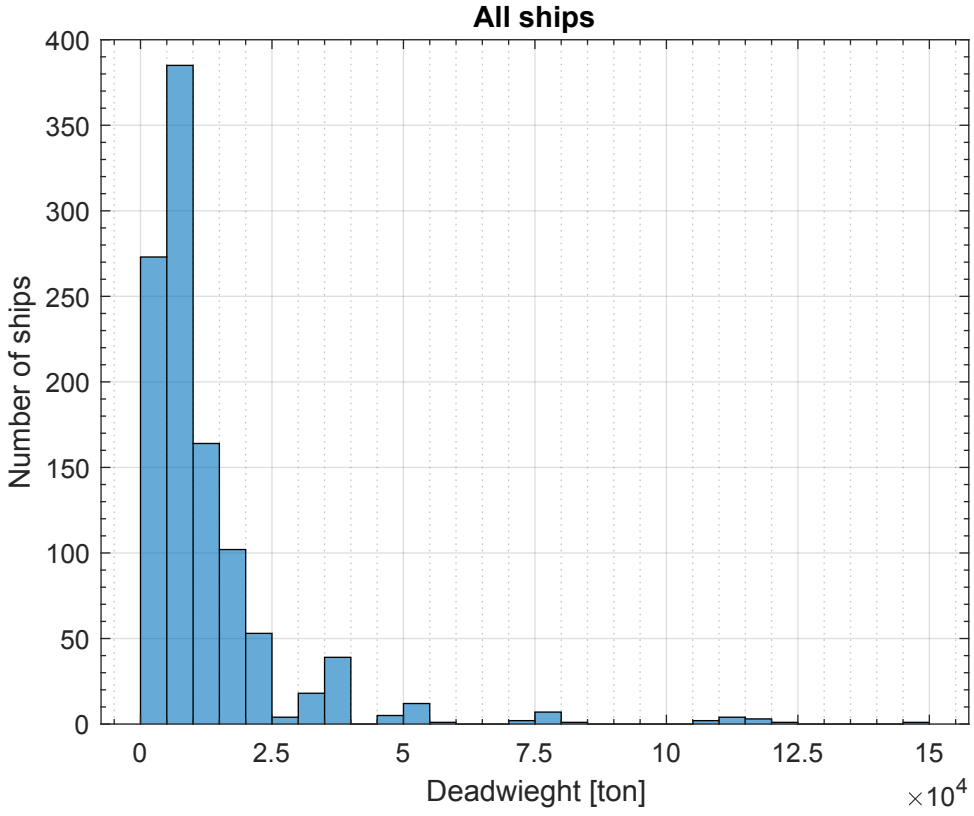


Figure 3-22: Histogram of the size of all ships during winters 2015-2016 to 2017-2018.

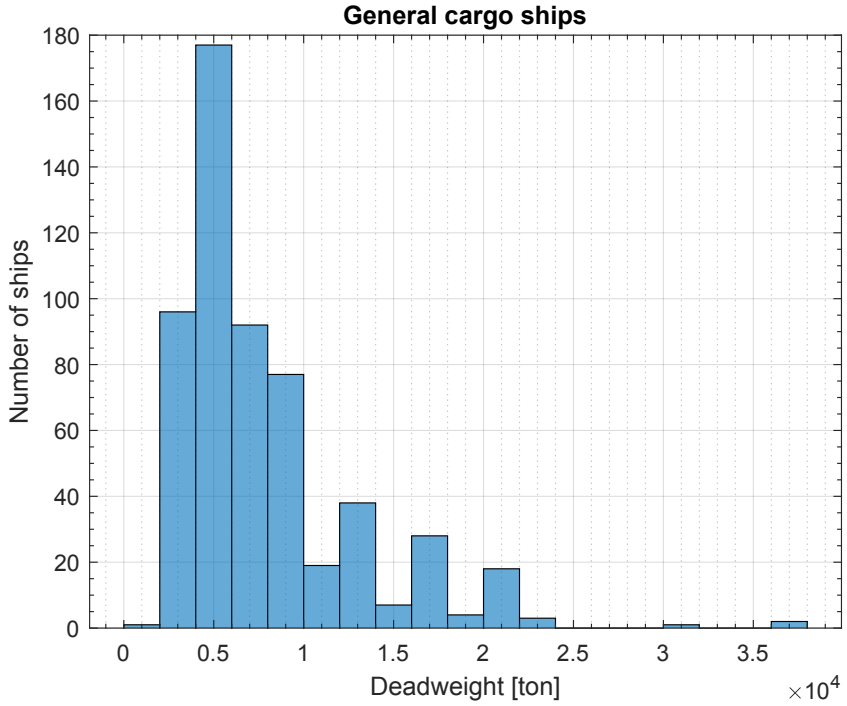


Figure 3-23: Histogram of the ship size of all general cargo ships observed during winters 2015-2016 to 2017-2018.

3.2.1 EEDI PHASE 0 AND 1 VESSELS, POWER-DEADWEIGHT RATIO

Based on the figures and summaries of the previous chapter, it is evident that only few new EEDI regulated vessels have visited the Finnish and Swedish ports during the previous three winters. A summary of the different Phase 0 and Phase 1 vessels is presented in Table 3-1.

Table 3-1: Summary of the new Phase 0 & 1 vessels.

EEDI_Phase	ShipType	ICE	OrderDate	LengthBP	Breadth	Draught	Deadweight	ServiceSpeed	TotalKWMainEng
Phase 1	Ro-Ro Cargo Ship	IA	01.11.2015	182	26.2	7.63	12 784	18	12000
Phase 1	General Cargo Ship	IA	01.01.2015	101.2	13.6	6.13	5 019	10.5	1650
Phase 1	General Cargo Ship	IA	01.01.2015	101.2	13.6	6.13	5 019	10.5	1650
Phase 1	General Cargo Ship	IA	01.03.2015	186.4	28.5	11	37 125	14.8	10470
Phase 1	General Cargo Ship	IA	01.03.2015	186.4	28.5	11	37 130	14.8	10470
Phase 1	General Cargo Ship	IA	01.09.2015	84.99	13.35	7.23	5 790	12	1950
Phase 1	General Cargo Ship	IA	01.09.2015	100.59	13.35	6.91	6 706	12	1950
Phase 0	Chemical/Products Tanker	IA	01.02.2013	176	27.4	11.916	38 734	14	8502
Phase 0	Chemical/Products Tanker	IA	01.02.2013	176	27.4	11.916	38 734	14	8502
Phase 0	Chemical/Products Tanker	IA	01.02.2013	176	27.34	11.916	38 734	14	8502
Phase 0	Chemical/Products Tanker	IA	01.02.2013	176	27.34	11.916	38 734	14	8502
Phase 0	Chemical/Products Tanker	IA	01.04.2013	176	27.4	11.92	38 734	14.5	8502
Phase 0	Chemical/Products Tanker	IA	01.04.2013	176	27.4	11.92	38 734	14.5	8502
Phase 0	Chemical/Products Tanker	IA	01.04.2013	176	27.4	11.916	38 734	14.5	8502
Phase 0	Chemical/Products Tanker	IB	01.12.2013	176	27.4	11.9	39 067	14.4	7290
Phase 0	Crude Oil Tanker	IB	01.03.2014	242	44	15.023	112 949	15	11820
Phase 0	Bulk Carrier	IC	01.05.2013	177	32	10.5	38 690	14	6100
Phase 0	Bulk Carrier	IC	01.05.2013	195.5	23.76	10.857	34 564	14	6400
Phase 0	Bulk Carrier	IC	01.07.2013	176.97	32	10.518	38 792	15.1	6100
Phase 0	Bulk Carrier	IC	01.11.2013	176.97	32	10.5	38 709	14	6100
Phase 0	Bulk Carrier	IA	01.10.2013	220	32.26	14.42	76 180	14.5	12000
Phase 0	Bulk Carrier	IA	01.10.2013	220	32.26	14.429	75 800	14.5	12000
Phase 0	Bulk Carrier	IC	01.10.2013	225.53	32.26	14.5	80 959	14.3	9930

Total of 23 different Phase 0 & 1 compliant vessels have visited the Finnish and Swedish ports during the previous three winters. Some of the vessels are clearly sister ships based on the similar particulars, limiting the amount of totally different designs built according to the EEDI-regulations.

The engine power as a function of deadweight and distributions of the deadweight-power ratios for different vessel types are presented in Figure 3-24 to Figure 3-30. Only vessel types which contain new vessels built to fulfil EEDI regulations are presented. The figures include all different vessels observed in the data set of past three winters for each vessel type. It should be noted that the ice classes are not categorized in the figures as all ice classes (IA-Super, IA, IB & IC) are included in them. The deadweight-power distribution figures are normalized based on probability in order to compare different sample sizes of different EEDI-compliancy categories. The N/A category is not included in the distributions for the sake of simplicity.

For general cargo ships, tankers and bulkers it seems that the power ratio of the new Phase 0 and 1 compliant vessels is on the lower edge compared to other vessels meaning that the new EEDI-regulated vessels seem to be less powerful. However, it should be noted that there are only few different EEDI-compliant designs to compare to older vessels.

For Ro-Ro cargo ships it is not possible to conclude anything about the power-deadweight ratios as there has been only one vessel which has been built according to the EEDI regulations.

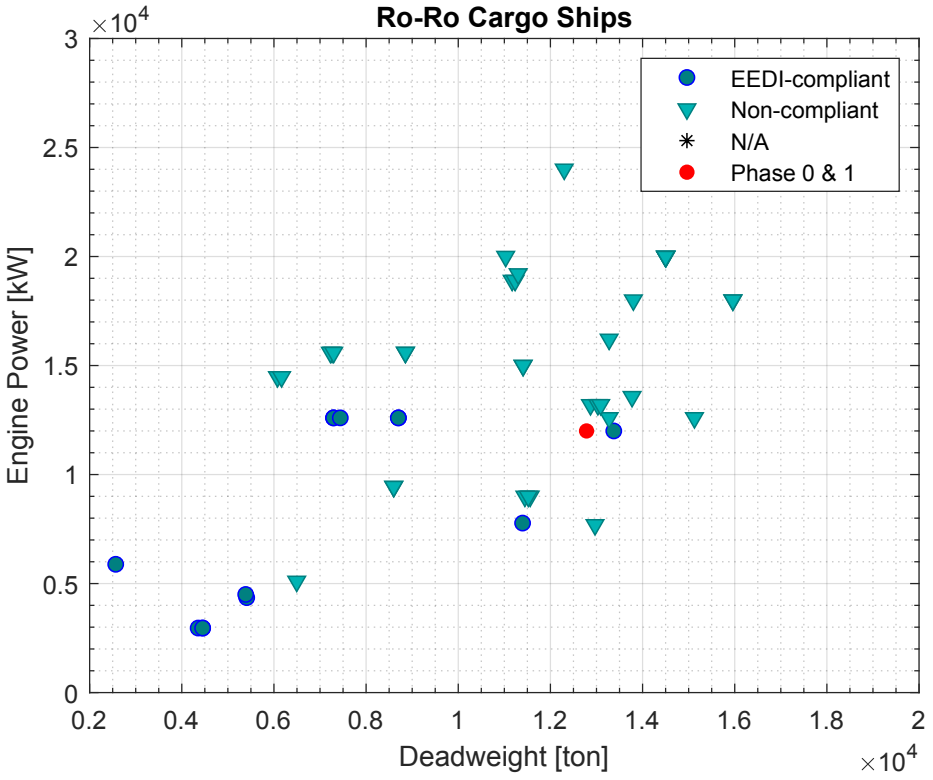


Figure 3-24: Engine power as a function of deadweight for Ro-Ro cargo ships.

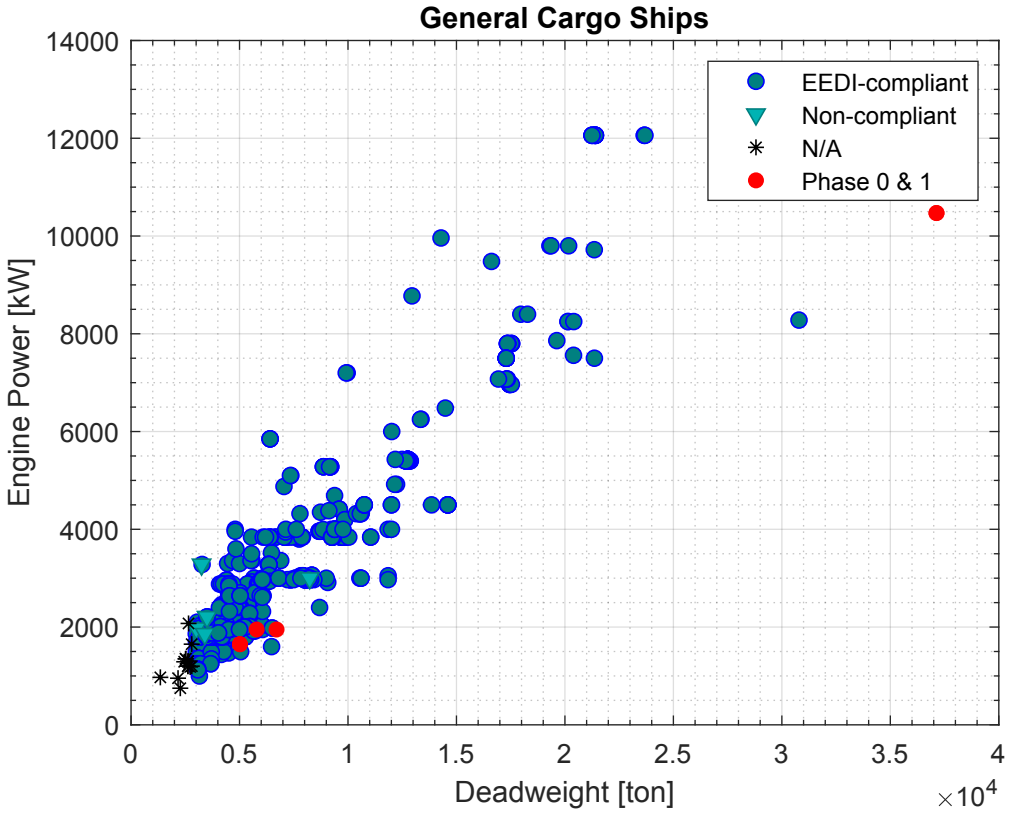


Figure 3-25: Engine power as a function of deadweight for general cargo ships.

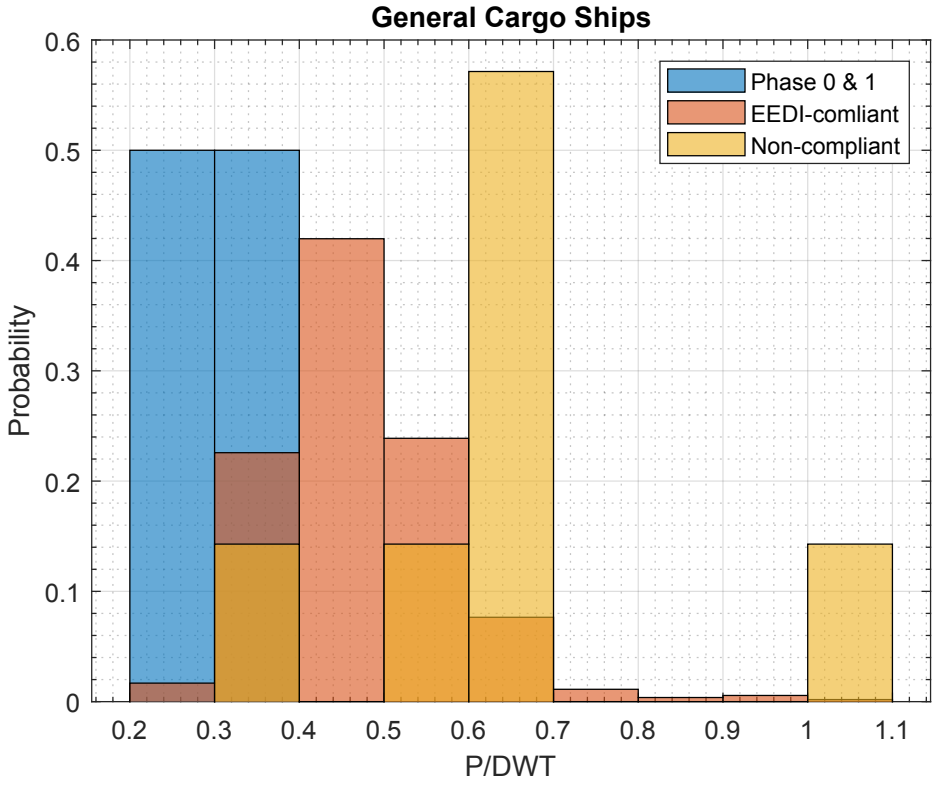


Figure 3-26: Distribution of the power-deadweight ratio based on the EEDI-compliancy for general cargo ships. The colors which are not listed in the legend refer to cases where the different distributions overlap.

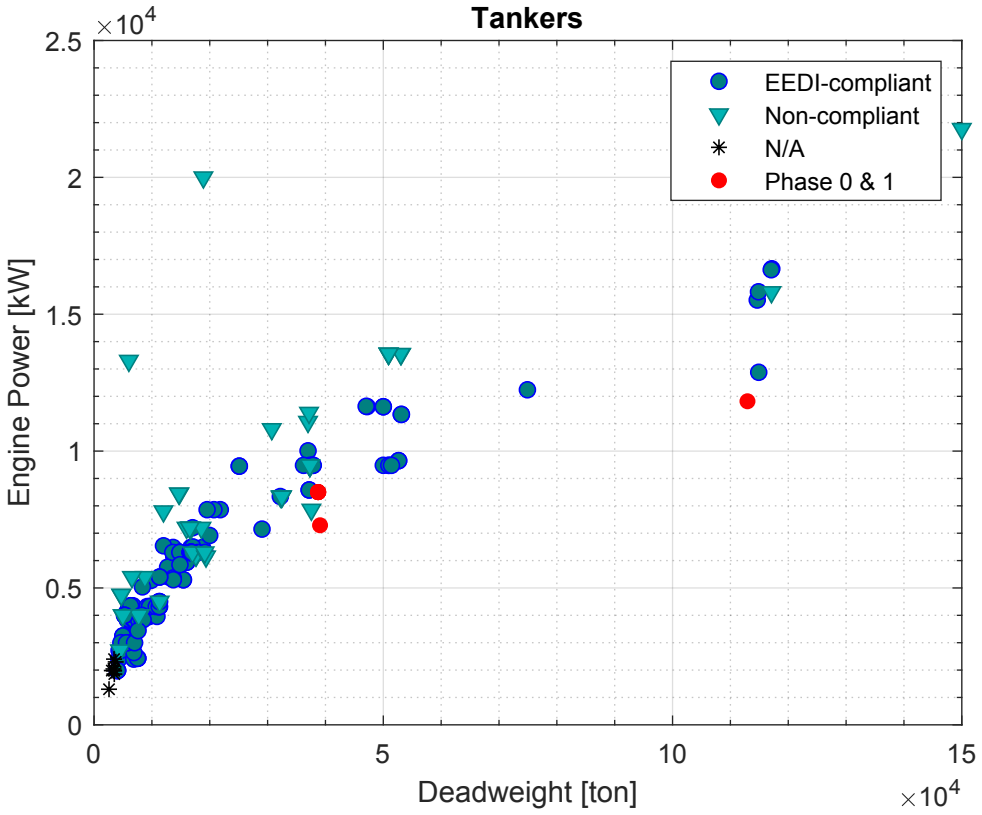


Figure 3-27: Engine power as a function of deadweight for tankers.

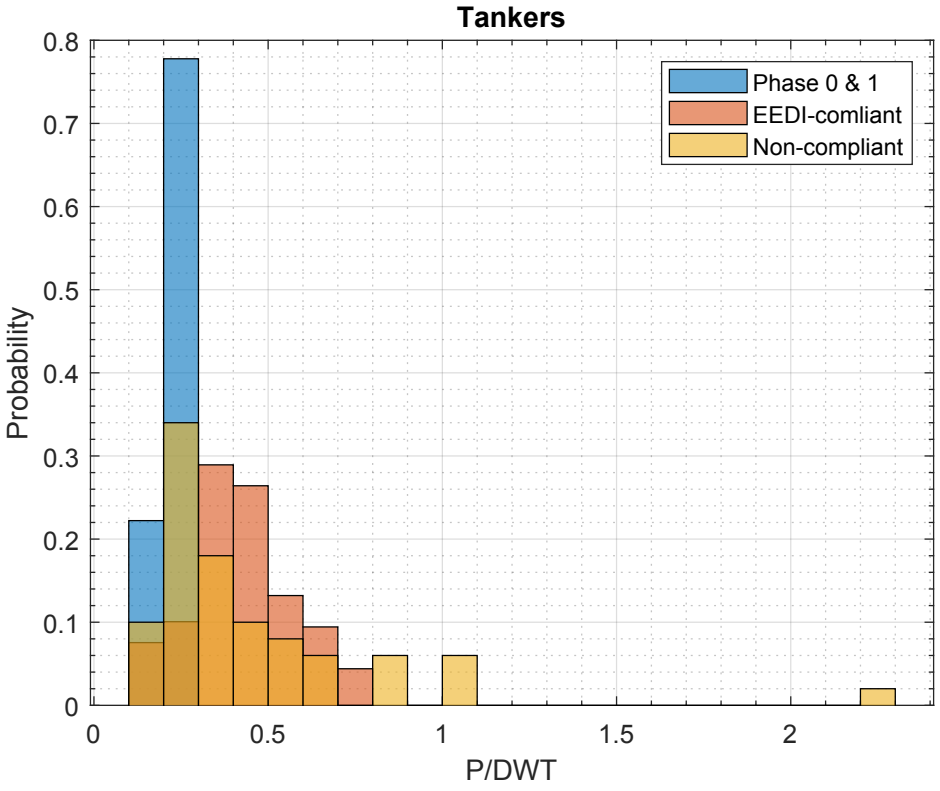


Figure 3-28: Distribution of the power-deadweight ratio based on the EEDI-compliancy for tankers. The colors which are not listed in the legend refer to cases where the different distributions overlap.

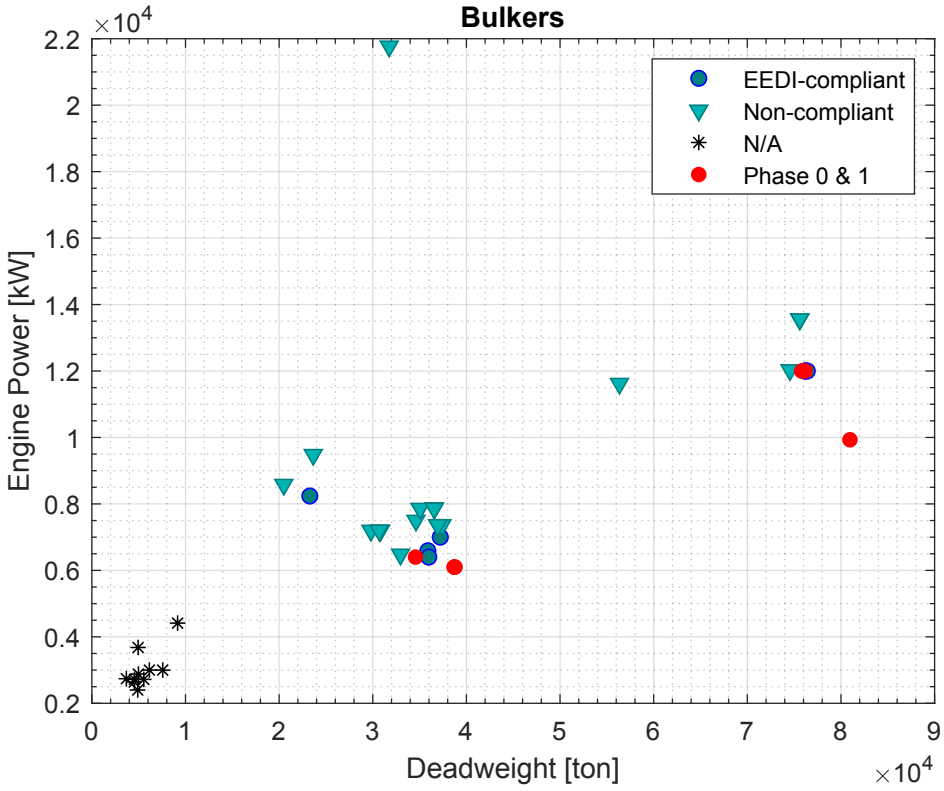


Figure 3-29: Engine power as a function of deadweight for bulkers. The one vessel with clearly higher power compared to others has IA-Super ice-class.

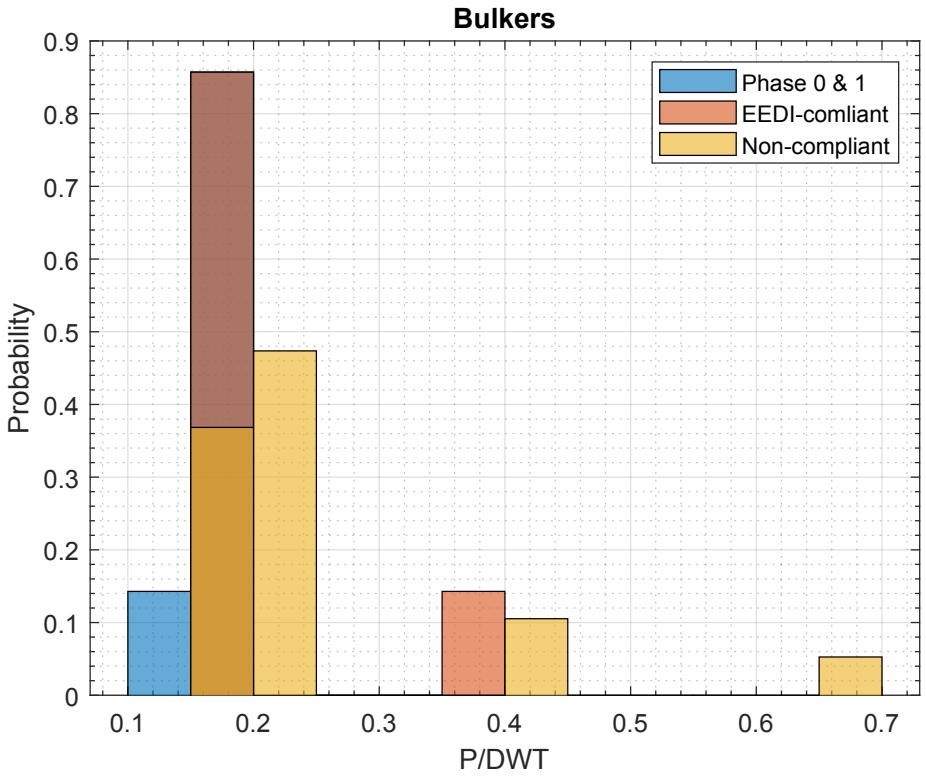


Figure 3-30: Distribution of the power-deadweight ratio based on the EEDI-compliancy for bulkers. The colors which are not listed in the legend refer to cases where the different distributions overlap.

4 ANALYSIS & RESULTS

As described in chapter 3, the vessels are categorized based on their EEDI compliancy (only ice classes IA-Super, IA, IB and IC are included) and also the ports are categorized into different groups. In addition, the data is also categorized based on the time of the winter. Following categories are used in the analysis:

- Period 1: Beginning of the season to mid-January (15. day)
- Period 2: Mid-January to mid-February
- Period 3: Mid-February to mid-March
- Period 4: Mid-March to mid-April
- Period 5: Mid-April to the end of the season

Categorization of the ports and the period allows to have relatively fair comparison between the different vessels as comparison is done in somewhat similar ice conditions based on the geographical location and time of the winter.

Example ice charts for each winter are presented in Appendix 2 (charts for the 1. and 15. day of the month). The winters 2015-2016 and 2016-2017 can be described mild while the winter 2017-2018 can be described as average.

The need for ice icebreaker assistance, average assistance speed, distance and duration are presented in the following chapters. The same analyses are also done for towing. In the analyses each port call is divided into arrival and departure and the above-mentioned quantities are investigated separately for both. The arrivals and departures are referred as voyages in the analysis.

In winter 2016-2017 there has been problems in port call registration for the Swedish ports. There are no port calls to Swedish ports after 24.2.2017. In addition, port groups FIN_4, FIN_5, FIN_6, SWE_3 and SWE_4 are excluded from the data for winter 2016-2017 as it is possible that the port data in these categories is compromised due to the problems in the port call registrations.

For winter 2015-2016 it is possible that some of the data port call data is compromised. Early and late in the season some of the voyages were registered to have occurred under traffic restriction even though there have not been restrictions in the given ports. Clearly erroneous information has been disregarded but it is possible that some of the data is still compromised. Therefore the data of 2015-2016 winter should be reviewed with caution.

4.1 NEED FOR ICEBREAKER ASSISTANCE

The need for icebreaker assistance is presented as a percentage on how many voyages there was icebreaker assistance for each vessel group. The need for icebreaker assistances are presented in Table 4-1 to Table 4-3. It should be noted that in some cases there has been only couple vessels from which the relative proportion is calculated. More detail statistics about how many voyages have been done totally and how much icebreaker assistance was needed is presented in Appendix 3.

Table 4-1: Summary on the need for icebreaker assistance during winter 2016-2017. Only the period and port group combinations in which there has been voyages are shown.

PERIOD	PORT_Group	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	44 %	100 %	61 %	37 %	14 %
	FIN_2	1 %		2 %	0 %	0 %
	SWE_1	0 %	0 %	0 %	0 %	0 %
	SWE_2	8 %		15 %	0 %	0 %
2	FIN_1	50 %		89 %	40 %	9 %
	FIN_2	9 %	0 %	13 %	1 %	0 %
	SWE_1	3 %		3 %	4 %	0 %
	SWE_2	8 %		17 %	0 %	0 %
3	FIN_1	56 %		91 %	59 %	11 %
	FIN_2	38 %	36 %	51 %	6 %	7 %
	FIN_3	6 %		6 %	0 %	
	SWE_1	4 %		6 %	0 %	0 %
	SWE_2	7 %		18 %	0 %	0 %
4	FIN_1	65 %		91 %	54 %	21 %
	FIN_2	28 %	8 %	40 %	4 %	8 %
	FIN_3	4 %		4 %	0 %	
5	FIN_1	20 %	0 %	28 %	8 %	26 %
	FIN_2	19 %	0 %	22 %	0 %	14 %

Table 4-2: Summary on the need for icebreaker assistance during winter 2015-2016. Only the period and port group combinations in which there has been voyages are shown.

PERIOD	PORT_Group	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	11 %		17 %	0 %	0 %
	FIN_2	19 %		28 %	8 %	0 %
	SWE_1	15 %		18 %	25 %	0 %
	SWE_2	22 %		33 %	0 %	25 %
	SWE_3	0 %		0 %	0 %	0 %
	SWE_4	0 %		0 %	0 %	
2	FIN_1	57 %		70 %	22 %	55 %
	FIN_2	22 %		29 %	5 %	0 %
	FIN_3	2 %		2 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	4 %	0 %	3 %	3 %	19 %
	SWE_1	33 %		38 %	11 %	29 %
	SWE_2	26 %	50 %	59 %	2 %	0 %
	SWE_3	2 %		2 %	0 %	0 %
	SWE_4	2 %		3 %	0 %	0 %
3	FIN_1	63 %		86 %	26 %	29 %
	FIN_2	19 %		26 %	1 %	20 %
	FIN_3	2 %	0 %	3 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %	0 %	0 %	0 %	0 %
	SWE_1	59 %		68 %	29 %	64 %
	SWE_2	21 %		48 %	1 %	8 %
	SWE_3	2 %		3 %	0 %	5 %
	SWE_4	2 %		2 %	0 %	0 %
4	FIN_1	66 %		87 %	26 %	52 %
	FIN_2	29 %		37 %	2 %	20 %
	FIN_3	0 %	0 %	0 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %		0 %	0 %	0 %
	SWE_1	41 %		51 %	27 %	14 %
	SWE_2	16 %		31 %	0 %	0 %
	SWE_3	1 %		0 %	5 %	0 %
	SWE_4	0 %		0 %		0 %
5	FIN_1	18 %		24 %	4 %	19 %
	FIN_2	12 %		14 %	0 %	0 %
	SWE_1	15 %		20 %	0 %	0 %
	SWE_2	6 %		6 %	0 %	
	SWE_3	0 %		0 %		
	SWE_4	0 %		0 %		

Table 4-3: Summary on the need for icebreaker assistance during winter 2017-2018. Only the period and port group combinations in which there has been voyages are shown.

PERIOD	PORT_Group	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	10 %	0 %	14 %	6 %	4 %
	FIN_2	0 %		0 %	0 %	
	SWE_1	1 %	0 %	2 %	0 %	0 %
	SWE_2	1 %	0 %	2 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	
2	FIN_1	66 %	100 %	86 %	40 %	43 %
	FIN_2	7 %	0 %	10 %	3 %	0 %
	FIN_3	1 %		1 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	1 %	0 %	0 %
	FIN_6	2 %	0 %	3 %	0 %	0 %
	SWE_1	64 %	100 %	77 %	18 %	75 %
	SWE_2	20 %		45 %	0 %	30 %
	SWE_3	3 %	0 %	4 %	0 %	0 %
	SWE_4	1 %		2 %	0 %	0 %
3	FIN_1	80 %	89 %	91 %	57 %	84 %
	FIN_2	52 %	57 %	77 %	7 %	19 %
	FIN_3	4 %	50 %	5 %	0 %	0 %
	FIN_4	3 %	0 %	5 %	0 %	0 %
	FIN_5	3 %	0 %	3 %	1 %	24 %
	FIN_6	25 %	33 %	33 %	9 %	44 %
	SWE_1	96 %	100 %	100 %	78 %	100 %
	SWE_2	40 %	88 %	74 %	5 %	50 %
	SWE_3	27 %	0 %	34 %	2 %	0 %
	SWE_4	2 %	50 %	2 %	0 %	0 %
4	FIN_1	74 %	67 %	90 %	48 %	79 %
	FIN_2	70 %	91 %	96 %	20 %	52 %
	FIN_3	3 %		5 %	0 %	0 %
	FIN_4	0 %	0 %	0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	3 %		4 %	0 %	10 %
	SWE_1	78 %		80 %	60 %	100 %
	SWE_2	34 %	100 %	63 %	1 %	75 %
	SWE_3	8 %	50 %	9 %	3 %	0 %
	SWE_4	2 %	0 %	3 %	0 %	0 %
5	FIN_1	26 %	64 %	37 %	8 %	12 %
	FIN_2	24 %	50 %	31 %	4 %	19 %
	FIN_6	0 %	0 %	0 %	0 %	0 %
	SWE_1	43 %	0 %	46 %	31 %	50 %
	SWE_2	23 %	50 %	38 %	0 %	17 %
	SWE_3	2 %		3 %	0 %	
	SWE_4	0 %		0 %		

4.2 ASSISTANCE DURATION

The average assistance durations for different EEDI-categories are presented in Table 4-4 to Table 4-6. Assistance times are based on icebreakers notifications on how long they have been assisting the vessels. The times for winter 2015-2016 are clearly longer than for the other two winters. The reason for this is unknown.

Table 4-4: Average assistance durations [hours] during winter 2017-2018. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		1.7	1.4	1.8
	SWE_1		0.4		
	SWE_2		0.9		
2	FIN_1	3.2	2.5	2.0	1.5
	FIN_2		3.0	2.7	
	FIN_3		0.7		
	FIN_5		1.3		
	FIN_6		3.1		
	SWE_1	2.0	3.7	2.7	3.2
	SWE_2		3.0		1.6
	SWE_3		1.2		
	SWE_4		0.8		
3	FIN_1	3.6	5.9	2.7	4.8
	FIN_2	2.7	5.2	3.9	1.1
	FIN_3	2.7	2.8		
	FIN_4		2.7		
	FIN_5		1.6	1.3	1.9
	FIN_6	1.6	2.1	1.4	5.4
	SWE_1	3.4	7.4	2.8	6.7
	SWE_2	5.3	5.7	0.9	3.1
	SWE_3		2.1	0.6	
	SWE_4	1.7	1.4		
4	FIN_1	11.0	8.3	3.3	4.3
	FIN_2	4.9	5.3	4.0	3.2
	FIN_3		2.3		
	FIN_5		0.7		
	FIN_6		2.3		1.7
	SWE_1		6.7	3.2	4.6
	SWE_2	9.5	6.5	0.6	4.2
	SWE_3	0.8	3.7	1.6	
	SWE_4		1.1		
5	FIN_1	3.3	2.7	2.4	2.5
	FIN_2	1.9	2.9	1.7	2.1
	SWE_1		4.0	2.1	3.4
	SWE_2	3.2	2.9		1.8
	SWE_3		1.6		

Table 4-5: Average assistance durations [hours] during winter 2016-2017. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	1.4	1.7	1.4	1.8
	FIN_2		3.8		
	SWE_2		1.4		
2	FIN_1		3.1	1.8	2.5
	FIN_2		1.6	0.4	
	SWE_1		1.5	0.5	
	SWE_2		3.4		
3	FIN_1		5.0	2.4	3.9
	FIN_2	1.5	2.8	2.2	1.8
	FIN_3		3.9		
	SWE_1		0.9		
	SWE_2		3.1		
4	FIN_1		5.2	3.7	4.8
	FIN_2	0.5	3.0	2.8	0.5
	FIN_3		6.9		
5	FIN_1		2.9	2.4	2.7
	FIN_2		1.5		0.6

Table 4-6: Average assistance durations [hours] during winter 2015-2016. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		4.9		
	FIN_2		2.0	3.7	
	SWE_1		1.2	0.5	
	SWE_2		2.9		1.6
2	FIN_1		9.1	3.5	7.5
	FIN_2		3.3	1.8	
	FIN_3		3.4		
	FIN_4		8.2		
	FIN_6		5.3	3.4	5.0
	SWE_1		3.7	2.7	3.0
	SWE_2	3.4	3.8	1.1	
	SWE_3		4.0		
	SWE_4		5.4		
3	FIN_1		12.7	7.3	7.5
	FIN_2		7.8	2.0	5.1
	FIN_3		3.3		
	FIN_5		3.0	5.0	
	SWE_1		8.6	9.8	10.2
	SWE_2		8.2	2.7	4.1
	SWE_3		7.2		4.8
	SWE_4		5.2		
4	FIN_1		8.7	6.1	6.1
	FIN_2		4.6	2.5	2.2
	SWE_1		4.6	6.7	9.4
	SWE_2		9.1		
	SWE_3			0.8	
5	FIN_1		5.5	7.6	6.7
	FIN_2		4.0		
	SWE_1		3.5		
	SWE_2		20.1		

4.3 ASSISTANCE DISTANCE

The average assistance distances are presented in Table 4-7 to Table 4-9. The assisted distance is based on the position information of the merchant vessels. In some cases, there has been gaps in the position information which distorts the distance data. Clearly erroneous distances (based on unrealistic assistance speeds) are excluded from the data. Due to gaps in the position data, the distance data shall be regarded less reliable than the duration data and should be considered indicative. The distances for winter 2015-2016 are clearly longer than for the other two winters. The reason for this is unknown.

Table 4-7: Average assistance distance [nautical miles] during winter 2017-2018. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		14.4	22.5	20.8
	SWE_1		3.0		
	SWE_2		8.5		
2	FIN_1	27.7	22.0	19.0	13.6
	FIN_2		29.0	21.4	
	FIN_3		5.1		
	FIN_5		13.1		
	FIN_6		25.0		
	SWE_1	15.3	34.0	28.3	29.6
	SWE_2		27.0		12.2
	SWE_3		9.4		
	SWE_4		7.8		
3	FIN_1	33.3	53.9	30.9	57.6
	FIN_2	34.2	45.2	32.8	10.6
	FIN_3	33.4	25.7		
	FIN_4		23.4		
	FIN_5		13.2	12.7	16.2
	FIN_6	15.3	17.2	17.2	18.7
	SWE_1	63.6	66.3	30.6	63.6
	SWE_2	51.4	53.4	11.2	34.6
	SWE_3		20.3	4.5	
	SWE_4		18.6		
4	FIN_1	124.5	76.5	34.7	48.6
	FIN_2	47.1	47.0	35.1	31.1
	FIN_3		22.7		
	FIN_5		5.8		
	FIN_6		19.2		13.8
	SWE_1		65.7	41.8	46.5
	SWE_2	83.1	62.4	6.2	52.0
	SWE_3	9.7	36.0	20.0	
	SWE_4		11.7		
5	FIN_1	38.3	28.7	27.9	30.0
	FIN_2	20.5	31.9	20.8	21.9
	SWE_1		40.8	27.9	36.6
	SWE_2	40.2	30.6		20.4
	SWE_3		10.7		

Table 4-8: Average assistance distance [nautical miles] during winter 2016-2017. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	7.5	14.7	15.0	16.3
	FIN_2				
	SWE_2		11.0		
2	FIN_1		22.3	16.7	20.7
	FIN_2		14.7	4.8	
	SWE_1		22.1		
	SWE_2		31.8		
3	FIN_1		41.1	22.9	33.3
	FIN_2	12.5	26.2	23.5	20.1
	FIN_3		38.0		
	SWE_1		10.9		
	SWE_2		33.7		
4	FIN_1		41.6	29.9	45.2
	FIN_2		28.1	22.3	
	FIN_3		62.9		
5	FIN_1		25.6	26.9	28.7
	FIN_2		14.4		

Table 4-9: Average assistance distance [nautical miles] during winter 2015-2016. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		42.8		
	FIN_2		15.1		
	SWE_1		7.0		
	SWE_2		14.1		9.1
2	FIN_1		81.4	34.2	65.6
	FIN_2		32.6	13.4	
	FIN_3		43.6		
	FIN_4		65.6		
	FIN_6		48.8	42.1	44.1
	SWE_1		32.8	22.8	37.7
	SWE_2	21.1	29.4	13.2	
	SWE_3		43.0		
	SWE_4		51.1		
3	FIN_1		106.3	58.2	89.2
	FIN_2		59.3	18.5	46.9
	FIN_3		31.0		
	FIN_5		28.0	67.0	
	SWE_1		75.3	121.0	88.5
	SWE_2		54.4	26.3	55.3
	SWE_3		44.3		50.3
	SWE_4		64.5		
4	FIN_1		78.8	65.7	56.5
	FIN_2		47.4	17.4	16.3
	SWE_1		55.4	73.0	159.7
	SWE_2		69.3		
	SWE_3			10.6	
5	FIN_1		55.8	87.9	84.5
	FIN_2		39.7		
	SWE_1		41.8		
	SWE_2				

4.4 ASSISTANCE SPEED

The average assistance speeds are presented in Table 4-10 to Table 4-12. The average assistance speed is calculated based on the assistance distance and duration. The assistance speed information shall be considered indicative due to limitations of the distance data. The data has been filtered by excluding average assistance speeds above 15 knots and below 5 knots.

Table 4-10: Average assistance speeds [knots] during winter 2017-2018. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		8.2	13.1	11.4
	SWE_1		8.2		
	SWE_2		9.4		
2	FIN_1	8.6	9.0	10.0	11.0
	FIN_2		9.5	8.7	
	FIN_3		7.3		
	FIN_5		9.8		
	FIN_6		8.1		
	SWE_1	7.6	9.5	10.7	8.8
	SWE_2		9.1		8.1
	SWE_3		8.6		
	SWE_4		10.4		
3	FIN_1	8.6	9.0	10.7	9.4
	FIN_2	9.7	8.9	7.8	9.5
	FIN_3	12.6	8.5		
	FIN_4		9.2		
	FIN_5		8.6	9.6	7.9
	FIN_6	9.6	8.1	9.1	6.8
	SWE_1	10.6	9.1	11.3	9.9
	SWE_2	9.9	9.6	12.6	10.0
	SWE_3		9.4	7.8	
	SWE_4		8.9		
4	FIN_1	11.4	9.3	10.9	10.8
	FIN_2	9.7	8.9	8.9	8.8
	FIN_3		10.1		
	FIN_5		8.1		
	FIN_6		8.7		8.2
	SWE_1		9.9	10.8	10.2
	SWE_2	8.5	9.6	10.3	8.1
	SWE_3	11.7	9.9	12.2	
	SWE_4		9.1		
5	FIN_1	10.5	10.1	11.1	11.7
	FIN_2	10.5	11.0	12.2	10.7
	SWE_1		10.4	13.0	10.8
	SWE_2	12.5	10.4		11.3
	SWE_3		6.8		

Table 4-11: Average assistance speeds [knots] during winter 2016-2017. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	5.6	8.3	10.4	8.5
	FIN_2				
	SWE_2		8.0		
2	FIN_1		8.0	9.6	7.9
	FIN_2		9.1	13.0	
	SWE_1		8.1		
	SWE_2		8.8		
3	FIN_1		8.0	9.1	8.9
	FIN_2	8.3	9.2	9.6	11.0
	FIN_3		9.5		
	SWE_1		12.4		
	SWE_2		8.2		
4	FIN_1		8.0	9.0	8.5
	FIN_2		9.1	8.6	
	FIN_3		9.1		
5	FIN_1		9.2	11.6	10.0
	FIN_2		9.2		

Table 4-12: Average assistance speeds [knots] during winter 2015-2016. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		8.2		
	FIN_2		7.0		
	SWE_1		9.0		
	SWE_2		6.5		5.7
2	FIN_1		9.0	10.2	9.0
	FIN_2		8.9	7.5	
	FIN_3		11.1		
	FIN_4		8.0		
	FIN_6		9.3	9.5	8.6
	SWE_1		9.2	9.0	10.3
	SWE_2	5.6	8.3	8.8	
	SWE_3		6.8		
	SWE_4		8.3		
3	FIN_1		8.9	9.9	10.0
	FIN_2		8.6	9.3	8.6
	FIN_3		8.8		
	FIN_5		9.3	13.3	
	SWE_1		9.7	9.9	10.4
	SWE_2		8.1	9.6	13.5
	SWE_3		9.2		10.5
	SWE_4		10.2		
4	FIN_1		9.0	10.8	9.1
	FIN_2		9.3	7.0	7.0
	SWE_1		10.3	8.1	12.1
	SWE_2		8.8		
	SWE_3			13.3	
5	FIN_1		10.1	11.1	12.2
	FIN_2		9.3		
	SWE_1		11.2		
	SWE_2				

4.5 NEED FOR TOWING

The need for towing is presented as a percentage on how many voyages the merchant vessel has been towed for each vessel group. The need for towing is presented in Table 4-13 to Table 4-15. It should be noted that in some cases there has been only couple vessels from which the relative proportion is calculated. More detail statistics about how many voyages have been done totally and how much icebreaker towing was needed is presented in Appendix 4.

Table 4-13: Summary on the need for towing during winter 2017-2018. Only the period and port group combinations in which there has been voyages are shown.

PERIOD	PORT_Group	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	0 %	0 %	1 %	0 %	0 %
	FIN_2	0 %		0 %	0 %	
	SWE_1	0 %	0 %	0 %	0 %	0 %
	SWE_2	0 %	0 %	0 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	
2	FIN_1	21 %	0 %	33 %	10 %	0 %
	FIN_2	0 %	0 %	0 %	0 %	0 %
	FIN_3	0 %		0 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %	0 %	0 %	0 %	0 %
	SWE_1	2 %	0 %	3 %	0 %	0 %
	SWE_2	2 %		5 %	0 %	0 %
	SWE_3	0 %	0 %	0 %	0 %	0 %
	SWE_4	0 %		0 %	0 %	0 %
3	FIN_1	23 %	56 %	35 %	0 %	12 %
	FIN_2	5 %	0 %	7 %	0 %	0 %
	FIN_3	0 %	0 %	0 %	0 %	0 %
	FIN_4	0 %	0 %	0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	3 %
	FIN_6	1 %	0 %	0 %	0 %	13 %
	SWE_1	13 %	50 %	17 %	0 %	0 %
	SWE_2	4 %	13 %	7 %	0 %	0 %
	SWE_3	0 %	0 %	0 %	0 %	0 %
	SWE_4	0 %	50 %	0 %	0 %	0 %
4	FIN_1	18 %	0 %	32 %	0 %	0 %
	FIN_2	10 %	9 %	16 %	0 %	5 %
	FIN_3	0 %		0 %	0 %	0 %
	FIN_4	0 %	0 %	0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %		0 %	0 %	0 %
	SWE_1	3 %		4 %	0 %	0 %
	SWE_2	1 %	0 %	1 %	0 %	25 %
	SWE_3	0 %	0 %	0 %	0 %	0 %
	SWE_4	0 %	0 %	0 %	0 %	0 %
5	FIN_1	0 %	0 %	1 %	0 %	0 %
	FIN_2	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %	0 %	0 %	0 %	0 %
	SWE_1	0 %	0 %	0 %	0 %	0 %
	SWE_2	0 %	0 %	0 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	
	SWE_4	0 %		0 %		

Table 4-14: Summary on the need for towing during winter 2016-2017. Only the period and port group combinations in which there has been voyages are shown.

PERIOD	PORT_Group	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	5 %	50 %	9 %	0 %	0 %
	FIN_2	1 %		2 %	0 %	0 %
	SWE_1	0 %	0 %	0 %	0 %	0 %
	SWE_2	0 %		0 %	0 %	0 %
2	FIN_1	10 %		23 %	0 %	2 %
	FIN_2	0 %	0 %	0 %	0 %	0 %
	SWE_1	0 %		0 %	0 %	0 %
	SWE_2	1 %		1 %	0 %	0 %
3	FIN_1	10 %		20 %	1 %	2 %
	FIN_2	1 %	0 %	1 %	0 %	0 %
	FIN_3	0 %		0 %	0 %	
	SWE_1	0 %		0 %	0 %	0 %
	SWE_2	0 %		0 %	0 %	0 %
4	FIN_1	26 %		50 %	0 %	7 %
	FIN_2	3 %	0 %	5 %	0 %	0 %
	FIN_3	0 %		0 %	0 %	
5	FIN_1	1 %	0 %	2 %	0 %	0 %
	FIN_2	1 %	0 %	2 %	0 %	0 %

Table 4-15: Summary on the need for towing during winter 2015-2016. Only the period and port group combinations in which there has been voyages are shown.

PERIOD	PORT_Group	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	0 %		0 %	0 %	0 %
	FIN_2	0 %		0 %	0 %	0 %
	SWE_1	0 %		0 %	0 %	0 %
	SWE_2	0 %		0 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	0 %
	SWE_4	0 %		0 %	0 %	
2	FIN_1	9 %		12 %	0 %	15 %
	FIN_2	1 %		2 %	0 %	0 %
	FIN_3	0 %		0 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %	0 %	0 %	0 %	0 %
	SWE_1	1 %		1 %	0 %	0 %
	SWE_2	0 %	0 %	0 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	0 %
	SWE_4	0 %		0 %	0 %	0 %
3	FIN_1	13 %		21 %	0 %	0 %
	FIN_2	1 %		2 %	0 %	0 %
	FIN_3	1 %	0 %	1 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %	0 %	0 %	0 %	0 %
	SWE_1	2 %		2 %	0 %	7 %
	SWE_2	3 %		7 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	0 %
	SWE_4	0 %		0 %	0 %	0 %
4	FIN_1	10 %		16 %	0 %	0 %
	FIN_2	1 %		1 %	0 %	0 %
	FIN_3	0 %	0 %	0 %	0 %	0 %
	FIN_4	0 %		0 %	0 %	0 %
	FIN_5	0 %	0 %	0 %	0 %	0 %
	FIN_6	0 %		0 %	0 %	0 %
	SWE_1	0 %		0 %	0 %	0 %
	SWE_2	4 %		7 %	0 %	0 %
	SWE_3	0 %		0 %	0 %	0 %
	SWE_4	0 %		0 %		0 %
5	FIN_1	0 %		1 %	0 %	0 %
	FIN_2	0 %		0 %	0 %	0 %
	SWE_1	0 %		0 %	0 %	0 %
	SWE_2	0 %		0 %	0 %	
	SWE_3	0 %		0 %		
	SWE_4	0 %		0 %		

4.6 TOWING DURATION

The average towing durations for different EEDI-categories are presented in Table 4-16 to Table 4-18. Towing times are based on icebreakers notifications how long they have been towing the vessels. It should be noted that in some cases the average duration has been calculated only from couple events.
The durations for winter 2015-2016 are clearly longer than for the other two winters. The reason for this is unknown.

Table 4-16: Average towing durations [hours] during winter 2017-2018. Only the period and port group combinations in which there has been towing are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		0.4		
2	FIN_1		2.1	1.1	
	FIN_2		2.8		
	SWE_1		3.1		
	SWE_2		1.3		
3	FIN_1	1.4	2.5		1.1
	FIN_2		2.8		
	FIN_5				1.2
	FIN_6				2.4
	SWE_1	1.7	2.4		
	SWE_2	5.7	2.7		
	SWE_4	0.7	0.8		
4	FIN_1		2.6		
	FIN_2	1.0	1.9		1.9
	SWE_1		2.6		
	SWE_2		1.1		1.2
	SWE_3		1.3		
	SWE_4		1.0		
5	FIN_1		2.3		

Table 4-17: Average towing durations [hours] during winter 2016-2017. Only the period and port group combinations in which there has been towing are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	0.3	0.9		
	FIN_2		1.5		
2	FIN_1		2.0		2.3
	FIN_2		0.5		
	SWE_2		1.5		
3	FIN_1		3.0	0.5	1.1
	FIN_2		1.8		
4	FIN_1		4.0		1.3
	FIN_2		2.3		
5	FIN_1		2.3		
	FIN_2		0.5		

Table 4-18: Average towing durations [hours] during winter 2015-2016. Only the period and port group combinations in which there has been towing are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
2	FIN_1		8.0		4.6
	FIN_2		8.2		
	SWE_1		7.8		
3	FIN_1		8.2		
	FIN_2		12.3		
	FIN_3		6.4		
	SWE_1		8.0		0.0
	SWE_2		2.9		
4	FIN_1		5.8		
	FIN_2		3.8		
	SWE_2		4.8		
5	FIN_1		5.3		

4.7 TOWING DISTANCE

The average towing distances are presented in Table 4-19 to Table 4-21. The towing distance is based on the position information of the merchant vessels. In some cases, there have been gaps in the position information which distorts the distance data. Due to gaps in the position data, the distance data shall be regarded as less reliable than the duration data and should be considered indicative. It should be noted that in some cases the average distance has been calculated only from couple events. The distances for winter 2015-2016 are clearly longer than for the other two winters. The reason for this is unknown.

Table 4-19: Average towing distance [nautical miles] during winter 2017-2018. Only the period and port group combinations in which there has been towing are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		0.3		
2	FIN_1		14.2	4.1	
	FIN_2		25.3		
	SWE_1		5.9		
	SWE_2		6.7		
3	FIN_1	12.5	19.6		7.4
	FIN_2		22.3		
	FIN_5				5.2
	FIN_6				17.8
	SWE_1	14.1	13.7		
	SWE_2	40.5	20.6		
	SWE_4	0.7	2.0		
4	FIN_1		20.6		
	FIN_2	7.7	10.6		14.6
	SWE_1		19.5		
	SWE_2		8.9		2.7
	SWE_3		6.8		
	SWE_4		2.0		
5	FIN_1		16.9		

Table 4-20: Average towing distance [nautical miles] during winter 2016-2017. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	0.6	3.4		
	FIN_2		7.2		
2	FIN_1		10.9		13.6
	FIN_2		0.5		
	SWE_2		12.6		
3	FIN_1		14.0	1.3	3.2
	FIN_2		1.2		
4	FIN_1		27.1		6.9
	FIN_2		15.9		
5	FIN_1		11.6		
	FIN_2		3.2		

Table 4-21: Average towing distance [nautical miles] during winter 2015-2016. Only the period and port group combinations in which there has been assistance are shown.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
2	FIN_1		60.7		41.2
	FIN_2		73.9		
	SWE_1		86.6		
3	FIN_1		62.6		
	FIN_2		105.2		
	FIN_3		55.7		
	SWE_1		57.5		0.4
	SWE_2		18.1		
4	FIN_1		46.6		
	FIN_2		31.9		
	SWE_2		34.7		
5	FIN_1		40.7		

4.8 TOWING SPEED

The average towing speeds are presented in Table 4-22 to Table 4-24. The average towing speed is calculated based on the assistance distance and duration. The towing speed information shall be considered indicative due to limitations of the distance data.

Table 4-22: Average towing speeds [knots] during winter 2017-2018.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1		0.7		
2	FIN_1		6.2	4.1	
	FIN_2		8.9		
	SWE_1		2.1		
	SWE_2		5.2		
3	FIN_1	8.2	7.7		6.1
	FIN_2		7.6		
	FIN_5				4.4
	FIN_6				7.6
	SWE_1	8.4	5.4		
	SWE_2	7.5	8.0		
	SWE_4	1.0	2.4		
4	FIN_1		7.7		
	FIN_2	7.7	4.7		7.6
	SWE_1		7.5		
	SWE_2		8.2		2.3
	SWE_3		5.1		
	SWE_4		2.0		
5	FIN_1		7.3		

Table 4-23: Average towing speeds [knots] during winter 2016-2017.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	1.8	3.7		
	FIN_2		5.0		
2	FIN_1		4.9		6.1
	FIN_2		1.0		
	SWE_2		8.4		
3	FIN_1		5.1	2.6	3.6
	FIN_2		1.4		
4	FIN_1		6.9		4.5
	FIN_2		5.9		
5	FIN_1		7.2		
	FIN_2		6.6		

Table 4-24: Average towing speeds [knots] during winter 2015-2016.

PERIOD	PORT_Group	Phase_0_1	EEDI_compliant	Non_compliant	NA
2	FIN_1		6.4		8.5
	FIN_2		7.0		
	SWE_1		11.1		
3	FIN_1		6.8		
	FIN_2		8.7		
	FIN_3		8.7		
	SWE_1		7.2		13.3
	SWE_2		4.1		
4	FIN_1		7.7		
	FIN_2		7.7		
	SWE_2		5.7		
5	FIN_1		7.8		

4.9 SUMMARY ON ASSISTANCE AND TOWING

Summaries of the icebreaker assistance and towing related quantities are presented in Table 4-25 and Table 4-26. The tables present the average values which have been calculated for the whole winter in all port groups. The averages calculated for the whole winter and whole area indicate that the new vessels built to EEDI Phase 0 and 1 regulations and old EEDI compliant vessels need more icebreaker assistance and towing compared to non-compliant vessels. In addition, the assisted and towed times and distance are longer, and speeds are lower compared to non-compliant vessels.

However, it should be noted that calculating the averages for the whole winter and whole area is quite big simplification as different ice conditions are mixed. A more detailed picture can be obtained by investigating the tables of the previous chapters.

Table 4-25: Summary for icebreaker assistance.

	Year	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
Need for assistance	2017-2018	21.4 %	36.7 %	27.9 %	9.8 %	23.3 %
	2016-2017	20.6 %	20.7 %	31.0 %	11.9 %	6.8 %
	2015-2016	14.0 %	6.3 %	19.3 %	5.1 %	9.4 %
Time [h]	2017-2018		3.8	3.1	2.2	3.1
	2016-2017		1.1	3.0	2.0	2.3
	2015-2016		3.4	6.0	4.0	5.6
Distance [NM]	2017-2018		42.5	28.5	23.4	30.4
	2016-2017		10.0	27.4	20.2	27.4
	2015-2016		21.1	48.5	44.8	61.8
Speed [kn]	2017-2018		10.1	9.1	10.6	9.7
	2016-2017		7.0	8.9	10.1	9.1
	2015-2016		5.6	8.9	9.8	9.8

Table 4-26: Summary for icebreaker towing.

	Year	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
Need for towing	2017-2018	2.5 %	5.7 %	3.9 %	0.2 %	1.5 %
	2016-2017	3.3 %	7.1 %	6.4 %	0.1 %	0.6 %
	2015-2016	1.1 %	0.0 %	1.7 %	0.0 %	0.6 %
Time [h]	2017-2018		2.1	2.0	1.1	1.6
	2016-2017		0.3	1.8	0.5	1.6
	2015-2016		-	6.8	-	2.3
Distance [NM]	2017-2018		15.1	12.7	4.1	9.5
	2016-2017		0.6	9.8	1.3	7.9
	2015-2016		-	56.2	-	20.8
Speed [kn]	2017-2018		6.6	5.7	4.1	5.6
	2016-2017		1.8	5.1	2.6	4.8
	2015-2016		-	7.4	-	10.9

4.10 EFFECT OF POWER-DEADWEIGHT RATIO

The effect of the power-displacement ratio is investigated by focusing on port group FIN_1 (Oulu, Kemi, Tornio) from mid-February to mid-April on winter 2018 (periods 3 and 4). The ice conditions are considered to be most difficult on this location-period combination from the whole data set.

The power-deadweight ratio has been compared to the assistance speed, duration and distance in Figure 4-1 to Figure 4-3. There is quite lot of scatter in the figures, but it seems that there are slight trends that the assistance duration and distance increase as the power-deadweight ratio decreases and the assistance speed decreases as the power-deadweight ratio decreases.

In Figure 4-4 and Figure 4-5 is presented the power-deadweight ratio distribution of assisted and non-assisted vessels. The distributions are normalized based on probability in order to compare different sample sizes. It is clearly visible that the vessels which have needed icebreaker assistance have lower power-deadweight ratio compared to vessels which have not needed assistance.

In Figure 4-6 and Figure 4-7 is presented the power-deadweight ratio of towed and non-towed vessels. Similar trends as for assistance can be seen although it is not as clear. Very few vessels with power-deadweight ratio above 0.8 have been towed and no vessels with 1.0 power-deadweight have been towed in the investigated sample.

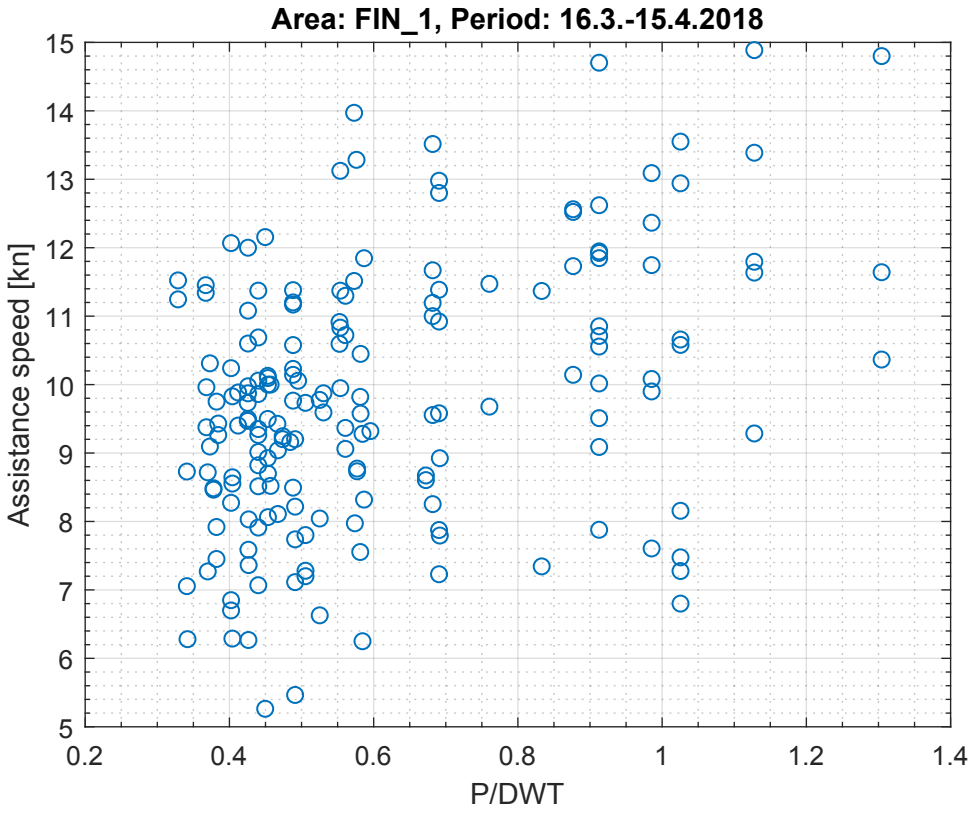


Figure 4-1: Power-deadweight ratio versus assistance speed.

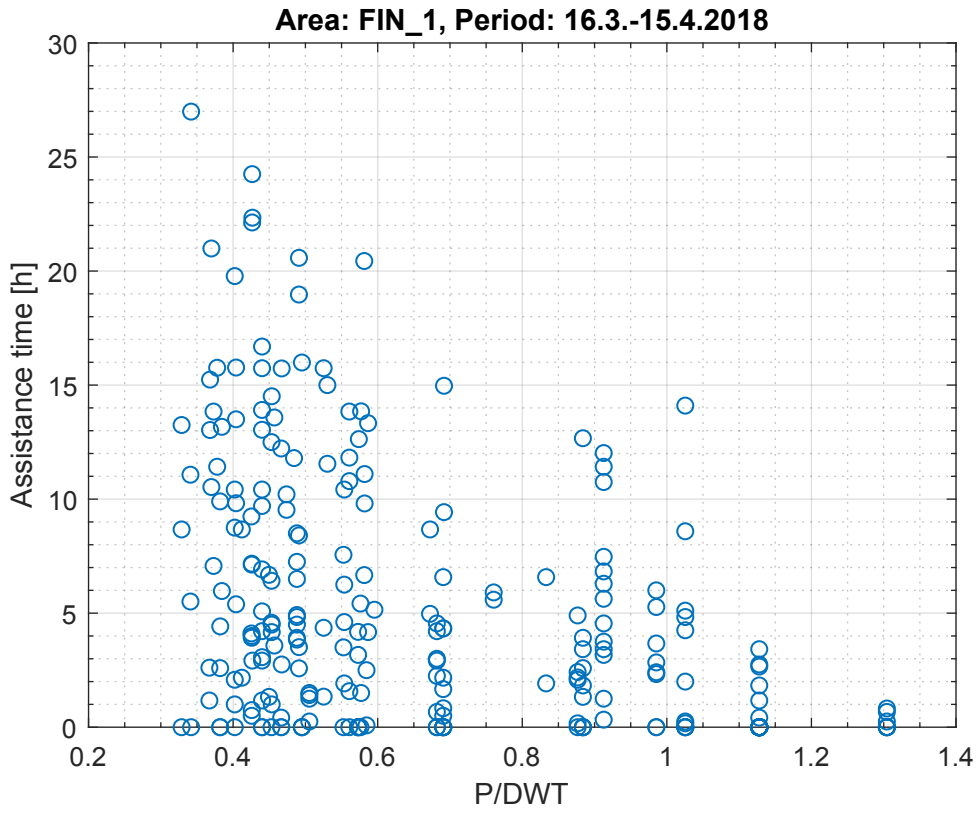


Figure 4-2: Power-deadweight ratio versus assistance duration.

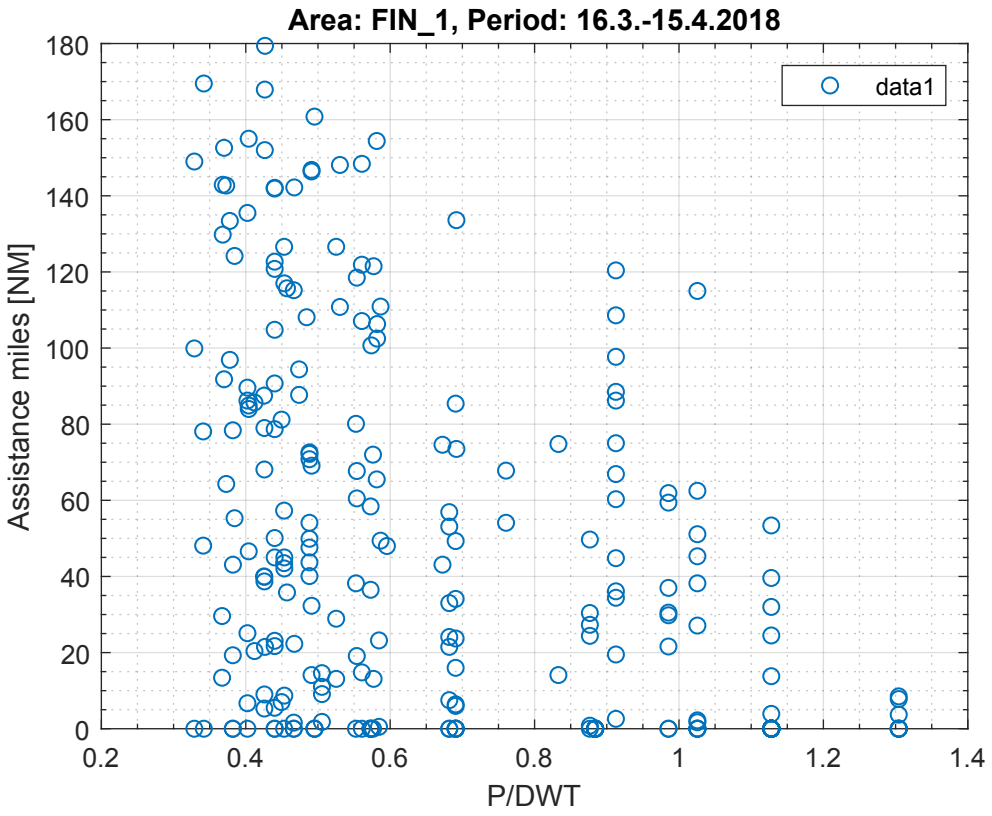


Figure 4-3: Power-deadweight ratio versus assistance miles.

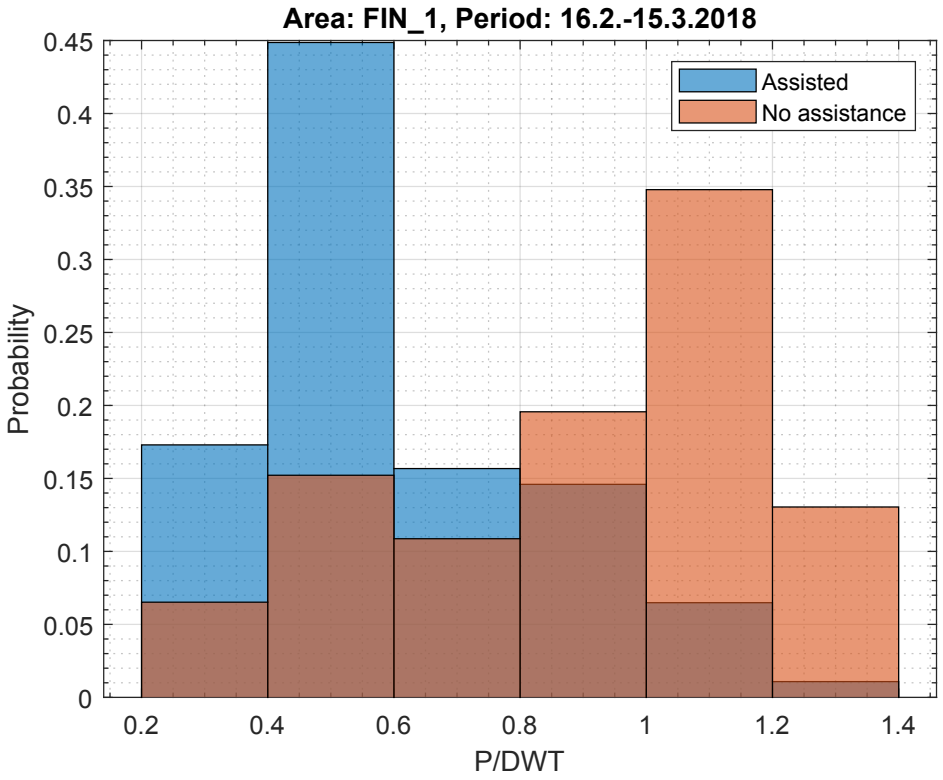


Figure 4-4: Power-deadweight distribution of the assisted and non-assisted vessels, period 3. The dark brown color refers to a case where the two distributions overlap.

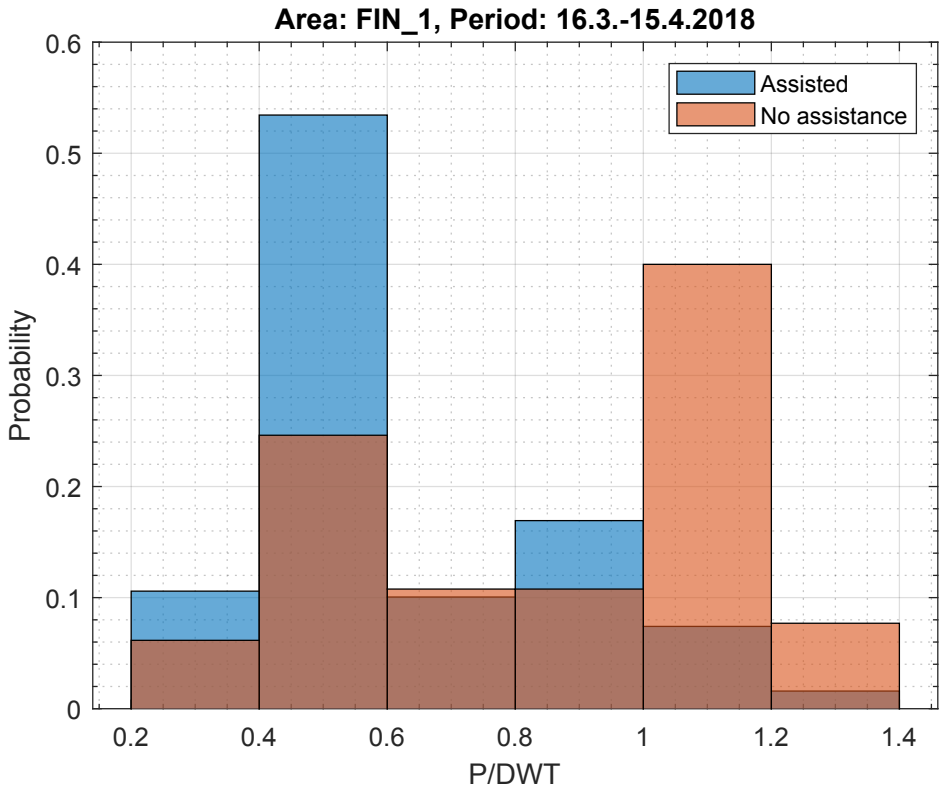


Figure 4-5: Power-deadweight distribution of the assisted and non-assisted vessels, period 4. The dark brown color refers to a case where the two distributions overlap.

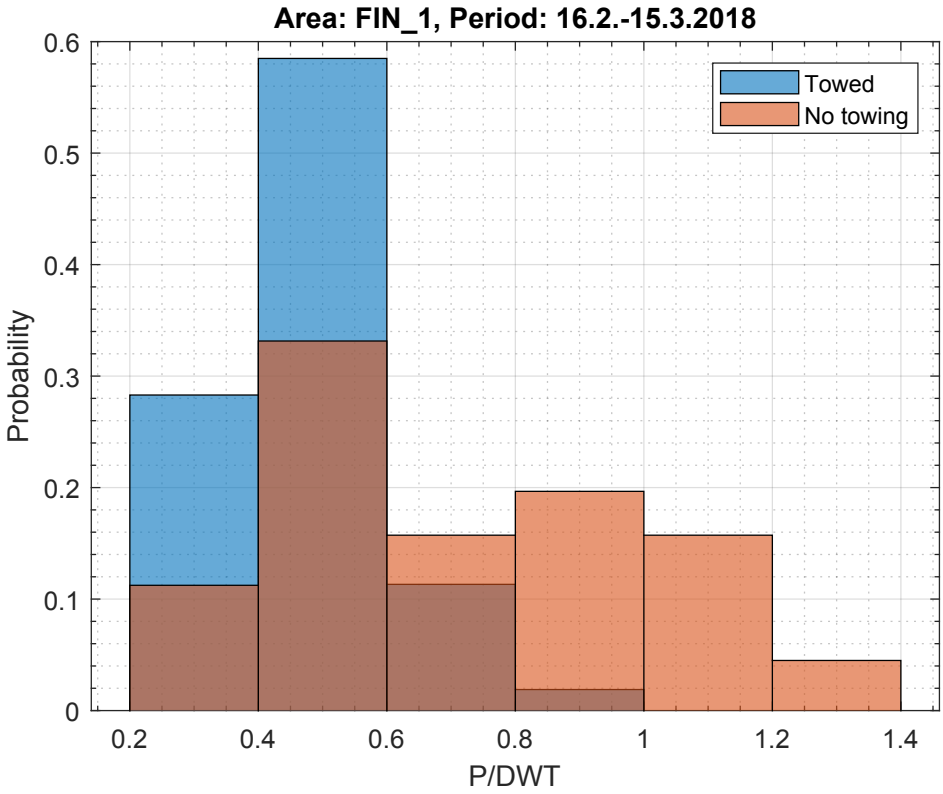


Figure 4-6: Power-deadweight distribution of the towed and non-towed vessels, period 3. The dark brown color refers to a case where the two distributions overlap.

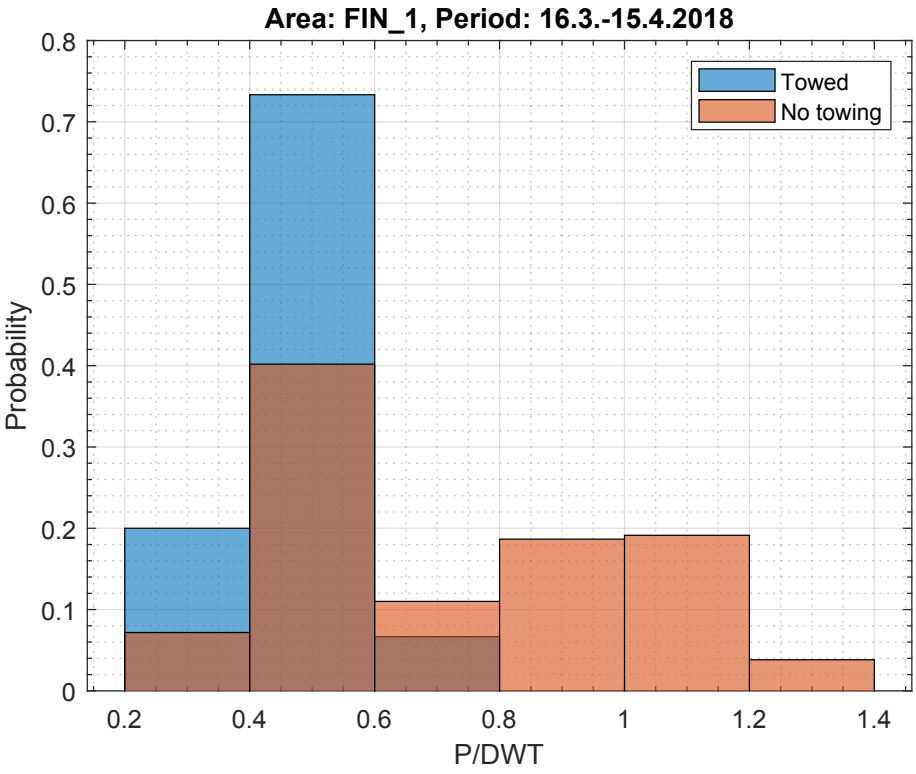


Figure 4-7: Power-deadweight distribution of the towed and non-towed vessels, period 4. The dark brown color refers to a case where the two distributions overlap.

5 CONCLUSIONS

The ice-going performance of different EEDI-category vessels has been investigated in this report.

Only few (23) different vessels which are built according to the EEDI-regulations have visited the ports of the northern Baltic Sea during the past three winters. In addition, most of these are sister ships which reduces the amount of different EEDI-compliant designs. However, despite of the small data set, it is possible to find some trends on how the EEDI-compliant vessel are performing when compared to non-compliant vessels.

It is interesting to observe that majority of the old vessels would fulfil their required EEDI value. This most likely results from the small vessel size of the typical vessels present at the northern Baltic Sea. Even though older vessel would fulfil their required EEDI-value, it seems that the new vessels which are built according to the EEDI regulations have a smaller power-deadweight ratio when compared to older vessels. It is possible that the open-water speeds of the future fleets are reducing which will reduce the installed powers more than the EEDI regulations alone would require. This can also be related to improved hydrodynamic design of the new vessels.

Based on this data set, there seems to be a clear correlation between the power-deadweight ratio of the merchant vessel and the need for icebreaker assistance and towing. The need for icebreaker assistance increases as the power-deadweight ratio decreases. As the power-deadweight ratio is smaller for new ships, it is expected that more icebreaker assistance and towing is needed in the future. For winters 2017-2018 and 2016-2017, approximately 30% of the EEDI-compliant vessels have needed icebreaker assistance while only about 10% of the non-compliant vessels needed assistance. For winter 2015-2016 ~20% of EEDI-compliant vessel needed icebreaker assistance while only ~5% of the non-compliant vessel needed assistance. However, these are very rough estimate based on the averages of the whole winter.

In addition, there seems to be a trend that for the EEDI-compliant vessels the assistance and towing times and distances are longer, and speeds are lower compared to non-compliant vessels.

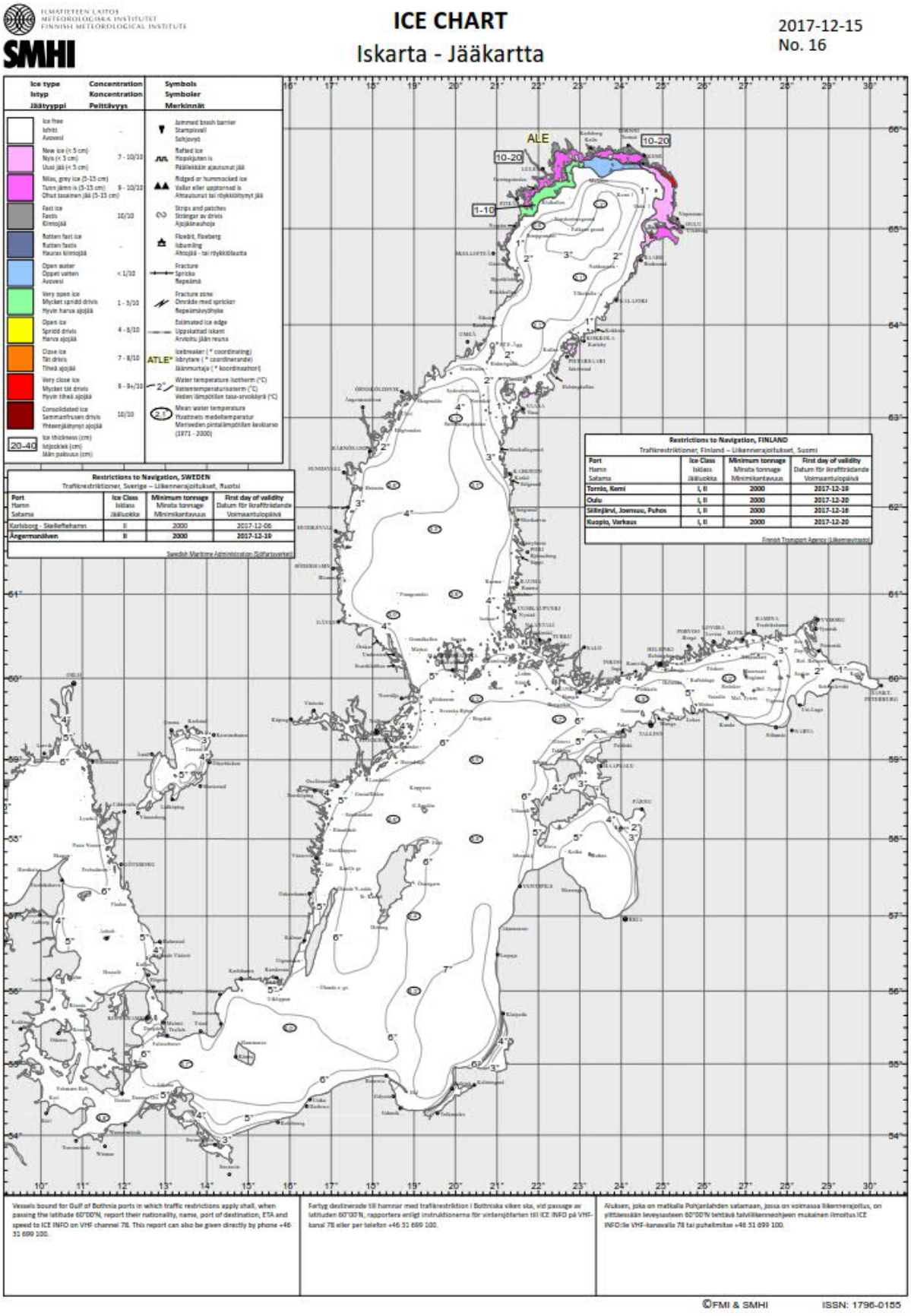
All the above factors could result that more icebreaker capacity is needed in the future. However, as there are only very few actual EEDI vessels in service, it is not possible to draw very definite conclusions. It is recommended that similar research is done also for following winters in order to have more data and information about the performance of the new vessels which have been built according to the EEDI regulations.

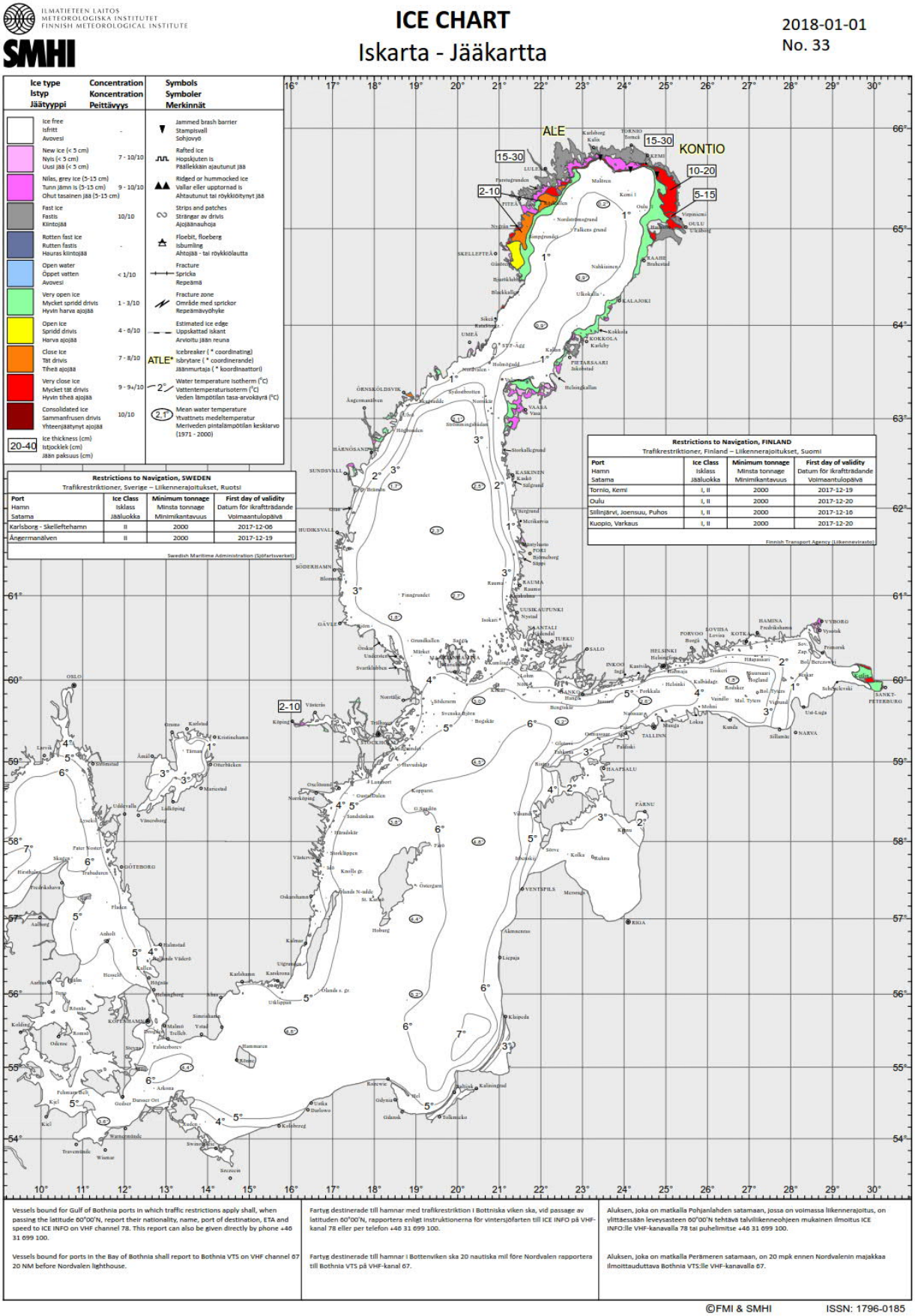
APPENDIX 1: LIST OF PORTS

FINLAND	
Port	**Group**
'KEMI'	FIN_1
'OULU'	FIN_1
'TORNIO'	FIN_1
'KALAJOKI'	FIN_2
'KOKKOLA'	FIN_2
'RAAHE'	FIN_2
'VAASA'	FIN_2
PIETARSAARI'	FIN_2
'KASKINEN'	FIN_3
'KRISTIINANKAUPUNKI'	FIN_3
'PORI'	FIN_3
'RAUMA'	FIN_3
'FÖRBY'	FIN_4
'NAANTALI'	FIN_4
'TURKU'	FIN_4
'UUSIKAUPUNKI'	FIN_4
'HANKO'	FIN_5
HELSINKI'	FIN_5
'INKOO'	FIN_5
'KANTVIK'	FIN_5
'KOVERHAR'	FIN_5
'LOVIISA'	FIN_5
'SKÖLDVIK'	FIN_5
'KOTKA'	FIN_6
'HAMINA'	FIN_6

SWEDEN	
Port	**Group**
'HARAHOLMEN'	SWE_1
'LULEÅ'	SWE_1
'HOLMSUND'	SWE_2
'KARLSBORG'	SWE_2
SKELLEFTEHAMN'	SWE_2
'HUDIKSVALL'	SWE_3
'HUSUM'	SWE_3
'HÄRNÖSAND'	SWE_3
'IGGESUND'	SWE_3
'RUNDVIK'	SWE_3
'SUNDSVALL'	SWE_3
'SÖRÅKER'	SWE_3
ÅNGERMANÄLVEN'	SWE_3
ÖRNSKÖLDSVIK'	SWE_3
'GRISSLEHAMN'	SWE_4
'GÄVLE'	SWE_4
'HALLSTAVIK'	SWE_4
'HARGSHAMN'	SWE_4
KAPELLSKÄR'	SWE_4
NORRSUNDET'	SWE_4
'ORRSKÄR'	SWE_4
SKUTSKÄR'	SWE_4
'STOCKHOLM'	SWE_4
'SÖDERHAMN'	SWE_4

APPENDIX 2: ICE CHARTS




ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-01-01
No. 33
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Avovesi
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Heuras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
20-40
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöityny jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Flaebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
ATLE*
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
2°
Water temperature Isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2.1°
Mean water temperature
Yttvattnets medeltemperatur
Meriveden pintalämpötilan keskiarvo
(1971 - 2000)
ALE
15-30
KONTIO
15-30
10-20
2-10
5-15
2-10
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Liikennerajoitukset, Ruotsi
Port
Hamn
Satama
Ice Class
Isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Karlsborg - Skelleftehamn | II | 2000 | 2017-12-06
Ångermanälven | II | 2000 | 2017-12-19
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port
Hamn
Satama
Ice Class
Isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Tornio, Kemi | I, II | 2000 | 2017-12-19
Oulu | I, II | 2000 | 2017-12-20
Siilinjärvi, Joensuu, Puhos | I, II | 2000 | 2017-12-16
Kuopio, Varkaus | I, II | 2000 | 2017-12-20
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
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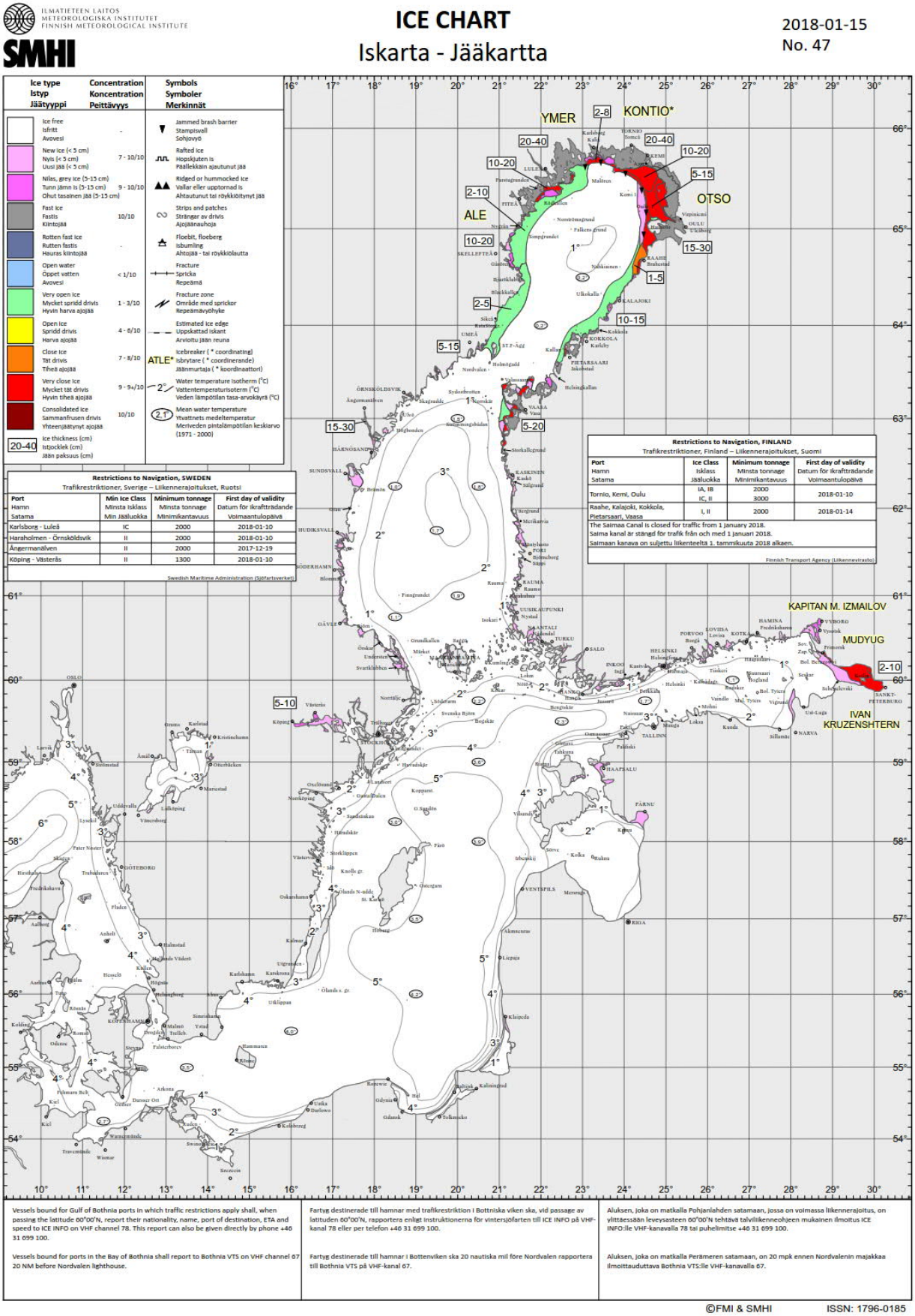
ISSN: 1796-0185


ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-01-15
No. 47
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Avovesi
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöitynyt jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
ATLE*
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
2°
Water temperature isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2.1°
Mean water temperature
Ytvattnets medeltemperatur
Merivеden pintalämpötilan keskiarvo
(1971 - 2000)
YMER
2-8
KONTIO*
20-40
20-40
10-20
10-20
5-15
2-10
OTSO
ALE
10-20
15-30
1-5
2-5
10-15
5-15
5-20
15-30
5-10
2-10
KAPITAN M. IZMAILOV
MUDYUG
IVAN KRUZENSHTERN
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Lilkennerajoitukset, Ruotsi
Port / Hamn / Satama
Min Ice Class / Minsta Isklass / Min Jääluokka
Minimum tonnage / Minsta tonnage / Minimikantavuus
First day of validity / Datum för ikraftträdande / Voimaantulopäivä
Karlsborg - Luleå | IC | 2000 | 2018-01-10
Haraholmen - Örnsköldsvik | II | 2000 | 2018-01-10
Ångermanälven | II | 2000 | 2017-12-19
Köping - Västerås | II | 1300 | 2018-01-10
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port / Hamn / Satama
Ice Class / Isklass / Jääluokka
Minimum tonnage / Minsta tonnage / Minimikantavuus
First day of validity / Datum för ikraftträdande / Voimaantulopäivä
Tornio, Kemi, Oulu | IA, IB | IC, II | 2000 | 3000 | 2018-01-10
Raahe, Kalajoki, Kokkola, Pietarsaari, Vaasa | I, II | 2000 | 2018-01-14
The Saimaa Canal is closed for traffic from 1 January 2018.
Saima kanal är stängd för trafik från och med 1 januari 2018.
Saimaan kanava on suljettu liikenteeltä 1. tammikuuta 2018 alkaen.
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talvililikennеohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
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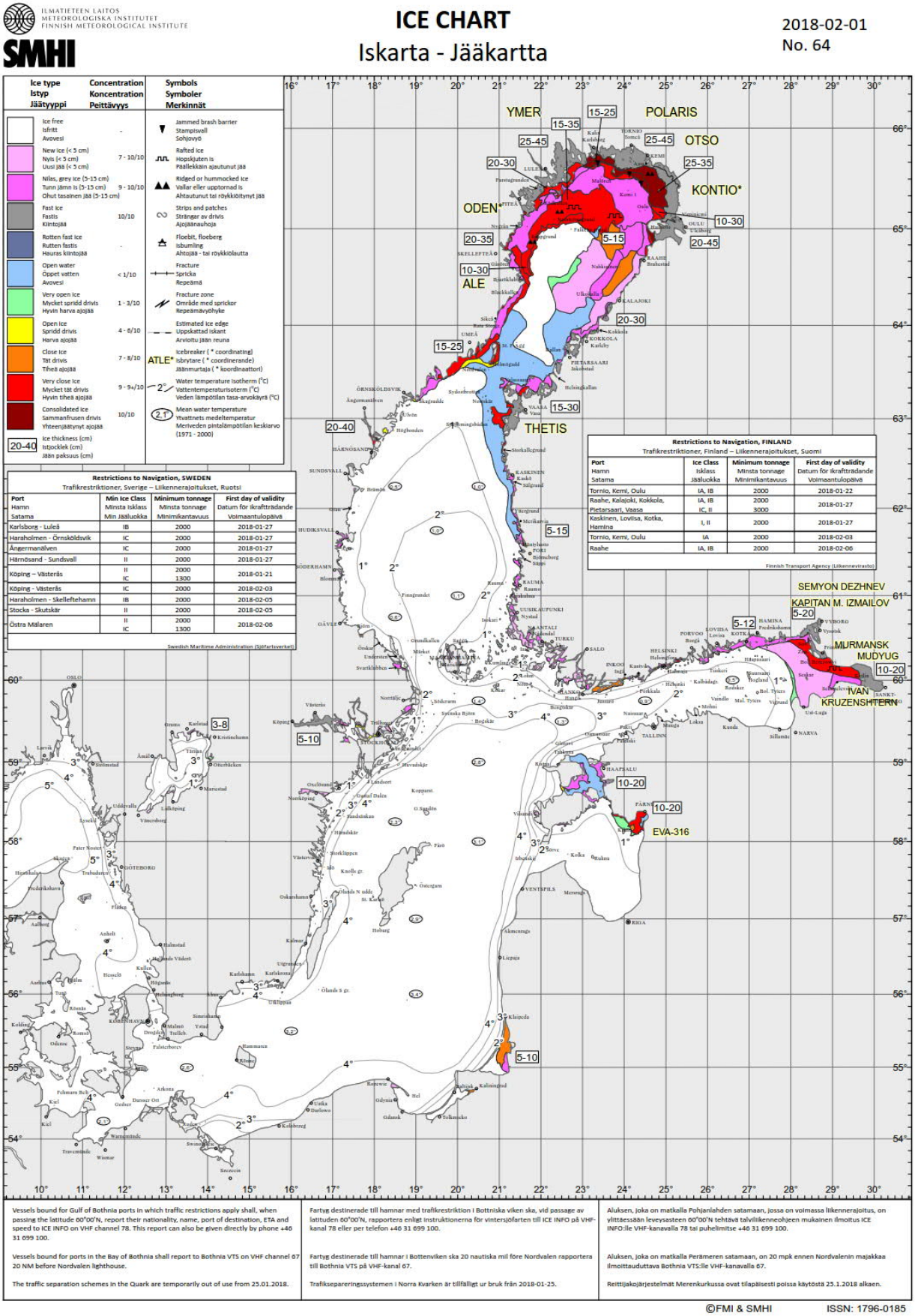
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-02-01
No. 64
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Avovesi
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöityny jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
ATLE*
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
2°
Water temperature isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2.1°
Mean water temperature
Ytvattnets medeltemperatur
Meriveden pintalämpötilan keskiarvo
(1971 - 2000)
YMER
15-35
15-25
POLARIS
25-45
25-45
OTSO
20-30
25-35
KONTIO*
ODEN*
10-30
20-35
5-15
20-45
10-30
ALE
20-30
15-25
15-30
THETIS
20-40
5-15
SEMYON DEZHNEV
KAPITAN M. IZMAILOV
5-20
5-12
MURMANSK
MUDYUG
10-20
IVAN
KRUZENSHTERN
3-8
5-10
10-20
10-20
EVA-316
5-10
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Likennerajoitukset, Ruotsi
Port
Hamn
Satama
Min Ice Class
Minsta isklass
Min jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Karlsborg - Luleå | IB | 2000 | 2018-01-27
Haraholmen - Örnsköldsvik | IC | 2000 | 2018-01-27
Ångermanälven | IC | 2000 | 2018-01-27
Härnösand - Sundsvall | II | 2000 | 2018-01-27
Köping – Västerås | II / IC | 2000 / 1300 | 2018-01-21
Köping - Västerås | IC | 2000 | 2018-02-03
Haraholmen - Skelleftehamn | IB | 2000 | 2018-02-05
Stocka - Skutskär | II | 2000 | 2018-02-05
Östra Mälaren | II / IC | 2000 / 1300 | 2018-02-06
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port
Hamn
Satama
Ice Class
Isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Tornio, Kemi, Oulu | IA, IB | 2000 | 2018-01-22
Raahe, Kalajoki, Kokkola, Pietarsaari, Vaasa | IA, IB / IC, II | 2000 / 3000 | 2018-01-27
Kaskinen, Loviisa, Kotka, Hamina | I, II | 2000 | 2018-01-27
Tornio, Kemi, Oulu | IA | 2000 | 2018-02-03
Raahe | IA, IB | 2000 | 2018-02-06
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
The traffic separation schemes in the Quark are temporarily out of use from 25.01.2018.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Trafikseparerингssystemen i Norra Kvarken är tillfälligt ur bruk från 2018-01-25.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talvilikennеohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
Reittijakojärjestelmät Merenkurkussa ovat tilapäisesti poissa käytöstä 25.1.2018 alkaen.
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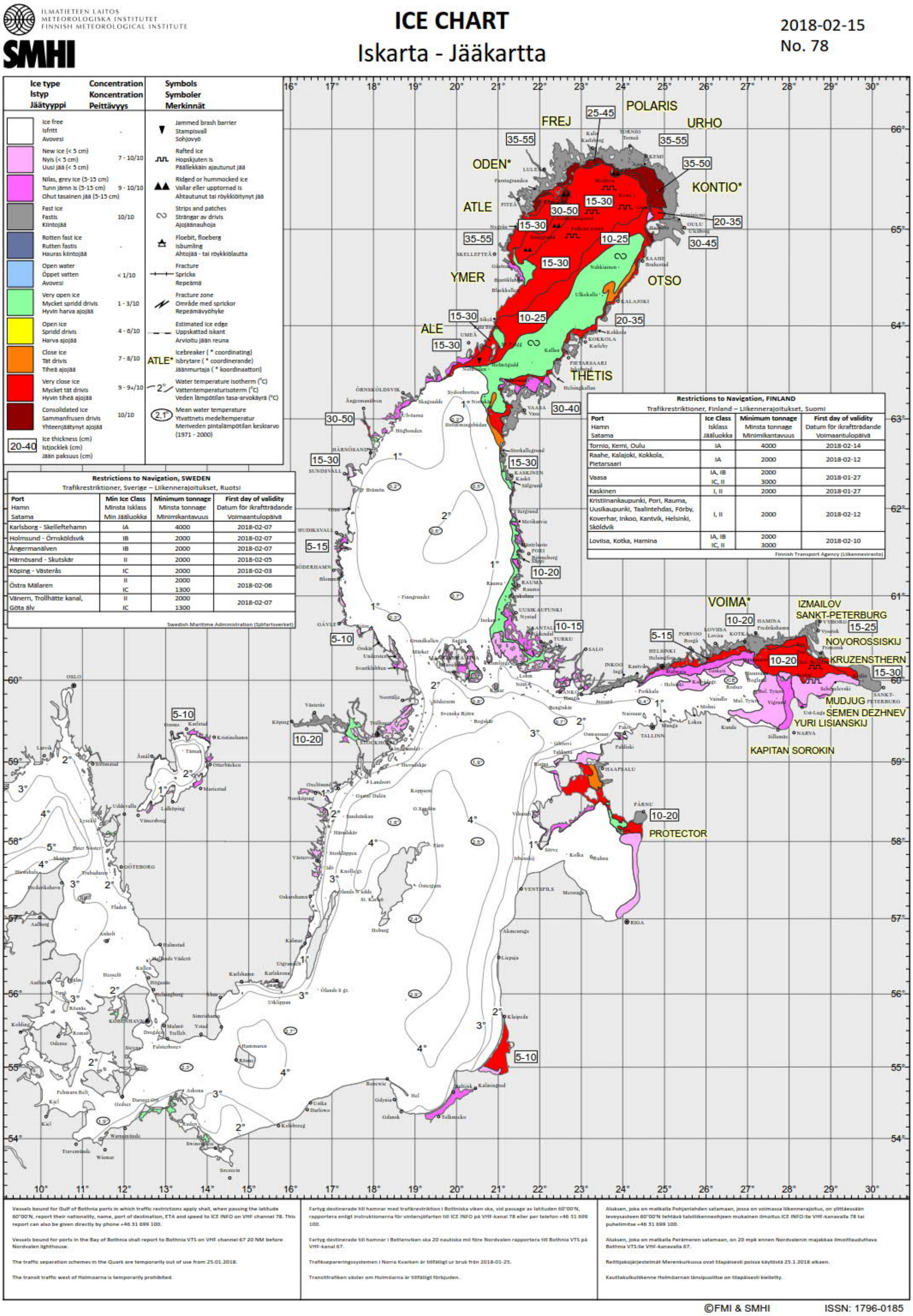
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-02-15
No. 78
Ice type / Istyp / Jäätyyppi
Concentration / Koncentration / Peittävyys
Symbols / Symboler / Merkinnät
Ice free / Isfritt / Avovesi
New ice (< 5 cm) / Nyis (< 5 cm) / Uusi jää (< 5 cm) 7 - 10/10
Nilas, grey ice (5-15 cm) / Tunn jämn is (5-15 cm) / Ohut tasainen jää (5-15 cm) 9 - 10/10
Fast ice / Fastis / Kiintojää 10/10
Rotten fast ice / Rutten fastis / Hauras kiintojää
Open water / Öppet vatten / Avovesi < 1/10
Very open ice / Mycket spridd drivis / Hyvin harva ajojää 1 - 3/10
Open ice / Spridd drivis / Harva ajojää 4 - 6/10
Close ice / Tät drivis / Tiheä ajojää 7 - 8/10
Very close ice / Mycket tät drivis / Hyvin tiheä ajojää 9 - 9+/10
Consolidated ice / Sammanfrusen drivis / Yhteenjäätynyt ajojää 10/10
20-40 Ice thickness (cm) / Istjocklek (cm) / Jään paksuus (cm)
Jammed brash barrier / Stampisvall / Sohjovyö
Rafted ice / Hopskjuten is / Päällekkäin ajautunut jää
Ridged or hummocked ice / Vallar eller upptornad is / Ahtautunut tai röykkiöitynyt jää
Strips and patches / Strängar av drivis / Ajojäänauhoja
Floebit, floeberg / Isbumling / Ahtojää - tai röykkiölautta
Fracture / Spricka / Repeämä
Fracture zone / Område med sprickor / Repeämävyöhyke
Estimated ice edge / Uppskattad iskant / Arvioitu jään reuna
ATLE* Icebreaker (* coordinating) / Isbrytare (* coordinerande) / Jäänmurtaja (* koordinaattori)
Water temperature isotherm (°C) / Vattentemperaturisoterm (°C) / Veden lämpötilan tasa-arvokäyrä (°C)
2.1° Mean water temperature / Ytvattnets medeltemperatur / Meriveden pintalämpötilan keskiarvo (1971 - 2000)
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Liikennerajoitukset, Ruotsi
Port / Hamn / Satama | Min Ice Class / Minsta Isklass / Min Jääluokka | Minimum tonnage / Minsta tonnage / Minimikantavuus | First day of validity / Datum för ikraftträdande / Voimaantulopäivä
Karlsborg - Skelleftehamn | IA | 4000 | 2018-02-07
Holmsund - Örnsköldsvik | IB | 2000 | 2018-02-07
Ångermanälven | IB | 2000 | 2018-02-07
Härnösand - Skutskär | II | 2000 | 2018-02-05
Köping - Västerås | IC | 2000 | 2018-02-03
Östra Mälaren | II, IC | 2000, 1300 | 2018-02-06
Vänern, Trollhätte kanal, Göta älv | II, IC | 2000, 1300 | 2018-02-07
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port / Hamn / Satama | Ice Class / Isklass / Jääluokka | Minimum tonnage / Minsta tonnage / Minimikantavuus | First day of validity / Datum för ikraftträdande / Voimaantulopäivä
Tornio, Kemi, Oulu | IA | 4000 | 2018-02-14
Raahe, Kalajoki, Kokkola, Pietarsaari | IA | 2000 | 2018-02-12
Vaasa | IA, IB / IC, II | 2000 / 3000 | 2018-01-27
Kaskinen | I, II | 2000 | 2018-01-27
Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Taalintehdas, Förby, Koverhar, Inkoo, Kantvik, Helsinki, Sköldvik | I, II | 2000 | 2018-02-12
Loviisa, Kotka, Hamina | IA, IB / IC, II | 2000 / 3000 | 2018-02-10
Finnish Transport Agency (Liikennevirasto)
POLARIS
FREJ
URHO
ODEN*
KONTIO*
ATLE
YMER
OTSO
ALE
THETIS
VOIMA*
IZMAILOV
SANKT-PETERBURG
NOVOROSSISKIJ
KRUZENSTHERN
MUDJUG
SEMEN DEZHNEV
YURI LISIANSKIJ
KAPITAN SOROKIN
PROTECTOR
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
The traffic separation schemes in the Quark are temporarily out of use from 25.01.2018.
The transit traffic west of Holmoarna is temporarily prohibited.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Trafikseparingssystemen i Norra Kvarken är tillfälligt ur bruk från 2018-01-25.
Transittrafiken väster om Holmöarna är tillfälligt förbjuden.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
Reittijakojärjestelmät Merenkurkussa ovat tilapäisesti poissa käytöstä 25.1.2018 alkaen.
Kauttakulkuliikenne Holmöarnan länsipuolitse on tilapäisesti kielletty.
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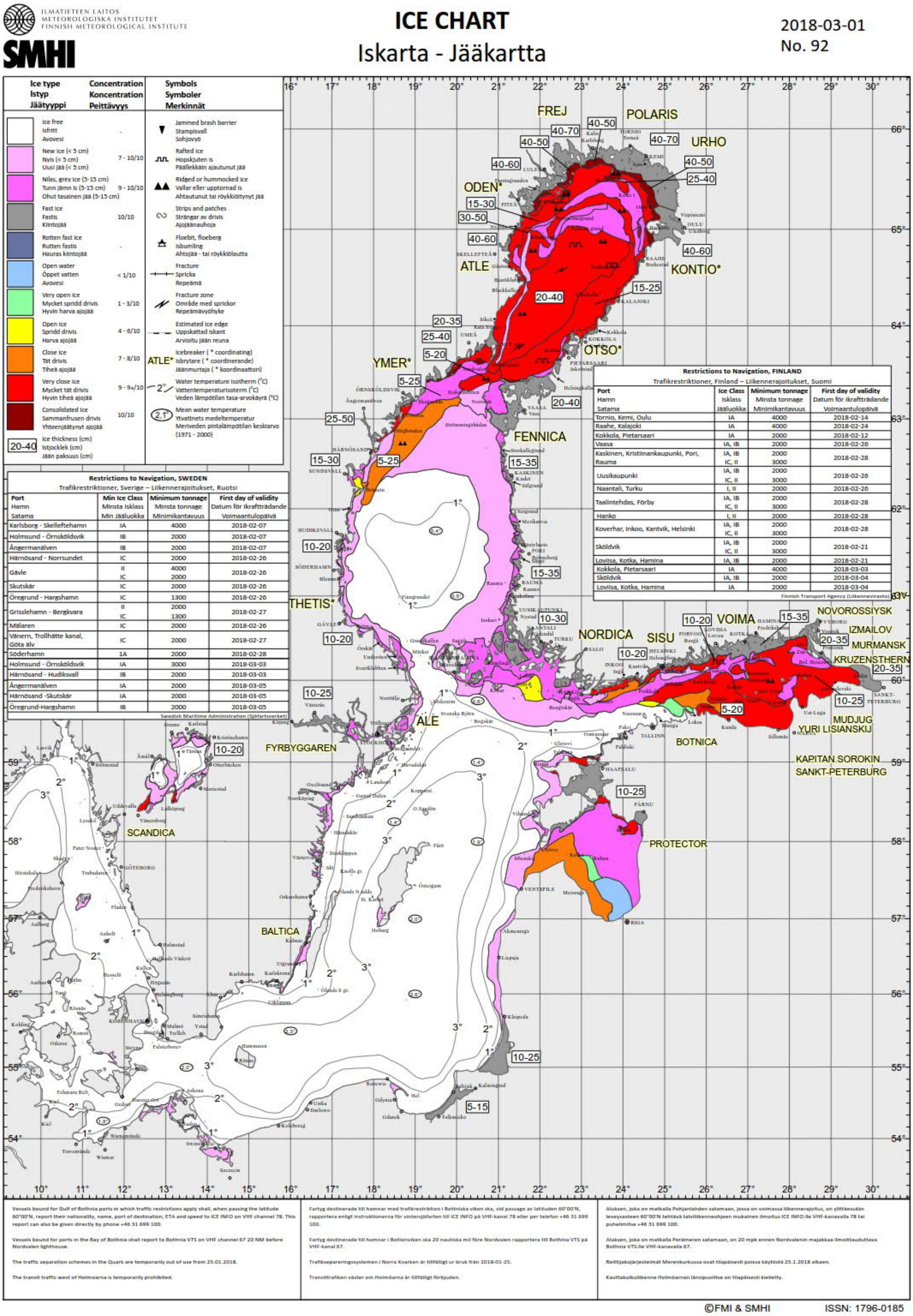
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-03-01
No. 92
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Restrictions to Navigation, SWEDEN
Restrictions to Navigation, FINLAND
FREJ
POLARIS
URHO
ODEN*
ATLE
KONTIO*
OTSO*
YMER*
FENNICA
THETIS*
NORDICA
SISU
VOIMA
NOVOROSSIYSK
IZMAILOV
MURMANSK
KRUZENSHTERN
MUDJUG
YURI LISIANSKIJ
BOTNICA
KAPITAN SOROKIN
SANKT-PETERBURG
ALE
FYRBYGGAREN
SCANDICA
PROTECTOR
BALTICA
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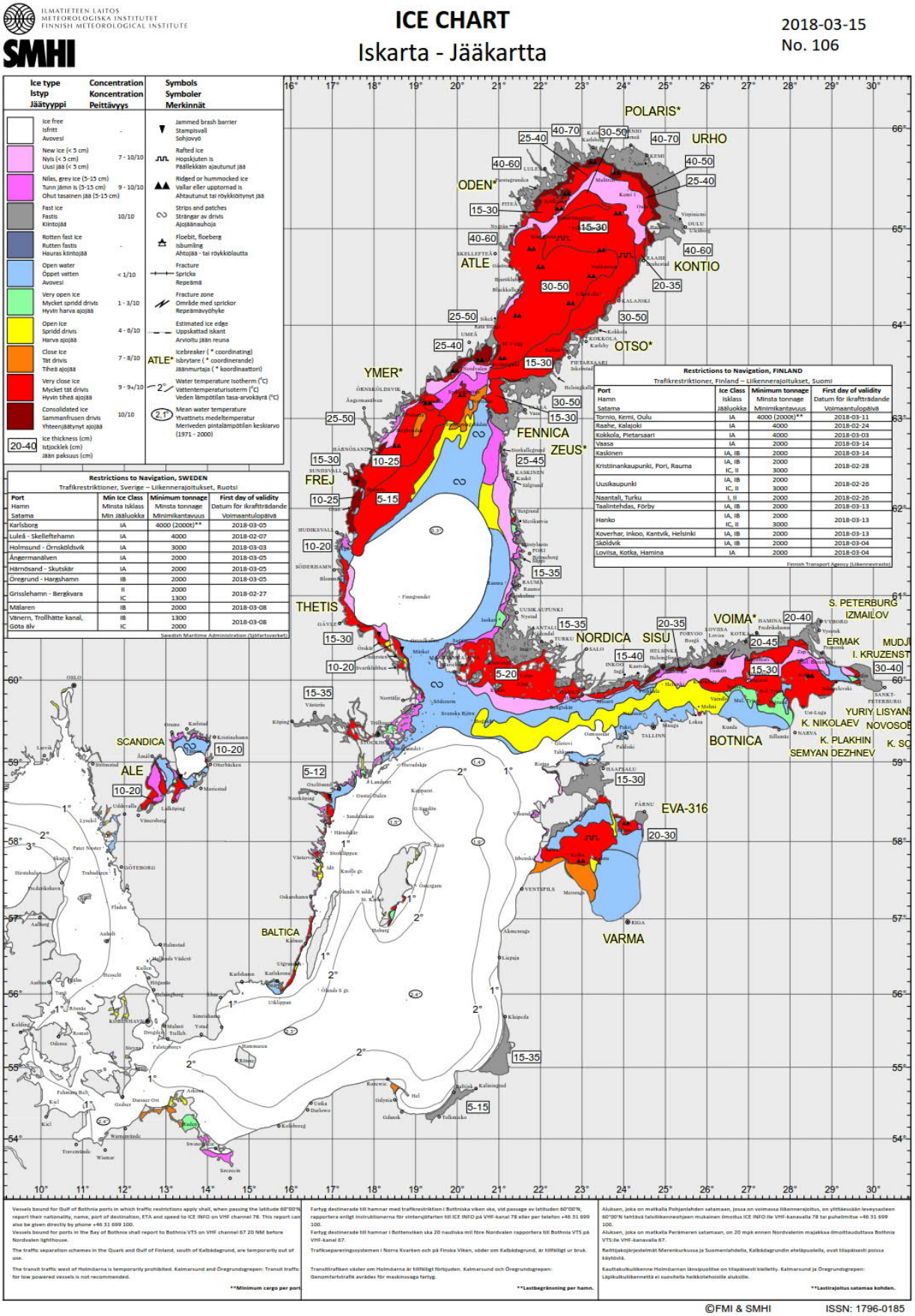
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-03-15
No. 106
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Avovesi
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöityny jää
Strips and patches
Strängar av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
ATLE*
Water temperature Isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2°
Mean water temperature
Ytvattnets medeltemperatur
Medveden pintalämpötilan keskiarvo
(1971 - 2000)
2.1°
POLARIS*
URHO
ODEN*
ATLE
KONTIO
OTSO*
YMER*
FENNICA
ZEUS*
FREJ
THETIS
NORDICA
SISU
VOIMA*
ERMAK
I. KRUZENST
K. NIKOLAEV
K. PLAKHIN
SEMYAN DEZHNEV
BOTNICA
S. PETERBURG
IZMAILOV
SCANDICA
ALE
EVA-316
BALTICA
VARMA
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Likennerajoitukset, Ruotsi
Port
Hamn
Satama
Min Ice Class
Minsta isklass
Min Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Karlsborg IA 4000 (2000t)** 2018-03-05
Luleå - Skellefteharnn IA 4000 2018-02-07
Holmsund - Örnsköldsvik IA 3000 2018-03-03
Ångermanälven IA 2000 2018-03-05
Härnösand - Skutskär IA 2000 2018-03-05
Öregrund - Hargshamn IB 2000 2018-03-05
Grisslehamn - Bergkvara II 2000 2018-02-27
IC 1300
Mälaren IB 2000 2018-03-08
Vänern, Trollhätte kanal, Göta älv IB 1300 2018-03-08
IC 2000
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port
Hamn
Satama
Ice Class
Isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Tornio, Kemi, Oulu IA 4000 (2000t)** 2018-03-11
Raahe, Kalajoki IA 4000 2018-02-24
Kokkola, Pietarsaari IA 4000 2018-03-03
Vaasa IA 2000 2018-03-14
Kaskinen IA, IB 2000 2018-03-14
Kristiinankaupunki, Pori, Rauma IA, IB 2000 2018-02-28
IC, II 3000
Uusikaupunki IA, IB 2000 2018-02-26
IC, II 3000
Naantali, Turku I, II 2000 2018-02-26
Taalintehdas, Förby IA, IB 2000 2018-03-13
Hanko IA, IB 2000 2018-03-13
IC, II 3000
Koverhar, Inkoo, Kantvik, Helsinki IA, IB 2000 2018-03-13
Skoldvik IA, IB 2000 2018-03-04
Loviisa, Kotka, Hamina IA 2000 2018-03-04
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
The traffic separation schemes in the Quark and Gulf of Finland, south of Kalbådagrund, are temporarily out of use.
The transit traffic west of Holmöarna is temporarily prohibited. Kalmarsund and Öregrundsgrepen: Transit traffic for low powered vessels is not recommended.
**Minimum cargo per port.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Trafiksepareringssystemen i Norra Kvarken och på Finska Viken, söder om Kalbådagrund, är tillfälligt ur bruk.
Transittrafiken väster om Holmöarna är tillfälligt förbjuden. Kalmarsund och Öregrundsgrepen: Genomfartstrafik avrådes för maskinsvaga fartyg.
**Lastbegränsning per hamn.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoitettauduttava Bothnia VTS:lle VHF-kanavalla 67.
Reittijakojärjestelmät Merenkurkussa ja Suomenlahdella, Kalbådagrundin eteläpuolella, ovat tilapäisesti poissa käytöstä.
Kauttakulkuliikenne Holmöarnan länsipuolitse on tilapäisesti kielletty. Kalmarsund ja Öregrundsgrepen: Läpikulkuliikennettä ei suositella heikkotehoisille aluksille.
**Lastirajoitus satamaa kohden.
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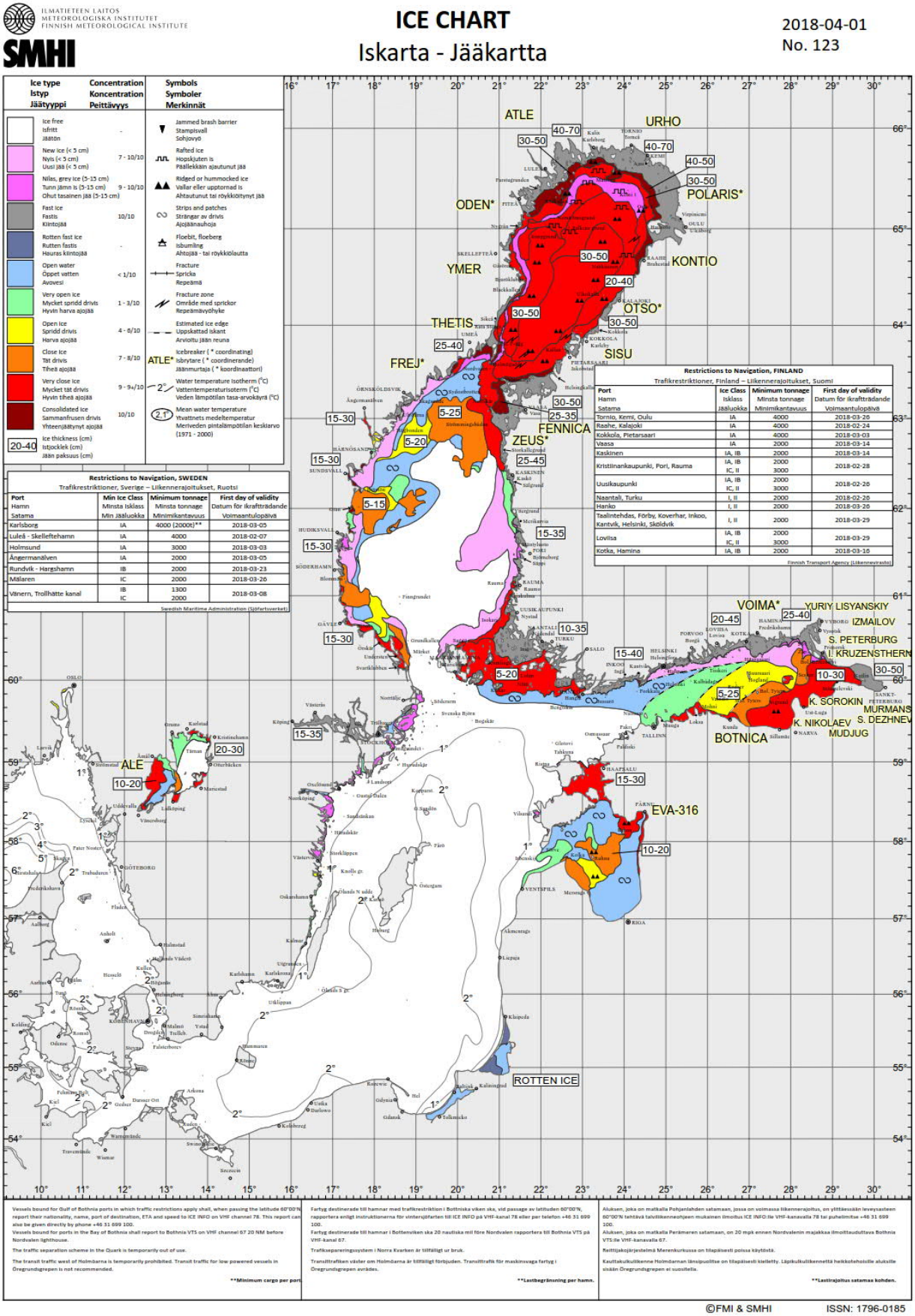
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-04-01
No. 123
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Jäätön
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöitynyt jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
ATLE*
Water temperature Isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2°
Mean water temperature
Ytvattnets medeltemperatur
Meriveden pintalämpötilan keskiarvo
(1971 - 2000)
2.1°
ATLE
URHO
ODEN*
POLARIS*
YMER
KONTIO
OTSO*
THETIS
FREJ*
SISU
FENNICA
ZEUS*
VOIMA*
YURIY LISYANSKIY
IZMAILOV
S. PETERSBURG
I. KRUZENSTHERN
K. SOROKIN
K. NIKOLAEV
MUDJUG
MURMANSK
S. DEZHNEV
BOTNICA
ALE
EVA-316
ROTTEN ICE
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Likennerajoitukset, Ruotsi
Port / Hamn / Satama
Min Ice Class / Minsta isklass / Min Jääluokka
Minimum tonnage / Minsta tonnage / Minimikantavuus
First day of validity / Datum för ikraftträdande / Voimaantulopäivä
Karlsborg IA 4000 (2000t)** 2018-03-05
Luleå - Skellefteahmn IA 4000 2018-02-07
Holmsund IA 3000 2018-03-03
Ångermanälven IA 2000 2018-03-05
Rundvik - Hargshamn IB 2000 2018-03-23
Mälaren IC 2000 2018-03-26
Vänern, Trollhätte kanal IB / IC 1300 / 2000 2018-03-08
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Likennerajoitukset, Suomi
Port / Hamn / Satama
Ice Class / Isklass / Jääluokka
Minimum tonnage / Minsta tonnage / Minimikantavuus
First day of validity / Datum för ikraftträdande / Voimaantulopäivä
Tornio, Kemi, Oulu IA 4000 2018-03-26
Raahe, Kalajoki IA 4000 2018-02-24
Kokkola, Pietarsaari IA 4000 2018-03-03
Vaasa IA 2000 2018-03-14
Kaskinen IA, IB 2000 2018-03-14
Kristiinankaupunki, Pori, Rauma IA, IB / IC, II 2000 / 3000 2018-02-28
Uusikaupunki IA, IB / IC, II 2000 / 3000 2018-02-26
Naantali, Turku I, II 2000 2018-02-26
Hanko I, II 2000 2018-03-26
Taalintehdas, Förby, Koverhar, Inkoo, Kantvik, Helsinki, Skåldvik I, II 2000 2018-03-29
Lovilsa IA, IB / IC, II 2000 / 3000 2018-03-29
Kotka, Hamina IA, IB 2000 2018-03-16
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
The traffic separation scheme in the Quark is temporarily out of use.
The transit traffic west of Holmöarna is temporarily prohibited. Transit traffic for low powered vessels in Öregrundsgrepen is not recommended.
**Minimum cargo per port
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Trafiksepareringssystem i Norra Kvarken är tillfälligt ur bruk.
Transittrafiken väster om Holmöarna är tillfälligt förbjuden. Transittrafik för maskinsvaga fartyg i Öregrundsgrepen avrådes.
**Lastbegränsning per hamn.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
Reittijakojärjestelmä Merenkurkussa on tilapäisesti poissa käytöstä.
Kauttakulkuliikenne Holmöarnan länsipuolitse on tilapäisesti kielletty. Läpikulkuliikennettä heikkotehoisille aluksille sisään Öregrundsgrepen ei suositella.
**Lastirajoitus satamaa kohden.
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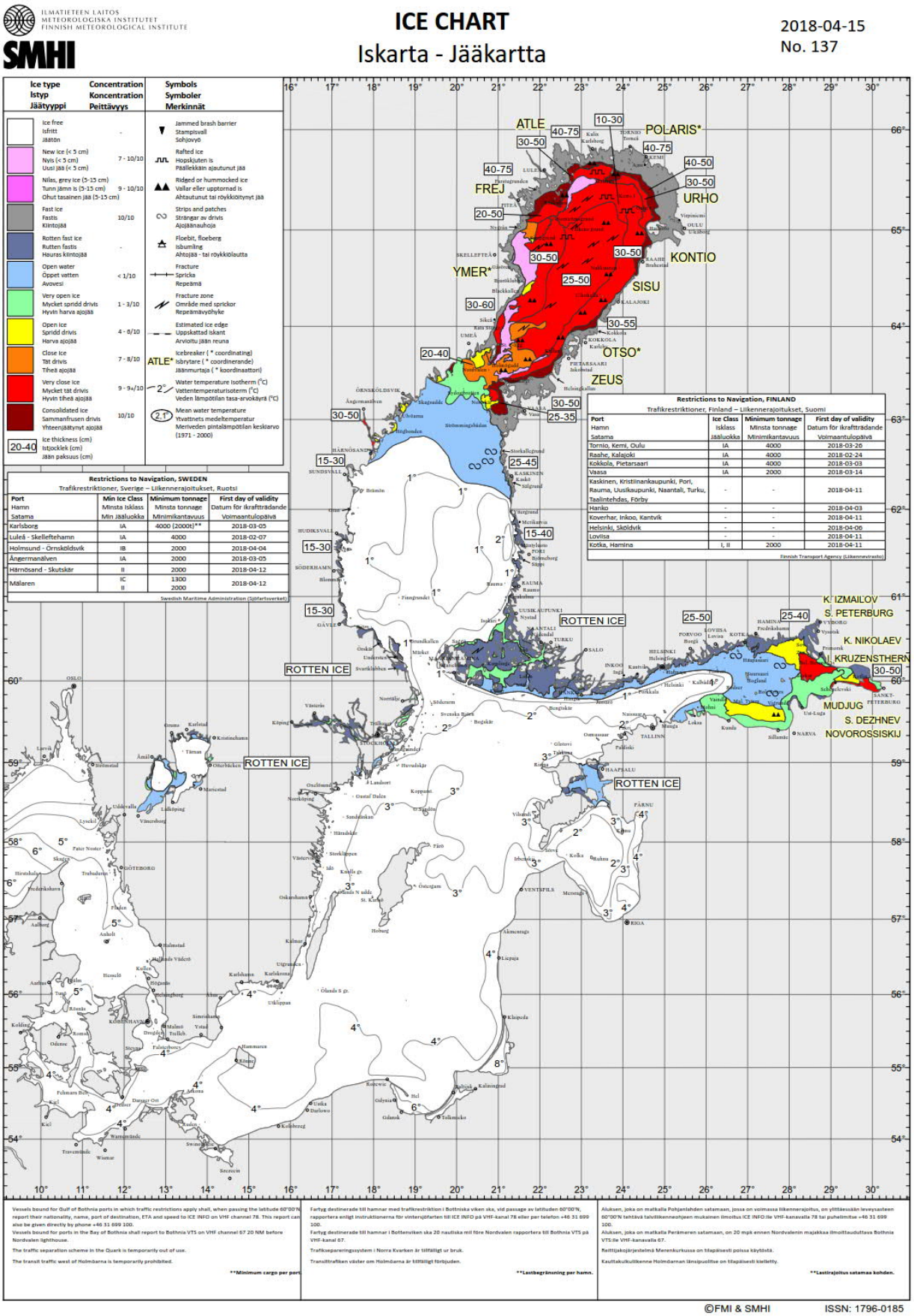
ISSN: 1796-0185


ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-04-15
No. 137
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Jäätön
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöityny jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
ATLE*
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
2°
Water temperature Isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2.1°
Mean water temperature
Ytvattnets medeltemperatur
Mertveden pintalämpötilan keskiarvo
(1971 - 2000)
ATLE
POLARIS*
FREJ
URHO
YMER*
KONTIO
SISU
OTSO*
ZEUS
10-30
30-50
40-75
40-50
20-50
30-60
30-55
20-40
25-50
25-35
15-30
25-45
15-40
ROTTEN ICE
K. IZMAILOV
S. PETERBURG
K. NIKOLAEV
KRUZENSTHERN
MUDJUG
S. DEZHNEV
NOVOROSSISKIJ
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Liikennerajoitukset, Ruotsi
Port
Hamn
Satama
Min Ice Class
Minsta isklass
Min Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Karlsborg IA 4000 (2000t)** 2018-03-05
Luleå - Skellefteharnn IA 4000 2018-02-07
Holmsund - Örnsköldsvik IB 2000 2018-04-04
Ångermanälven IA 2000 2018-03-05
Härnösand - Skutskär II 2000 2018-04-12
Mälaren IC 1300 2018-04-12
II 2000
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port
Hamn
Satama
Ice Class
isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Tornio, Kemi, Oulu IA 4000 2018-03-26
Raahe, Kalajoki IA 4000 2018-02-24
Kokkola, Pietarsaari IA 4000 2018-03-03
Vaasa IA 2000 2018-03-14
Kaskinen, Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby - - 2018-04-11
Hanko - - 2018-04-03
Koverhar, Inkoo, Kantvik - - 2018-04-11
Helsinki, Skoldvik - - 2018-04-06
Lovlisa - - 2018-04-11
Kotka, Hamina I, II 2000 2018-04-11
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
The traffic separation scheme in the Quark is temporarily out of use.
The transit traffic west of Holmöarna is temporarily prohibited.
**Minimum cargo per port
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vinterssjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Trafiksepareringssystem i Norra Kvarken är tillfälligt ur bruk.
Transittrafiken väster om Holmöarna är tillfälligt förbjuden.
**Lastbegränsning per hamn.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikennetiedotus mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
Reittijakojärjestelmä Merenkurkussa on tilapäisesti poissa käytöstä.
Kauttakulkuliikenne Holmöarnan länsipuolitse on tilapäisesti kielletty.
**Lastirajoitus satamas kohden.
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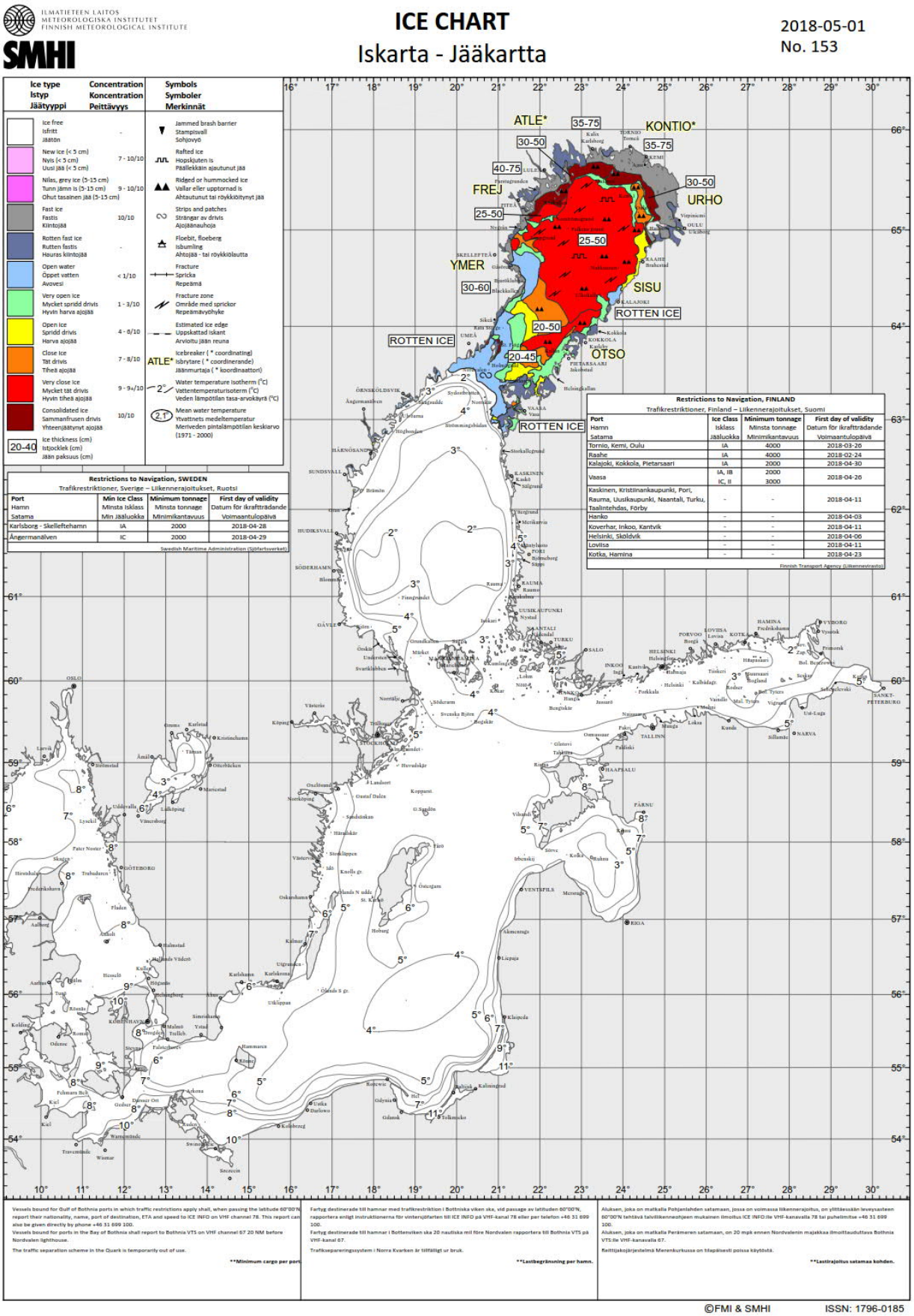
ISSN: 1796-0185


ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-05-01
No. 153
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Jäätön
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöityny jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölasutta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
ATLE*
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
2°
Water temperature isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2.1°
Mean water temperature
Ytvattnets medeltemperatur
Mertveden pintalämpötilan keskiarvo
(1971 - 2000)
ATLE*
KONTIO*
FREJ
URHO
YMER
SISU
OTSO
ROTTEN ICE
35-75
30-50
40-75
25-50
30-60
20-50
20-45
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Llikennerajoitukset, Ruotsi
Port
Hamn
Satama
Min Ice Class
Minsta isklass
Min jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Karlsborg - Skelleftehamn
IA
2000
2018-04-28
Ångermanälven
IC
2000
2018-04-29
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Llikennerajoitukset, Suomi
Port
Hamn
Satama
Ice Class
Isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Tornio, Kemi, Oulu
IA
4000
2018-03-26
Raahe
IA
4000
2018-02-24
Kalajoki, Kokkola, Pietarsaari
IA
2000
2018-04-30
Vaasa
IA, IB
IC, II
2000
3000
2018-04-26
Kaskinen, Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby
-
-
2018-04-11
Hanko
-
-
2018-04-03
Koverhar, Inkoo, Kantvik
-
-
2018-04-11
Helsinki, Skoldvik
-
-
2018-04-06
Lovlisa
-
-
2018-04-11
Kotka, Hamina
-
-
2018-04-23
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
The traffic separation scheme in the Quark is temporarily out of use.
**Minimum cargo per port
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vinterssjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Trafiksepareringssystem i Norra Kvarken är tillfälligt ur bruk.
**Lastbegränsning per hamn.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikennejärjestelmän mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittauduttava Bothnia VTS:lle VHF-kanavalla 67.
Reittijakojärjestelmä Merenkurkussa on tilapäisesti poissa käytöstä.
**Lastirajoitus satamas kohden.
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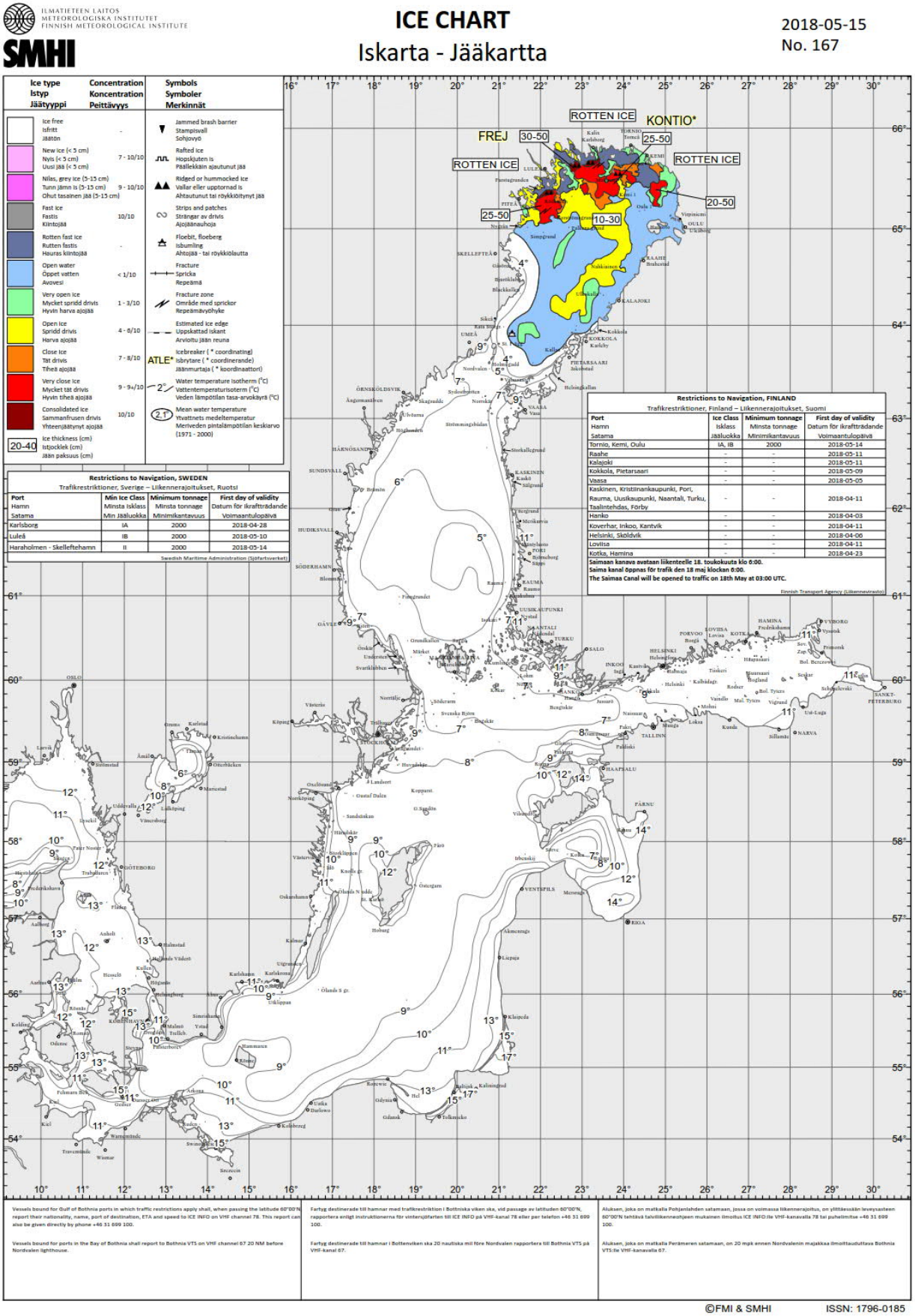
ISSN: 1796-0185


ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
SMHI
ICE CHART
Iskarta - Jääkartta
2018-05-15
No. 167
ROTTEN ICE
KONTIO*
FREJ
30-50
25-50
ROTTEN ICE
ROTTEN ICE
20-50
25-50
10-30
Ice type
Istyp
Jäätyyppi
Concentration
Koncentration
Peittävyys
Symbols
Symboler
Merkinnät
Ice free
Isfritt
Jäätön
New ice (< 5 cm)
Nyis (< 5 cm)
Uusi jää (< 5 cm)
7 - 10/10
Nilas, grey ice (5-15 cm)
Tunn jämn is (5-15 cm)
Ohut tasainen jää (5-15 cm)
9 - 10/10
Fast ice
Fastis
Kiintojää
10/10
Rotten fast ice
Rutten fastis
Hauras kiintojää
Open water
Öppet vatten
Avovesi
< 1/10
Very open ice
Mycket spridd drivis
Hyvin harva ajojää
1 - 3/10
Open ice
Spridd drivis
Harva ajojää
4 - 6/10
Close ice
Tät drivis
Tiheä ajojää
7 - 8/10
Very close ice
Mycket tät drivis
Hyvin tiheä ajojää
9 - 9+/10
Consolidated ice
Sammanfrusen drivis
Yhteenjäätynyt ajojää
10/10
Ice thickness (cm)
Istjocklek (cm)
Jään paksuus (cm)
20-40
Jammed brash barrier
Stampisvall
Sohjovyö
Rafted ice
Hopskjuten is
Päällekkäin ajautunut jää
Ridged or hummocked ice
Vallar eller upptornad is
Ahtautunut tai röykkiöityny jää
Strips and patches
Stränger av drivis
Ajojäänauhoja
Floebit, floeberg
Isbumling
Ahtojää - tai röykkiölautta
Fracture
Spricka
Repeämä
Fracture zone
Område med sprickor
Repeämävyöhyke
Estimated ice edge
Uppskattad iskant
Arvioitu jään reuna
ATLE*
Icebreaker (* coordinating)
Isbrytare (* coordinerande)
Jäänmurtaja (* koordinaattori)
2°
Water temperature isotherm (°C)
Vattentemperaturisoterm (°C)
Veden lämpötilan tasa-arvokäyrä (°C)
2.1°
Mean water temperature
Ytvattnets medeltemperatur
Merkveden pintalämpötilan keskiarvo
(1971 - 2000)
Restrictions to Navigation, SWEDEN
Trafikrestriktioner, Sverige – Liikennerajoitukset, Ruotsi
Port
Hamn
Satama
Min Ice Class
Minsta Isklass
Min Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Karlsborg | IA | 2000 | 2018-04-28
Luleå | IB | 2000 | 2018-05-10
Haraholmen - Skelleftehamn | II | 2000 | 2018-05-14
Swedish Maritime Administration (Sjöfartsverket)
Restrictions to Navigation, FINLAND
Trafikrestriktioner, Finland – Liikennerajoitukset, Suomi
Port
Hamn
Satama
Ice Class
Isklass
Jääluokka
Minimum tonnage
Minsta tonnage
Minimikantavuus
First day of validity
Datum för ikraftträdande
Voimaantulopäivä
Tornio, Kemi, Oulu | IA, IB | 2000 | 2018-05-14
Raahe | - | - | 2018-05-11
Kalajoki | - | - | 2018-05-11
Kokkola, Pietarsaari | - | - | 2018-05-09
Vaasa | - | - | 2018-05-05
Kaskinen, Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby | - | - | 2018-04-11
Hanko | - | - | 2018-04-03
Koverhar, Inkoo, Kantvik | - | - | 2018-04-11
Helsinki, Skoldvik | - | - | 2018-04-06
Lovlisa | - | - | 2018-04-11
Kotka, Hamina | - | - | 2018-04-23
Saimaan kanava avataan liikenteelle 18. toukokuuta klo 0:00.
Saima kanal öppnas för trafik den 18 maj klockan 0:00.
The Saimaa Canal will be opened to traffic on 18th May at 03:00 UTC.
Finnish Transport Agency (Liikennevirasto)
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60°00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 78. This report can also be given directly by phone +46 31 699 100.
Vessels bound for ports in the Bay of Bothnia shall report to Bothnia VTS on VHF channel 67 20 NM before Nordvalen lighthouse.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60°00'N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 78 eller per telefon +46 31 699 100.
Fartyg destinerade till hamnar i Bottenviken ska 20 nautiska mil före Nordvalen rapportera till Bothnia VTS på VHF-kanal 67.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60°00'N tehtävä talviliikennetiejoen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 78 tai puhelimitse +46 31 699 100.
Aluksen, joka on matkalla Perämeren satamaan, on 20 mpk ennen Nordvalenin majakkaa ilmoittaututtava Bothnia VTS:lle VHF-kanavalla 67.
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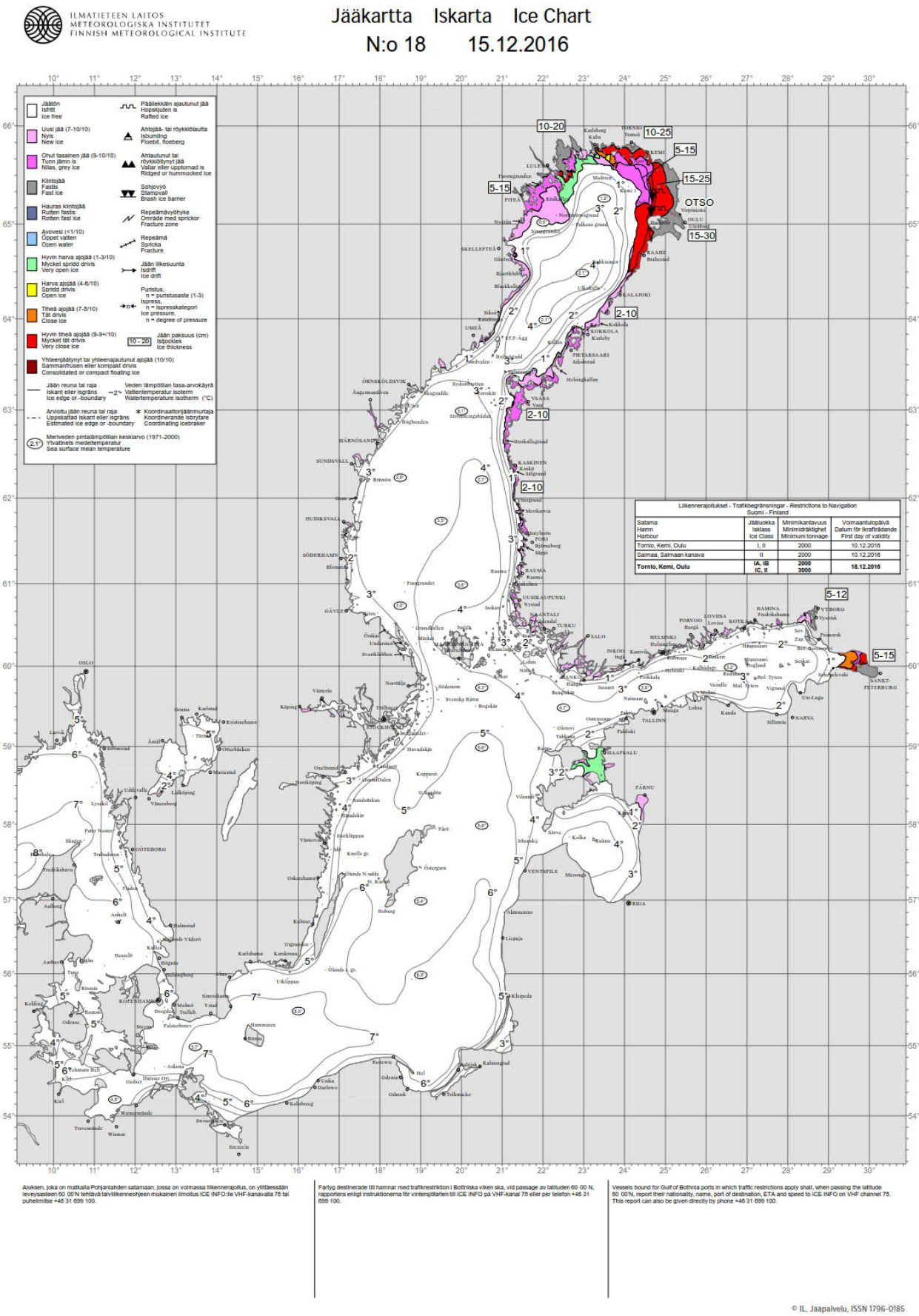
ISSN: 1796-0185


ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 18 15.12.2016
Jäätön
Isfritt
Ice free
Uusi jää (7-10/10)
Nyis
New ice
Ohut tasainen jää (9-10/10)
Tunn jämn is
Nilas, grey ice
Kiinteä jää
Fast ice
Hauras kiinteä jää
Rutten fastis
Rotten fast ice
Avovesi (<1/10)
Öppet vatten
Open water
Hyvin harva ajojää (1-3/10)
Mycket spridd drivis
Very open ice
Harva ajojää (4-5/10)
Spridd drivis
Open ice
Tiheä ajojää (7-8/10)
Tät drivis
Close ice
Hyvin tiheä ajojää (9-9+/10)
Mycket tät drivis
Very close ice
Yhteenjäätynyt tai yhteenajautunut ajojää (10/10)
Sammanfrusen eller kompakt drivis
Consolidated or compact floating ice
Jään reuna tai raja
Iskant eller isgräns
Ice edge or -boundary
Arvioitu jään reuna tai raja
Uppskattad iskant eller isgräns
Estimated ice edge or -boundary
Merenveden pintalämpötilan keskiarvo (1971-2000)
Ytvattnets medeltemperatur
Sea surface mean temperature
Päällekkäin ajautunut jää
Hopskjuten is
Rafted ice
Ahtojää- tai röykkiölautta
Isbumling
Floebit, floeberg
Ahtautunut tai röykkiöbtynyt jää
Vallar eller upptornad is
Ridged or hummocked ice
Sohjovyö
Slampvall
Brash ice barrier
Repeämävyöhyke
Område med sprickor
Fracture zone
Repeämä
Spricka
Fracture
Jään liikesuunta
Isdrift
Ice drift
Puristus,
n = puristusaste (1-3)
Ispress,
n = ispresskategori
Ice pressure,
n = degree of pressure
10 - 20
Jään paksuus (cm)
Istjocklek
Ice thickness
Veden lämpötilan tasa-arvokäyrä
Vattentemperatur isoterm
Watertemperature isotherm (°C)
Koordinaattorijäänmurtaja
Koordinerande isbrytare
Coordinating icebraker
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama
Hamn
Harbour
Jääluokka
Isklass
Ice Class
Minimikantavuus
Minimidräktighet
Minimum tonnage
Voimaantulopäivä
Datum för ikraftträdande
First day of validity
Tornio, Kemi, Oulu
I, II
2000
10.12.2016
Saimaa, Saimaan kanava
II
2000
10.12.2016
Tornio, Kemi, Oulu
IA, IB
IC, II
2000
3000
18.12.2016
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
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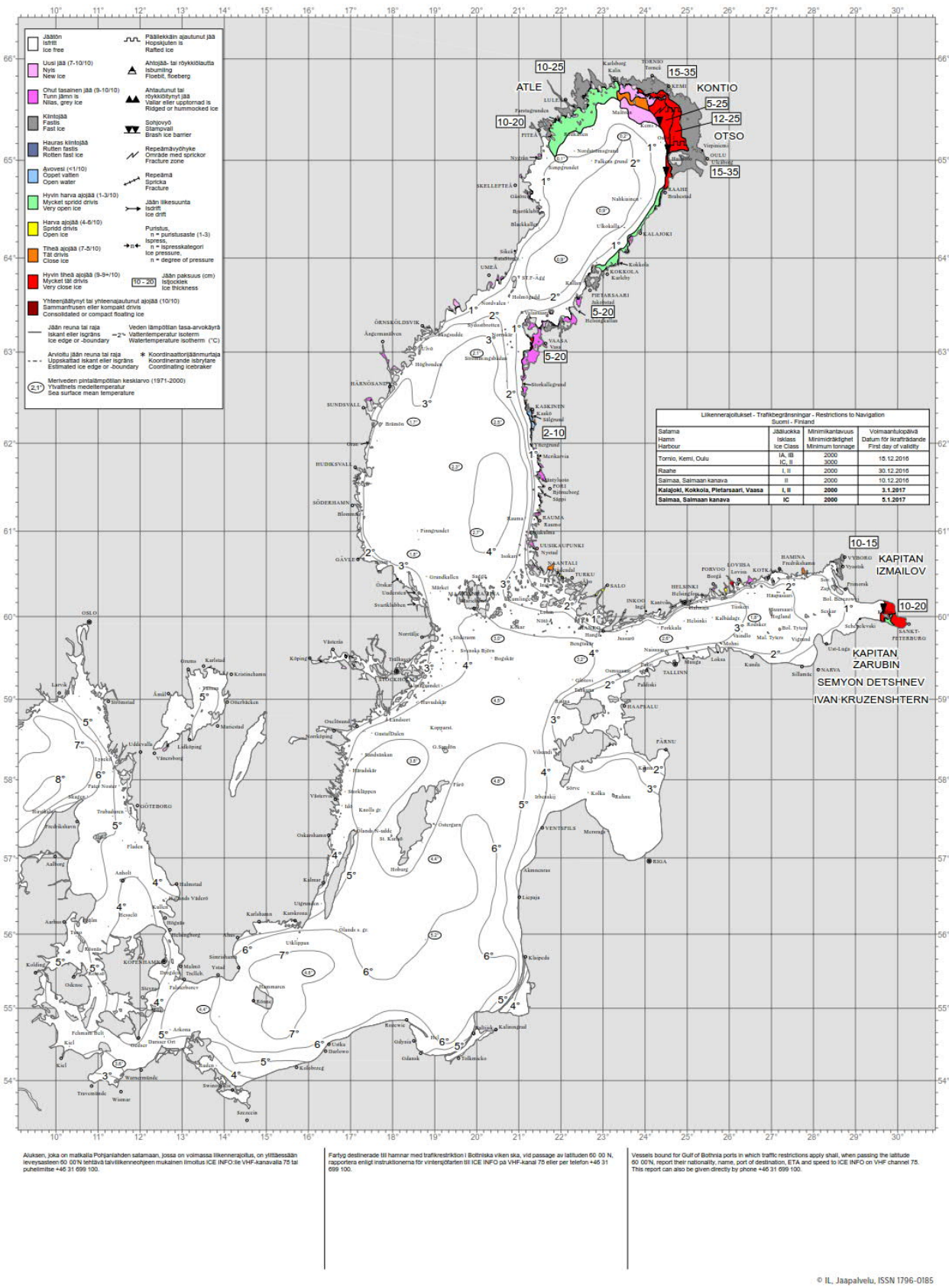
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 35 1.1.2017
ATLE
KONTIO
OTSO
KAPITAN IZMAILOV
KAPITAN ZARUBIN
SEMYON DETSHNEV
IVAN KRUZENSHTERN
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jääluokka / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu
IA, IB
IC, II
2000
3000
15.12.2016
Raahe
I, II
2000
30.12.2016
Saimaa, Saimaan kanava
II
2000
10.12.2016
Kalajoki, Kokkola, Pietarsaari, Vaasa
I, II
2000
3.1.2017
Saimaa, Saimaan kanava
IC
2000
5.1.2017
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
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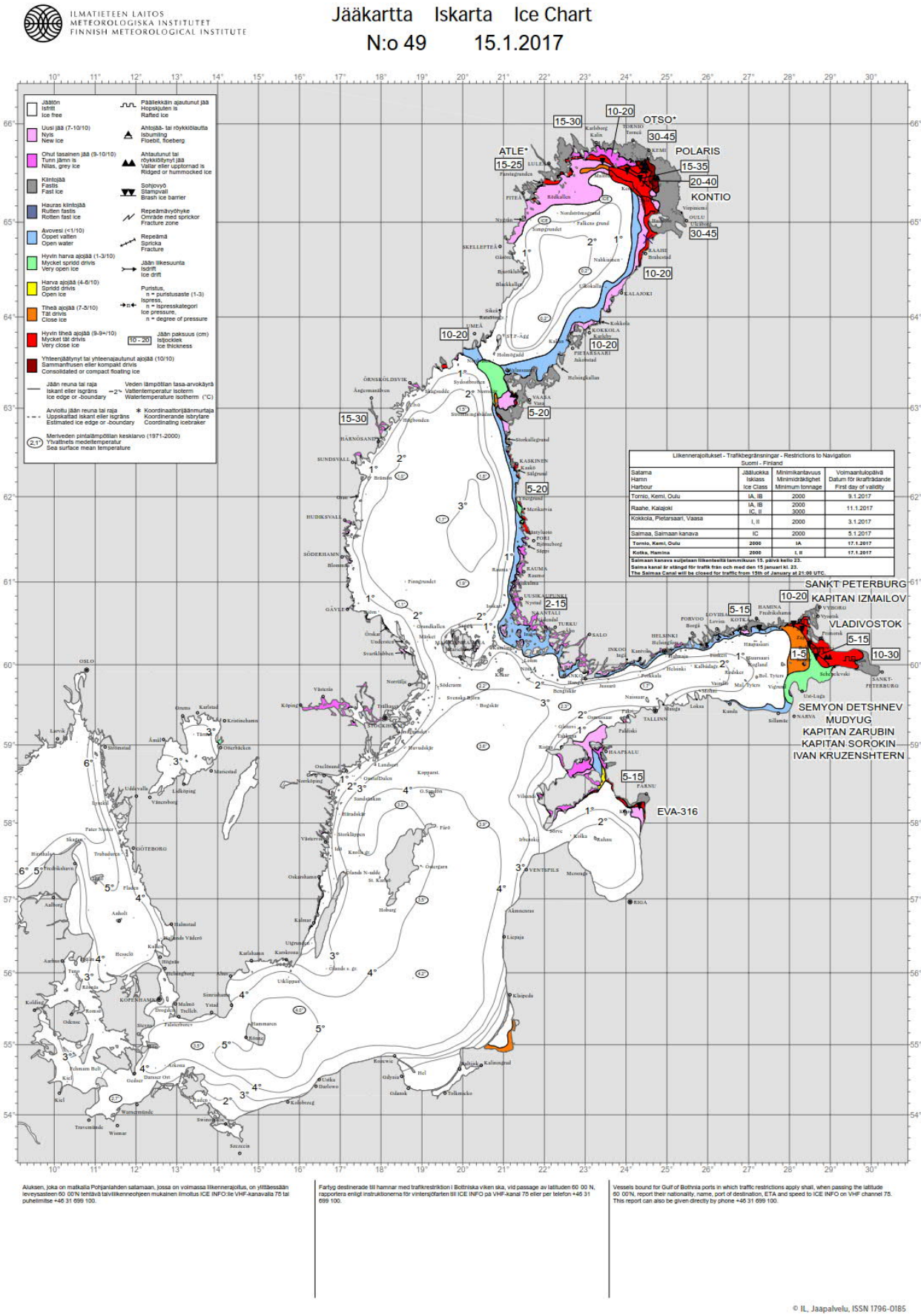

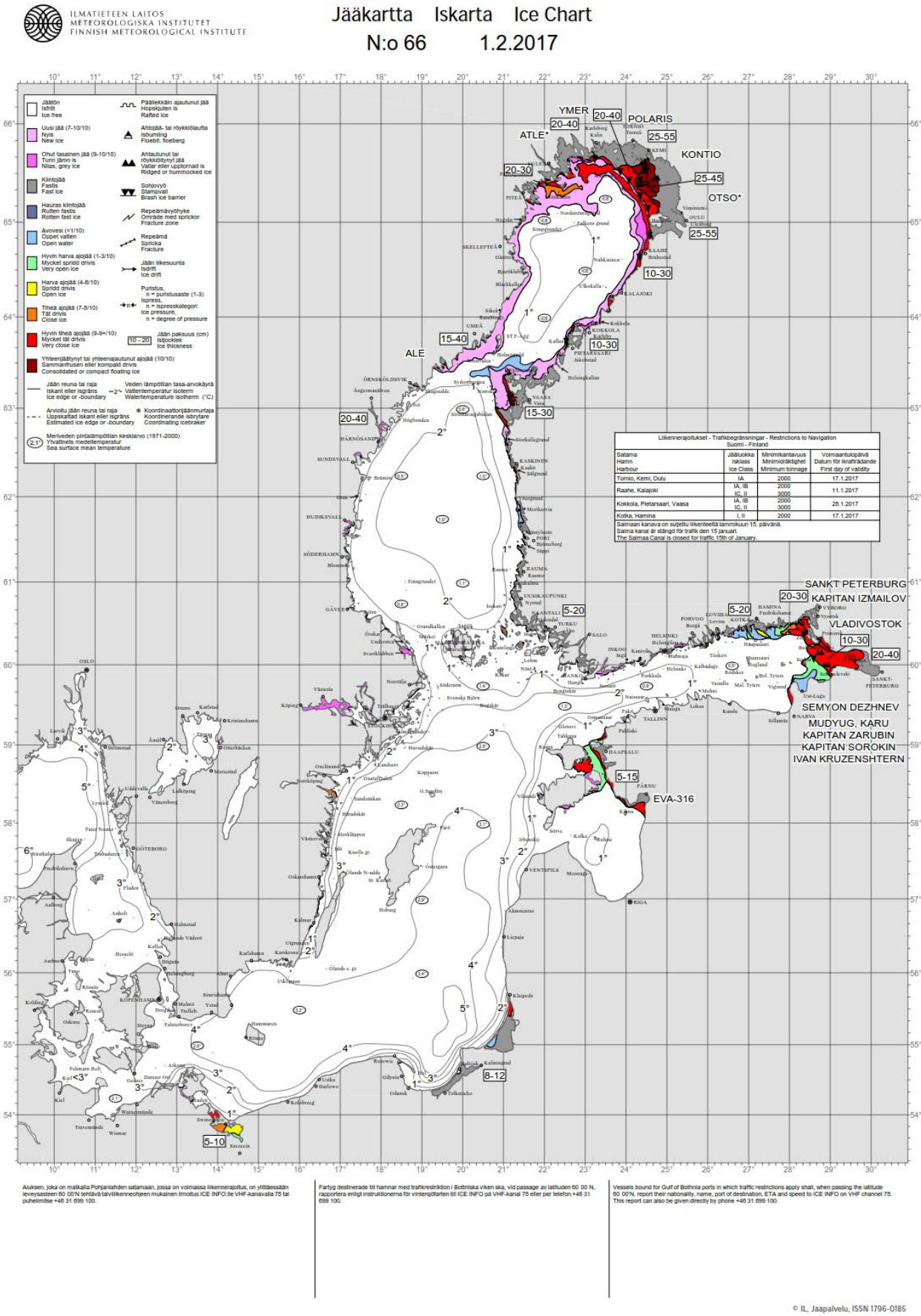
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 66 1.2.2017
YMER
20-40
POLARIS
20-40
25-55
ATLE*
KONTIO
20-30
25-45
OTSO*
25-55
10-30
15-40
ALE
10-30
15-30
20-40
5-20
SANKT PETERBURG
20-30
KAPITAN IZMAILOV
VLADIVOSTOK
10-30
20-40
SEMYON DEZHNEV
MUDYUG, KARU
KAPITAN ZARUBIN
KAPITAN SOROKIN
IVAN KRUZENSHTERN
5-15
EVA-316
8-12
5-10
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jäänluokka / Isklass / Ice Class
Minimikantavuus / Minimidräglighet / Minimum lonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu
IA
2000
17.1.2017
Raahe, Kalajoki
IA, IB
IC, II
2000
3000
11.1.2017
Kokkola, Pietarsaari, Vaasa
IA, IB
IC, II
2000
3000
25.1.2017
Kotka, Hamina
I, II
2000
17.1.2017
Saimaan kanava on suljettu liikenteeltä tammikuun 15. päivänä.
Saima kanal är stängd för trafik den 15 januari.
The Saimaa Canal is closed for traffic 15th of January.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
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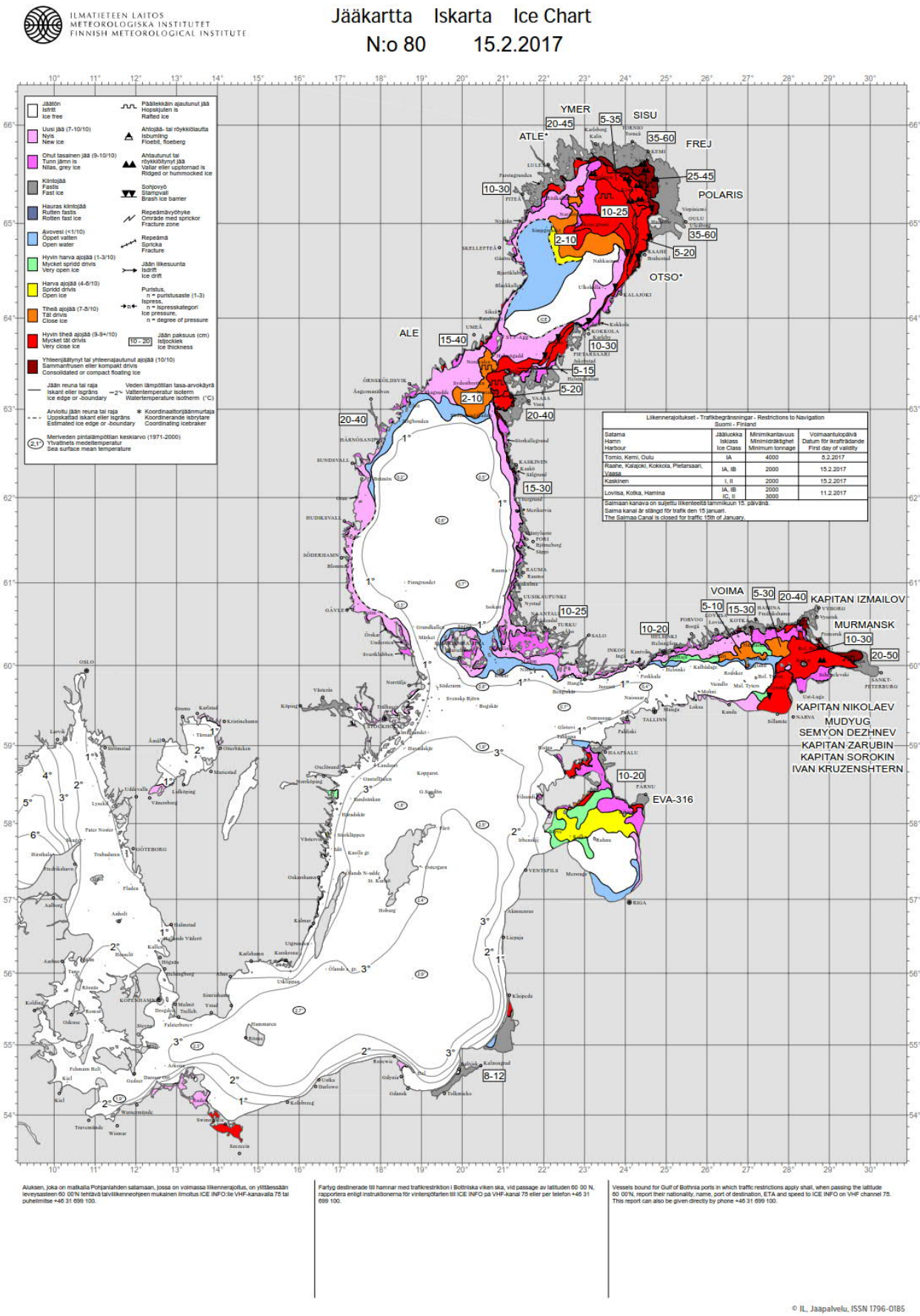
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 80 15.2.2017
YMER
20-45
SISU
5-35
ATLE*
35-60
FREJ
25-45
POLARIS
10-30
10-25
2-10
35-60
5-20
OTSO*
ALE
15-40
10-30
5-15
5-20
2-10
20-40
20-40
15-30
10-25
VOIMA
5-30
20-40
KAPITAN IZMAILOV
5-10
15-30
MURMANSK
10-20
10-30
20-50
KAPITAN NIKOLAEV
MUDYUG
SEMYON DEZHNEV
KAPITAN ZARUBIN
KAPITAN SOROKIN
IVAN KRUZENSHTERN
10-20
EVA-316
8-12
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jääluokka / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu — IA — 4000 — 5.2.2017
Raahe, Kalajoki, Kokkola, Pietarsaari, Vaasa — IA, IB — 2000 — 15.2.2017
Kaskinen — I, II — 2000 — 15.2.2017
Loviisa, Kotka, Hamina — IA, IB / IC, II — 2000 / 3000 — 11.2.2017
Saimaan kanava on suljettu liikenteeltä tammikuun 15. päivänä.
Saima kanal är stängt för trafik den 15 januari.
The Saimaa Canal is closed for traffic 15th of January.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
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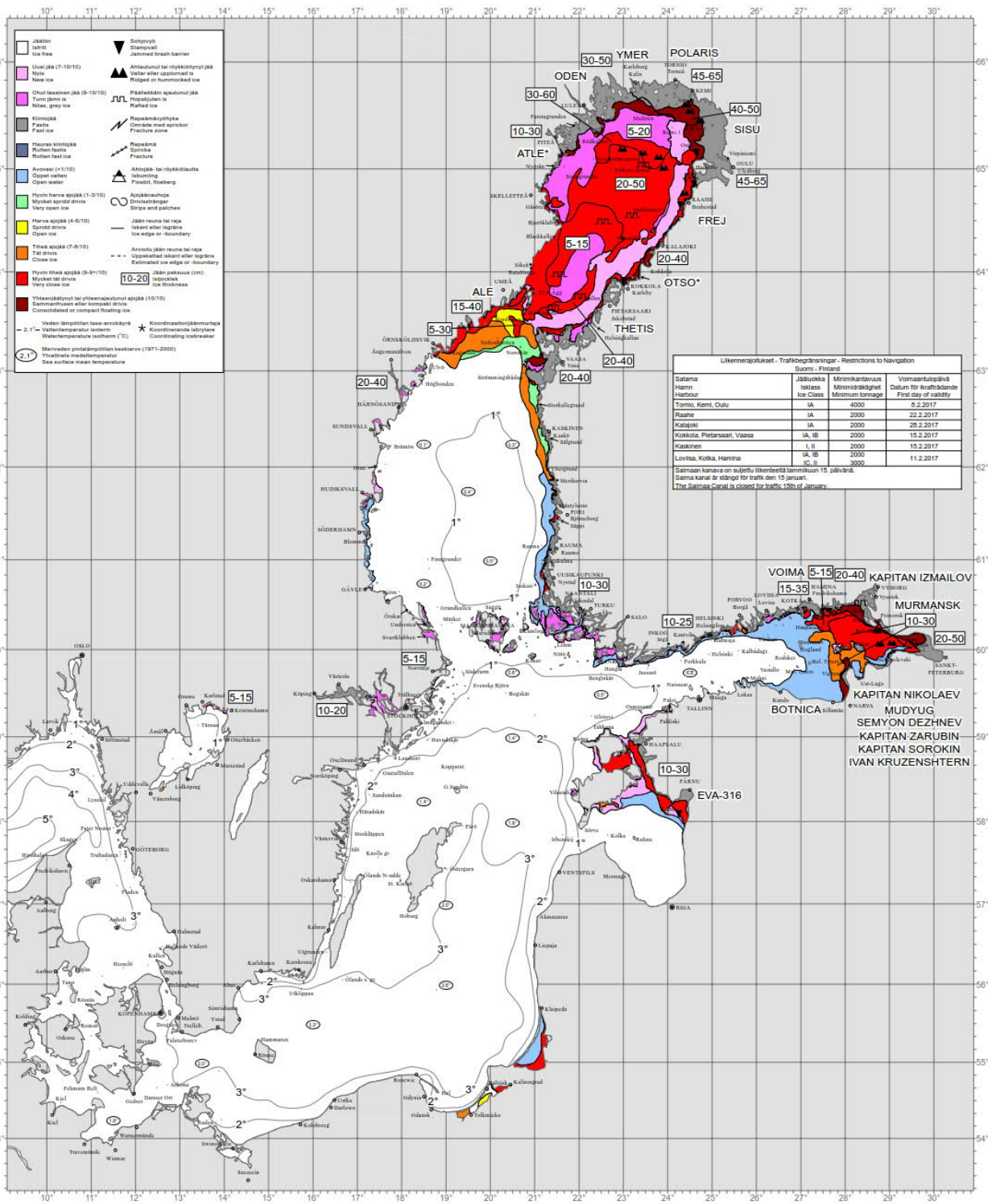
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 94 1.3.2017
YMER
POLARIS
ODEN
SISU
ATLE*
FREJ
ALE
OTSO*
THETIS
VOIMA
KAPITAN IZMAILOV
MURMANSK
KAPITAN NIKOLAEV
MUDYUG
SEMYON DEZHNEV
KAPITAN ZARUBIN
KAPITAN SOROKIN
IVAN KRUZENSHTERN
EVA-316
BOTNICA
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Salmaan kanava on suljettu liikenteeltä tammikuun 15. päivänä.
Saima kanal är stängd för trafik den 15 januari.
The Saimaa Canal is closed for traffic 15th of January.
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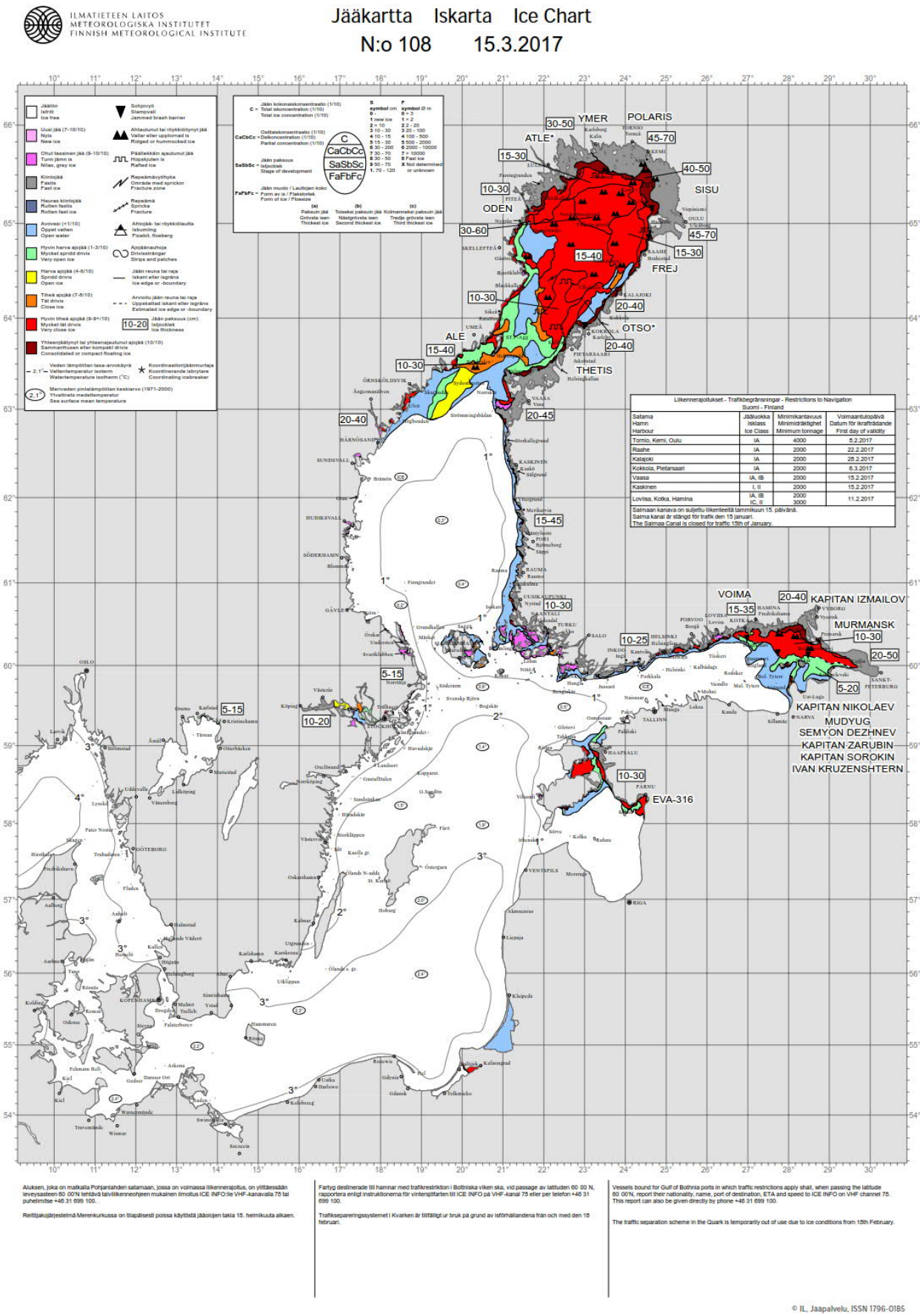
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 108 15.3.2017
YMER
POLARIS
ATLE*
SISU
ODEN
FREJ
OTSO*
ALE
THETIS
VOIMA
KAPITAN IZMAILOV
MURMANSK
KAPITAN NIKOLAEV
MUDYUG
SEMYON DEZHNEV
KAPITAN ZARUBIN
KAPITAN SOROKIN
IVAN KRUZENSHTERN
EVA-316
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Salama Hamn Harbour
Jääluokka Isklass Ice Class
Minimikantavuus Minimidräktighet Minimum tonnage
Voimaantulopäivä Datum för ikraftträdande First day of validity
Tornio, Kemi, Oulu IA 4000 5.2.2017
Raahe IA 2000 22.2.2017
Kalajoki IA 2000 28.2.2017
Kokkola, Pietarsaari IA 2000 6.3.2017
Vaasa IA, IB 2000 15.2.2017
Kaskinen I, II 2000 15.2.2017
Loviisa, Kotka, Hamina IA, IB 2000 11.2.2017
IC, II 3000
Saimaan kanava on suljettu liikenteeltä tammikuun 15. päivänä.
Saima kanal är stängt för trafik den 15 januari.
The Saimaa Canal is closed for traffic 15th of January.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talvilikennehojeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Reittijakojärjestelmä Merenkurkussa on tilapäisesti poissa käytöstä jääolojen takia 15. helmikuuta alkaen.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vinterstiden till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Trafiksepareringssystemet i Kvarken är tillfälligt ur bruk på grund av isförhållandena från och med den 15 februari.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
The traffic separation scheme in the Quark is temporarily out of use due to ice conditions from 15th February.
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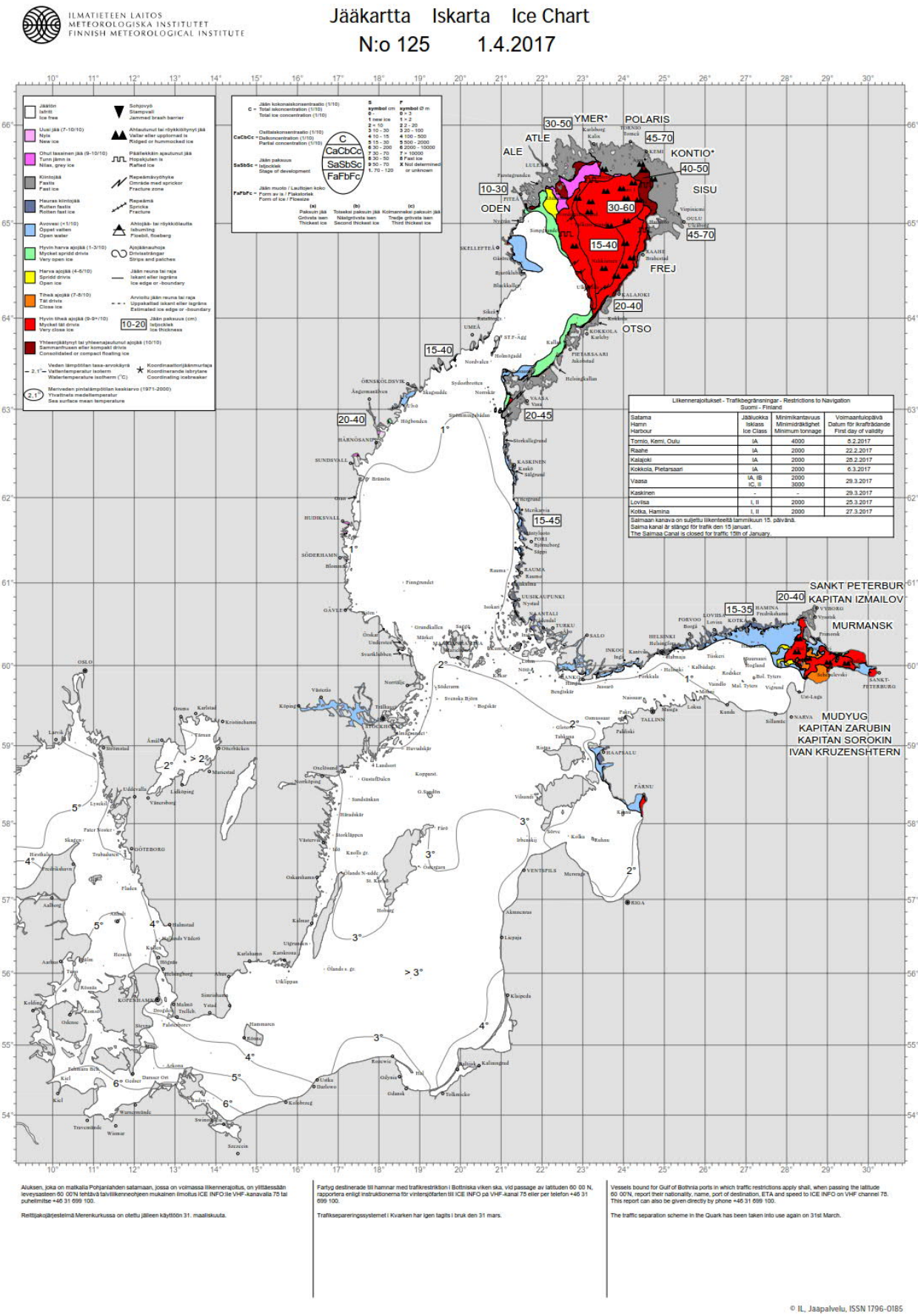
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 125 1.4.2017
YMER*
POLARIS
ATLE
ALE
KONTIO*
SISU
ODEN
FREJ
OTSO
SANKT PETERBURG
KAPITAN IZMAILOV
MURMANSK
MUDYUG
KAPITAN ZARUBIN
KAPITAN SOROKIN
IVAN KRUZENSHTERN
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama
Hamn
Harbour
Jääluokka
Isklass
Ice Class
Minimikantavuus
Minimidräktighet
Minimum tonnage
Voimaantulopäivä
Datum för ikraftträdande
First day of validity
Tornio, Kemi, Oulu IA 4000 5.2.2017
Raahe IA 2000 22.2.2017
Kalajoki IA 2000 25.2.2017
Kokkola, Pietarsaari IA 2000 6.3.2017
Vaasa IA, IB 2000 29.3.2017
IC, II 3000
Kaskinen - - 29.3.2017
Loviisa I, II 2000 25.3.2017
Kotka, Hamina I, II 2000 27.3.2017
Saimaan kanava on suljettu liikenteeltä tammikuun 15. päivänä.
Saima kanal är stängd för trafik den 15 januari.
The Saimaa Canal is closed for traffic 15th of January.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Reittijakojärjestelmä Merenkurkussa on otettu jälleen käyttöön 31. maaliskuuta.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Trafiksepareringssystemet i Kvarken har igen tagits i bruk den 31 mars.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
The traffic separation scheme in the Quark has been taken into use again on 31st March.
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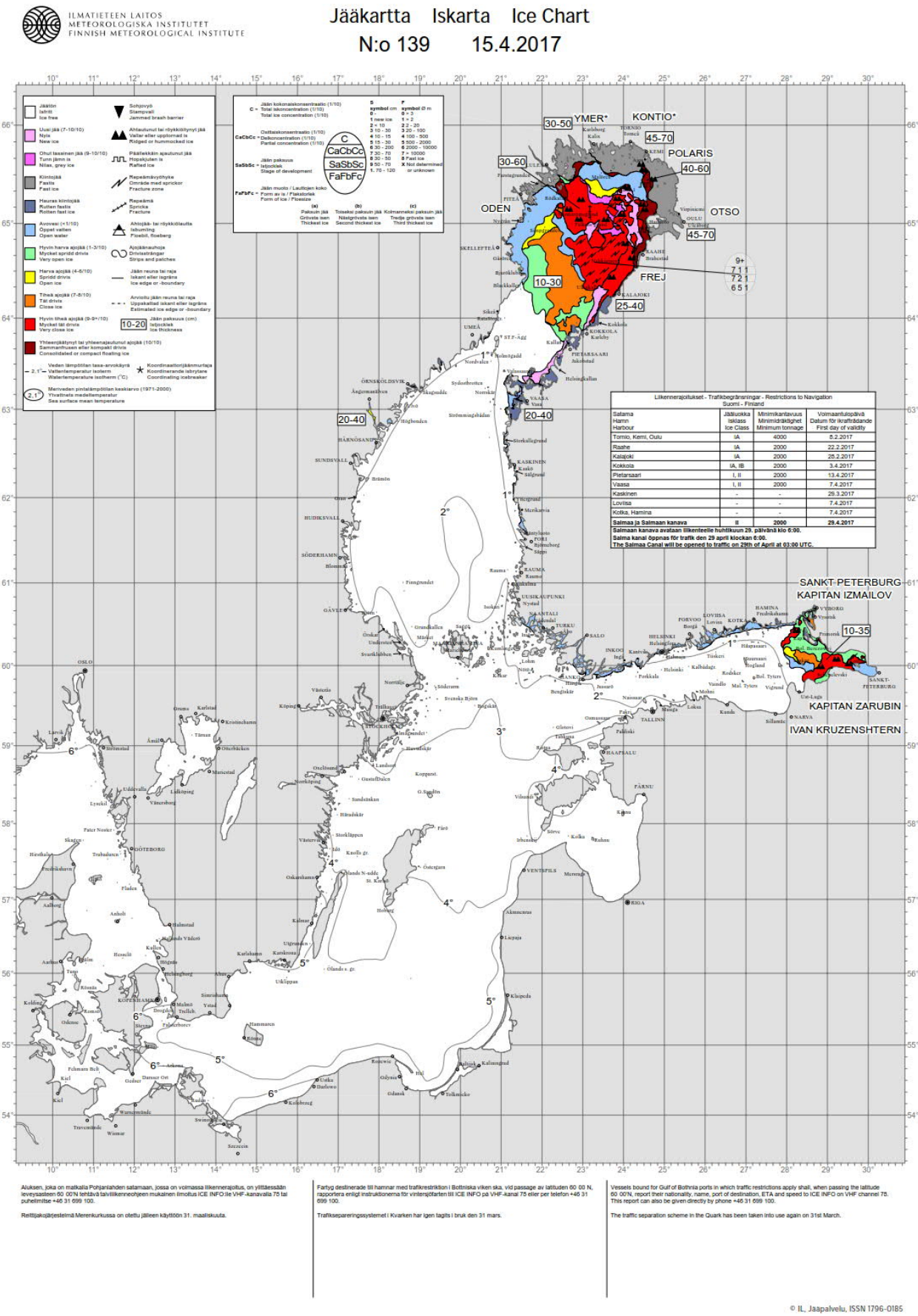


Satama Hamn Harbour	Jääluokka Isklass Ice Class	Minimikantavuus Minimidräktighet Minimum tonnage	Voimaantulopäivä Datum för ikraftträdande First day of validity
Tornio, Kemi, Oulu	IA	4000	5.2.2017
Raahe	IA	2000	22.2.2017
Kalajoki	IA	2000	25.2.2017
Kokkola	IA, IB	2000	3.4.2017
Pietarsaari	I, II	2000	13.4.2017
Vaasa	I, II	2000	7.4.2017
Kaskinen	-	-	29.3.2017
Loviisa	-	-	7.4.2017
Kotka, Hamina	-	-	7.4.2017
Saimaa ja Saimaan kanava	**II**	**2000**	**29.4.2017**

Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.

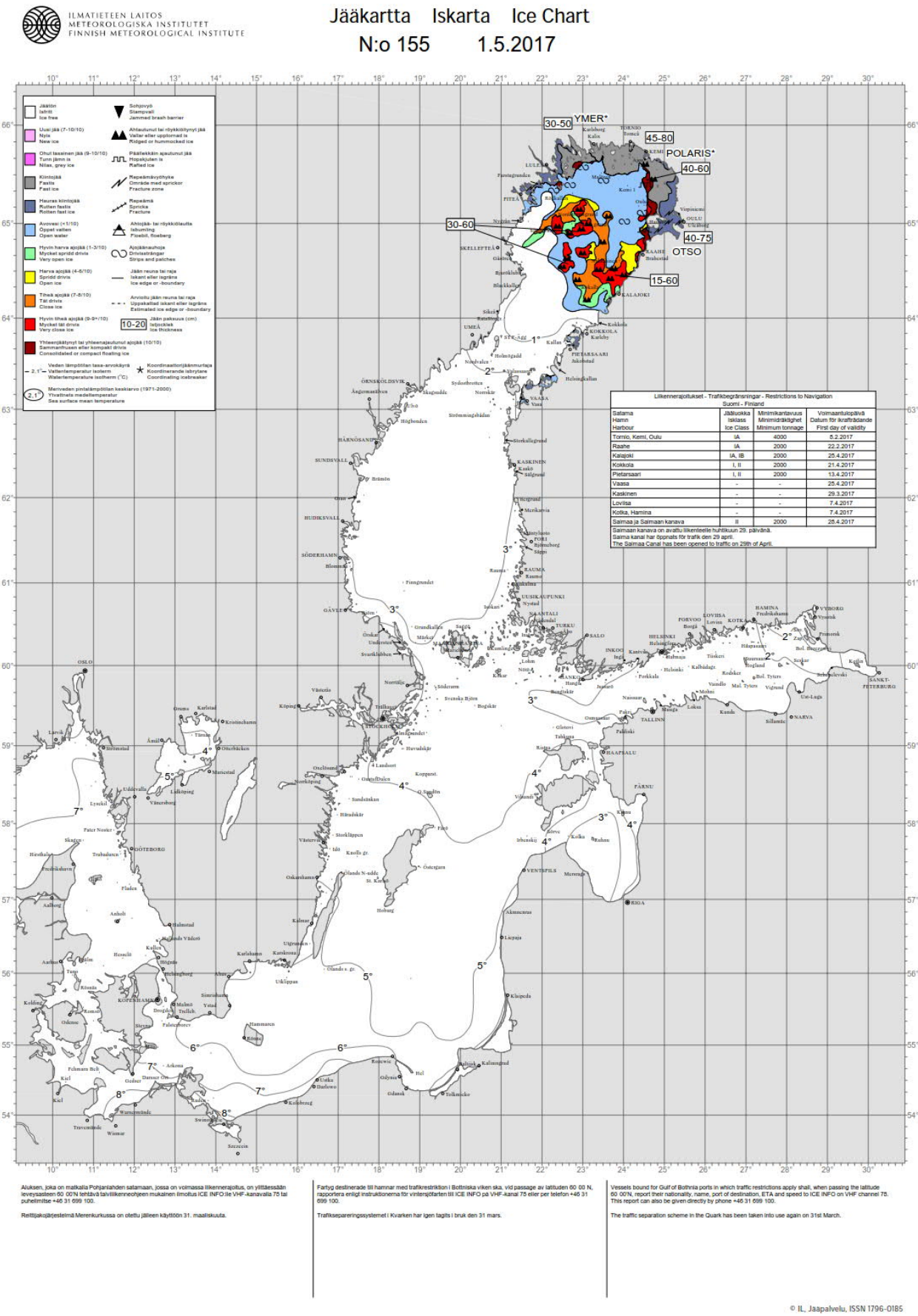
Reittijakojärjestelmä Merenkurkussa on otettu jälleen käyttöön 31. maaliskuuta.

Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vinterstjärtan till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.

Trafiksepareringssystemet i Kvarken har igen tagits i bruk den 31 mars.

Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.

The traffic separation scheme in the Quark has been taken into use again on 31st March.


ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 155 1.5.2017
30-50 YMER*
45-80 POLARIS*
40-60
30-60
40-75 OTSO
15-60
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jäätäväksä / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu IA 4000 5.2.2017
Raahe IA 2000 22.2.2017
Kalajoki IA, IB 2000 25.4.2017
Kokkola I, II 2000 21.4.2017
Pietarsaari I, II 2000 13.4.2017
Vaasa - - 25.4.2017
Kaskinen - - 29.3.2017
Loviisa - - 7.4.2017
Kotka, Hamina - - 7.4.2017
Saimaa ja Saimaan kanava II 2000 25.4.2017
Saimaan kanava on avattu liikenteelle huhtikuun 29. päivänä.
Saima kanal har öppnats för trafik den 29 april.
The Saimaa Canal has been opened to traffic on 29th of April.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.
Reittijakojärjestelmä Merenkurkussa on otettu jälleen käyttöön 31. maaliskuuta.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.
Trafiksepareringssystemet i Kvarken har igen tagits i bruk den 31 mars.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.
The traffic separation scheme in the Quark has been taken into use again on 31st March.
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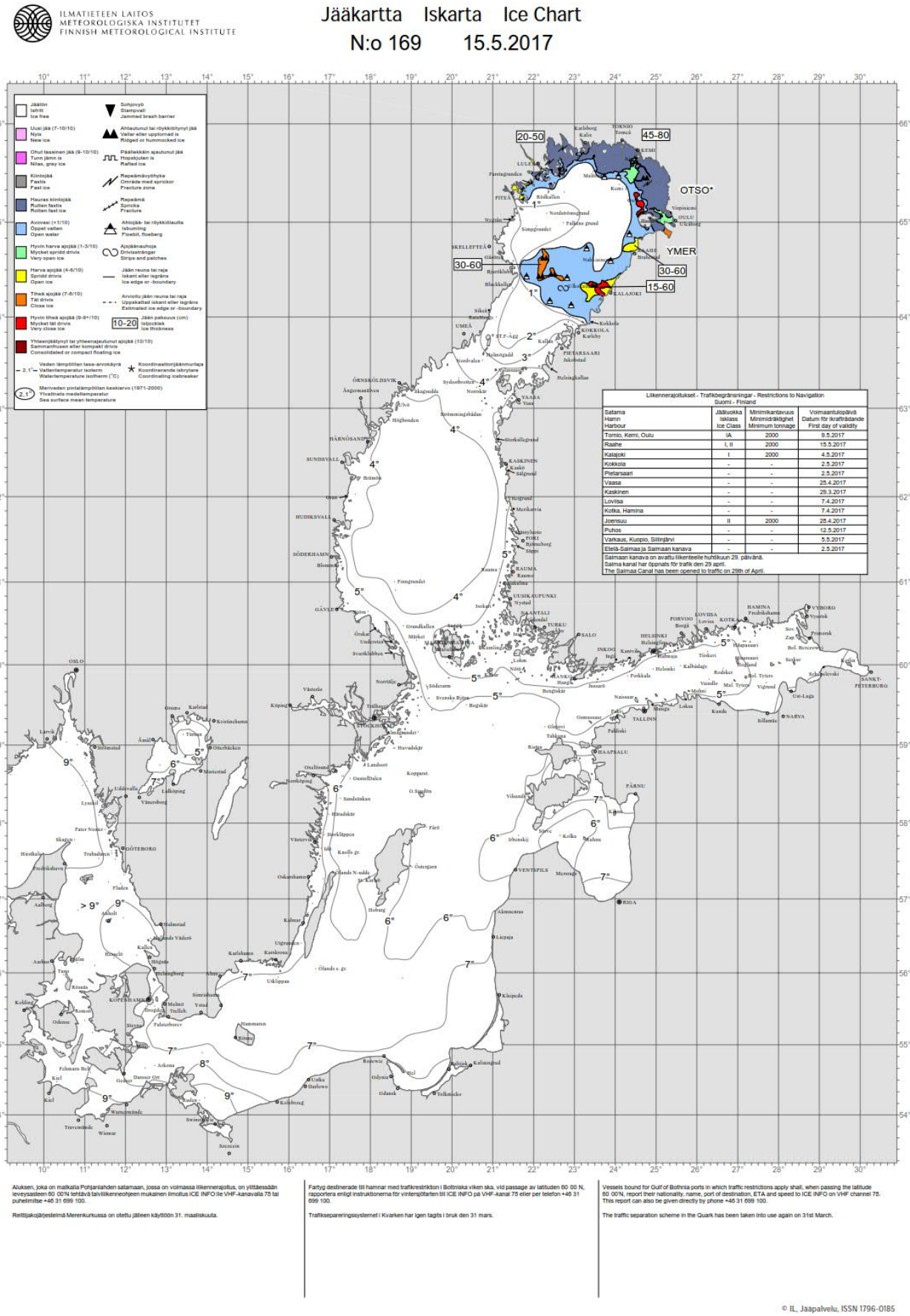


Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on ylittäessään leveysasteen 60 00'N tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 75 tai puhelimitse +46 31 699 100.

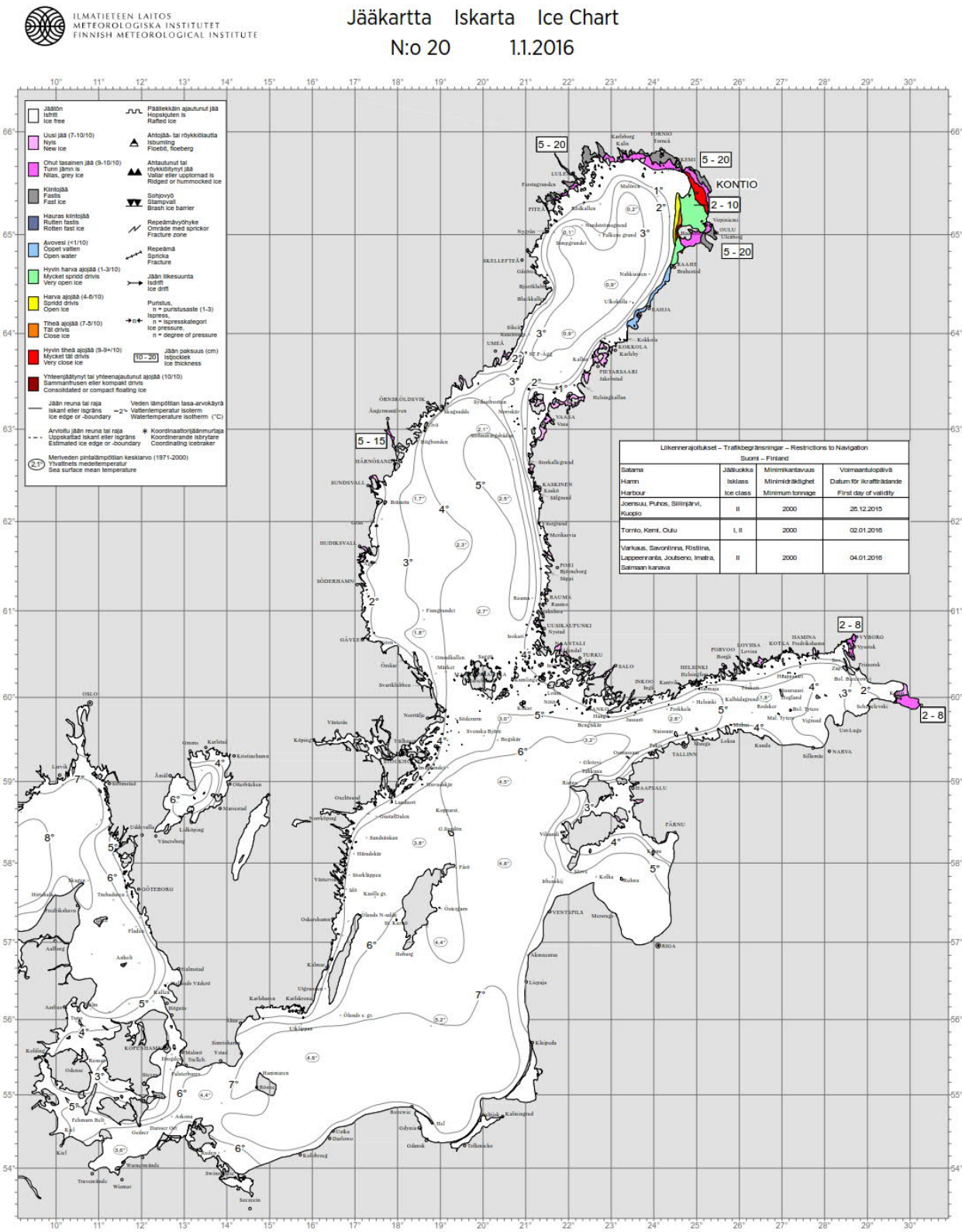
Reittijakojärjestelmä Merenkurkussa on otettu jälleen käyttöön 31. maaliskuuta.

Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av latituden 60 00 N, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF-kanal 75 eller per telefon +46 31 699 100.

Trafiksepareringssystemet i Kvarken har igen tagits i bruk den 31 mars.

Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing the latitude 60 00'N, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 75. This report can also be given directly by phone +46 31 699 100.

The traffic separation scheme in the Quark has been taken into use again on 31st March.



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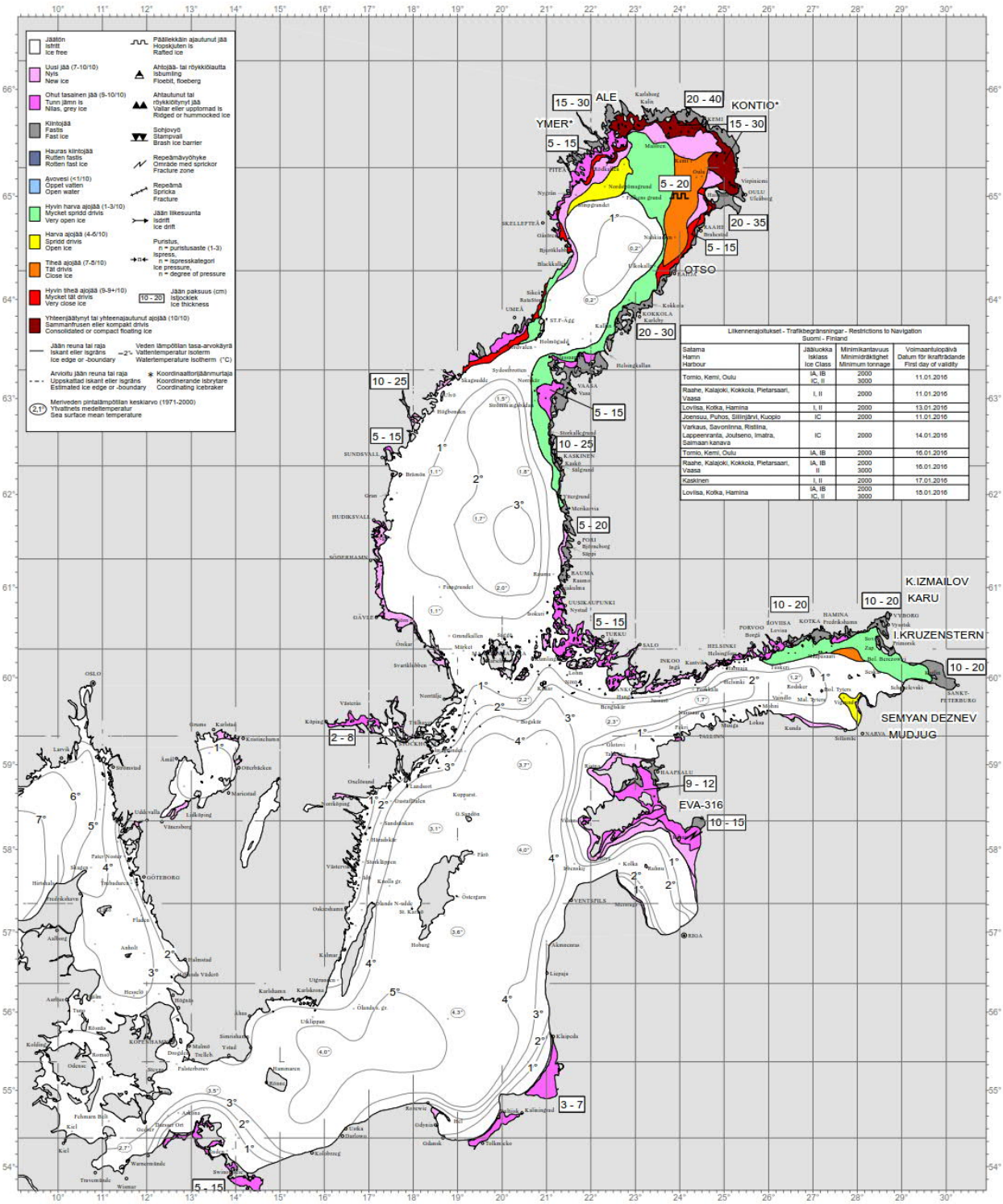
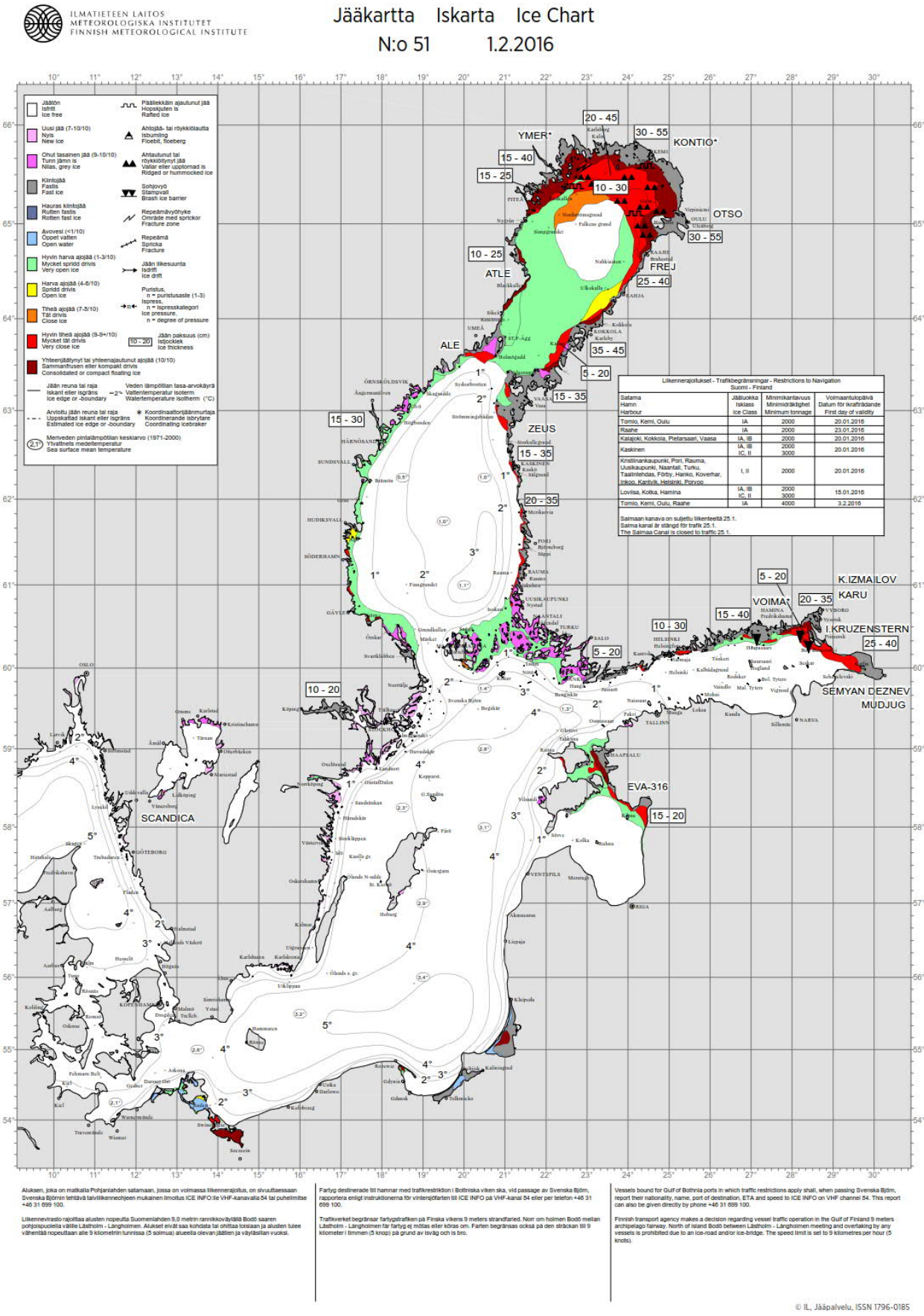
FINNISH METEOROLOGICAL INSTITUTE

Jääkartta Iskarta Ice Chart
N:o 33 14.1.2016




ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 51 1.2.2016
YMER*
KONTIO*
OTSO
FREJ
ATLE
ALE
ZEUS
SCANDICA
EVA-316
VOIMA*
KARU
K.IZMAILOV
I.KRUZENSTERN
SEMYAN DEZNEV
MUDJUG
20 - 45
30 - 55
15 - 40
15 - 25
10 - 30
10 - 25
25 - 40
35 - 45
5 - 20
15 - 35
15 - 30
20 - 35
10 - 20
5 - 20
10 - 30
15 - 40
20 - 35
25 - 40
15 - 20
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jääluokka / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu IA 2000 20.01.2016
Raahe IA 2000 23.01.2016
Kalajoki, Kokkola, Pietarsaari, Vaasa IA, IB 2000 20.01.2016
Kaskinen IA, IB 2000 3000 20.01.2016
Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Porvoo I, II 2000 20.01.2016
Loviisa, Kotka, Hamina IA, IB 2000 3000 15.01.2016
Tornio, Kemi, Oulu, Raahe IA 4000 3.2.2016
Saimaan kanava on sujettu liikenteeltä 25.1.
Saima kanal är stängd för trafik 25.1.
The Saimaa Canal is closed to traffic 25.1.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on sivuuttaessaan Svenska Björnin tehtävä talviliikennehjeen mukainen ilmoitus ICE INFO:lle VHF-kanavalla 54 tai puhelimitse +46 31 699 100.
Liikennevirasto rajoittaa alusten nopeutta Suomenlahden 9,0 metrin rannikkoväylällä Bodö saaren pohjoispuolella väliltä Lästholm - Langholmen. Alukset eivät saa kohdata tai ohittaa toisiaan ja alusten tulee vähentää nopeuttaan alle 9 kilometriin tunnissa (5 solmua) alueella olevan jäätilen ja väylästilan vuoksi.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av Svenska Björn, rapportera enligt instruktionerna för vinterstiftarten till ICE INFO på VHF-kanal 54 eller per telefon +46 31 699 100.
Trafikverket begränsar fartygstrafiken på Finska vikens 9 meters strandfarled. Norr om holmen Bodö mellan Lästholm - Langholmen får fartyg ej mötas eller köras om. Farten begränsas också på den sträckan till 9 kilometer i timmen (5 knop) på grund av isväg och is bro.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing Svenska Björn, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 54. This report can also be given directly by phone +46 31 699 100.
Finnish transport agency makes a decision regarding vessel traffic operation in the Gulf of Finland 9 meters archipelago fairway. North of island Bodö between Lästholm - Langholmen meeting and overtaking by any vessels is prohibited due to an ice-road and/or ice-bridge. The speed limit is set to 9 kilometres per hour (5 knots).
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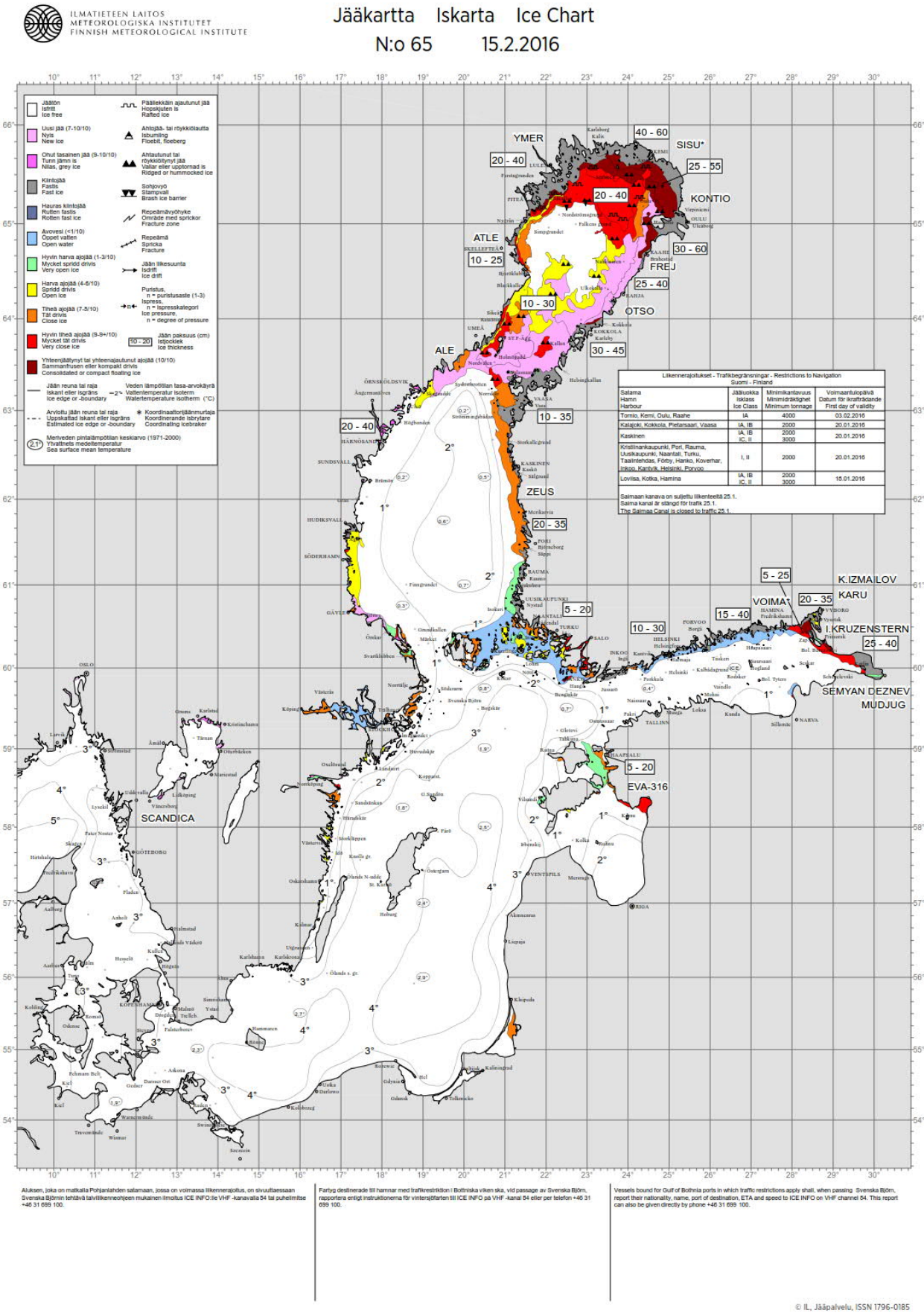
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 65 15.2.2016
YMER
SISU*
KONTIO
ATLE
FREJ
OTSO
ALE
ZEUS
SCANDICA
VOIMA
KARU
EVA-316
SEMYAN DEZNEV
MUDJUG
I.KRUZENSTERN
K.IZMAILOV
40 - 60
25 - 55
20 - 40
30 - 60
10 - 25
25 - 40
10 - 30
30 - 45
10 - 35
20 - 40
20 - 35
5 - 20
15 - 40
5 - 25
20 - 35
25 - 40
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jääluokka / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu, Raahe
Kalajoki, Kokkola, Pietarsaari, Vaasa
Kaskinen
Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Porvoo
Loviisa, Kotka, Hamina
Saimaan kanava on suljettu liikenteeltä 25.1.
Saima kanal är stängd för trafik 25.1.
The Saimaa Canal is closed to traffic 25.1.
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on sivuuttaessaan Svenska Björnin tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF -kanavalla 84 tai puhelimitse +46 31 699 100.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av Svenska Björn, rapportera enligt instruktionerna för vinterssjöfarten till ICE INFO på VHF -kanal 84 eller per telefon +46 31 699 100.
Vessels bound for Gulf of Bothnia ports in which traffic restrictions apply shall, when passing Svenska Björn, report their nationality, name, port of destination, ETA and speed to ICE INFO on VHF channel 84. This report can also be given directly by phone +46 31 699 100.
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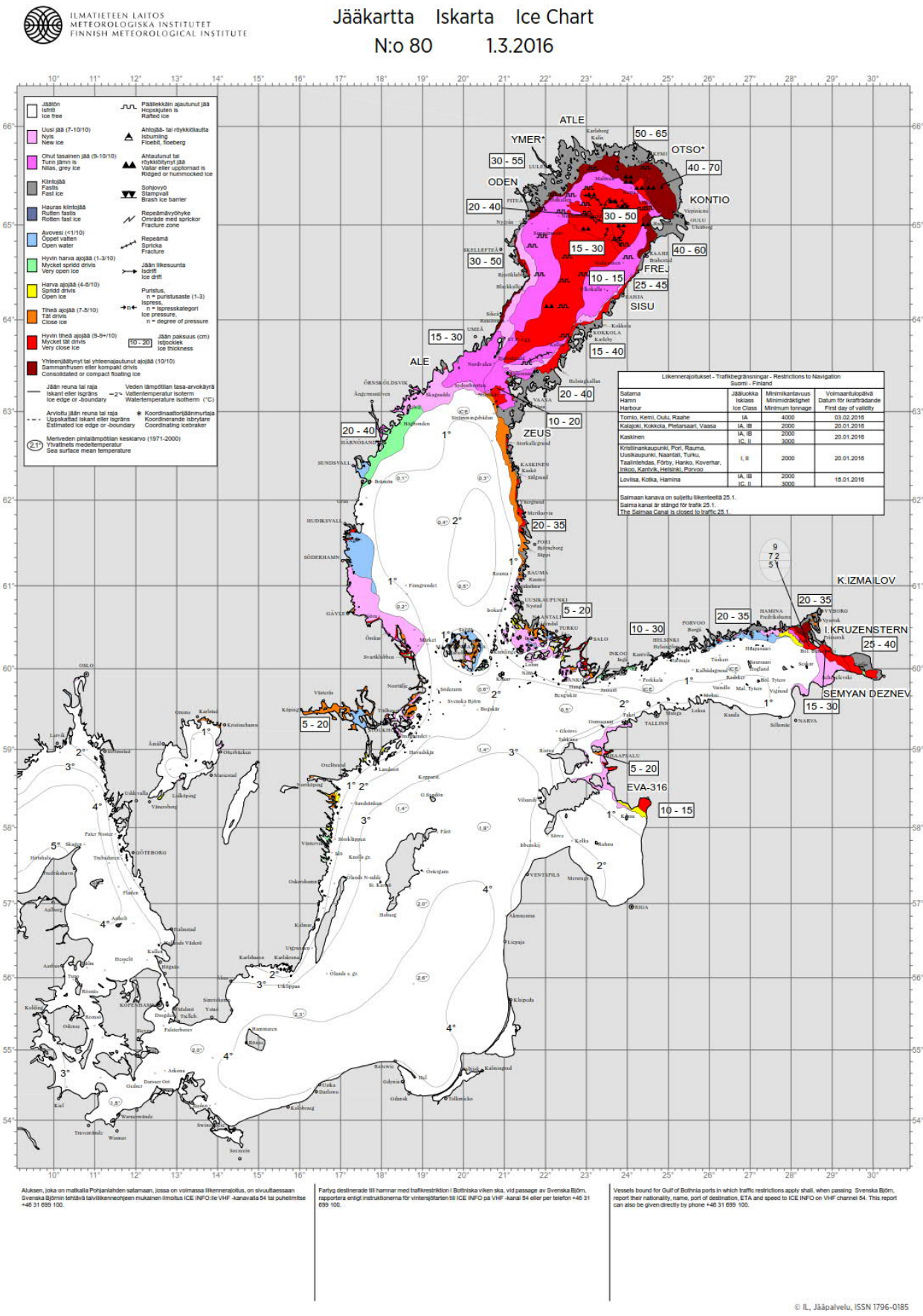
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 80 1.3.2016
ATLE
YMER*
OTSO*
ODEN
KONTIO
FREJ
SISU
ALE
ZEUS
K.IZMAILOV
I.KRUZENSTERN
SEMYAN DEZNEV
EVA-316
50 - 65
40 - 70
30 - 55
20 - 40
30 - 50
15 - 30
40 - 60
10 - 15
25 - 45
15 - 40
20 - 35
5 - 20
10 - 30
25 - 40
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Saimaa kanava on suljettu liikenteeltä 25.1.
Saima kanal är stängd för trafik 25.1.
The Saimaa Canal is closed to traffic 25.1.
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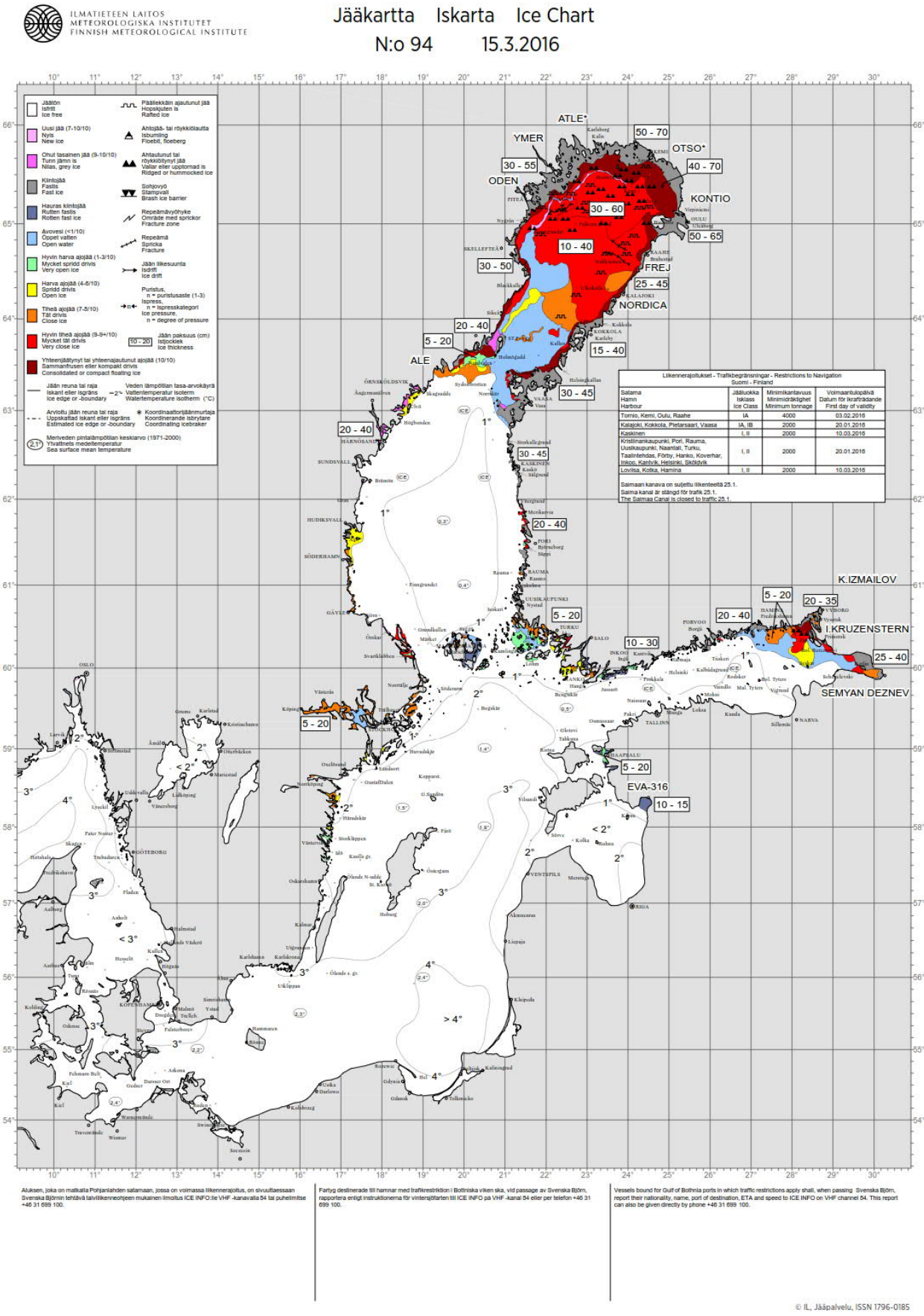
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 94 15.3.2016
ATLE*
YMER
ODEN
OTSO*
KONTIO
FREJ
NORDICA
ALE
K.IZMAILOV
I.KRUZENSTERN
SEMYAN DEZNEV
EVA-316
50 - 70
40 - 70
30 - 55
30 - 60
50 - 65
10 - 40
30 - 50
25 - 45
20 - 40
5 - 20
15 - 40
30 - 45
20 - 40
30 - 45
20 - 40
5 - 20
5 - 20
20 - 35
20 - 40
10 - 30
25 - 40
5 - 20
5 - 20
10 - 15
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jääluokka / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi, Oulu, Raahe
IA
4000
03.02.2016
Kalajoki, Kokkola, Pietarsaari, Vaasa
IA, IB
2000
20.01.2016
Kaskinen
I, II
2000
10.03.2016
Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Skönvik
I, II
2000
20.01.2016
Loviisa, Kotka, Hamina
I, II
2000
10.03.2016
Saimaan kanava on suljettu liikenteeltä 25.1.
Saima kanal är stängd för trafik 25.1.
The Saimaa Canal is closed to traffic 25.1.
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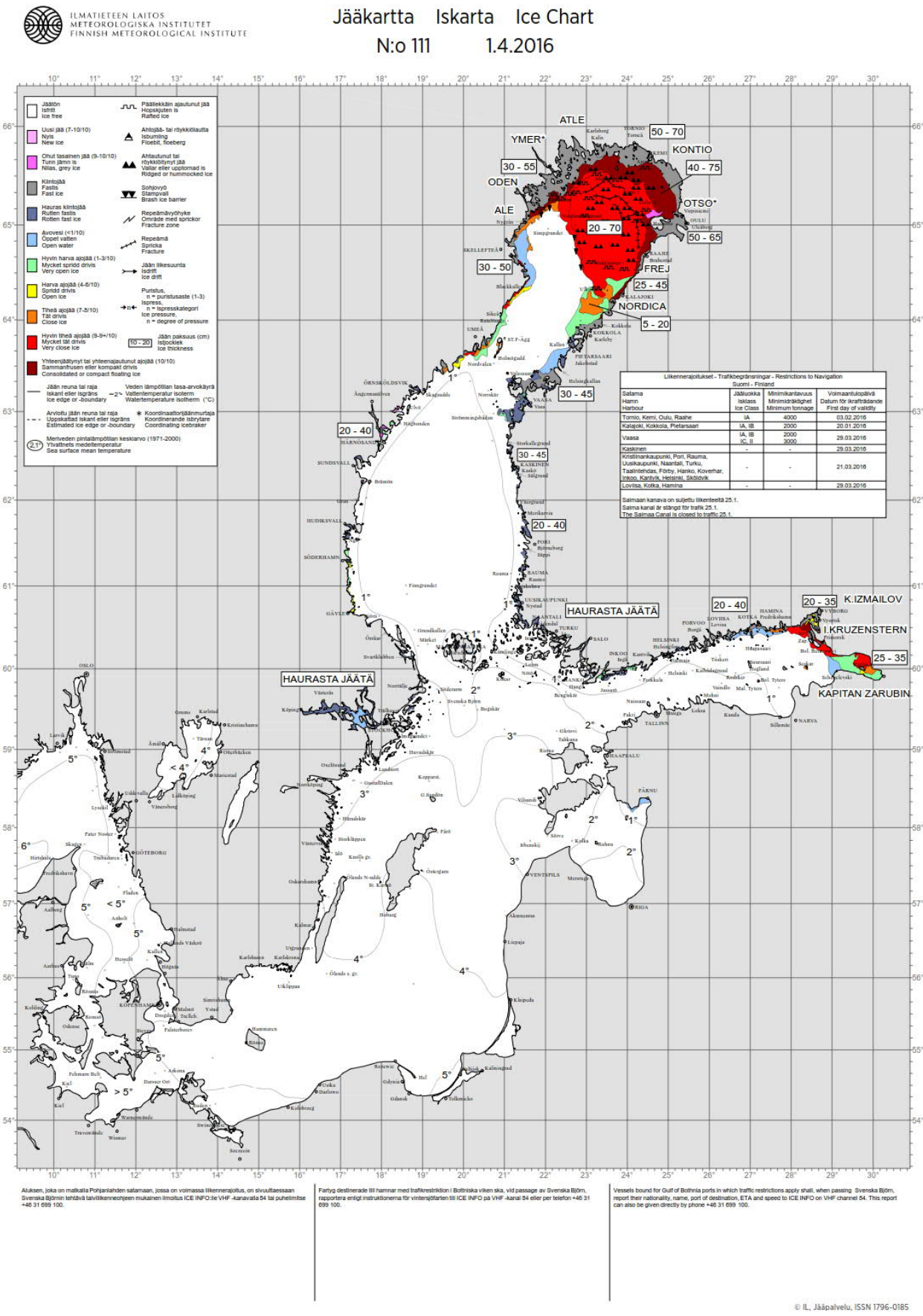
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 111 1.4.2016
ATLE
YMER*
50 - 70
KONTIO
30 - 55
40 - 75
ODEN
ALE
OTSO*
20 - 70
50 - 65
30 - 50
FREJ
25 - 45
NORDICA
5 - 20
30 - 45
20 - 40
30 - 45
20 - 40
HAURASTA JÄÄTÄ
20 - 40
20 - 35
K.IZMAILOV
I.KRUZENSTERN
25 - 35
KAPITAN ZARUBIN
HAURASTA JÄÄTÄ
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jäävahvuus Iskласс Ice Class
Minimikantavuus Minimidräktighet Minimum tonnage
Voimaantulopäivä Datum för ikraftträdande First day of validity
Tornio, Kemi, Oulu, Raahe
Kalajoki, Kokkola, Pietarsaari
Vaasa
Kaskinen
Kristinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Skolskär
Loviisa, Kotka, Hamina
IA
IA, IB
IA, IB IC, II
4000
2000
2000 3000
03.02.2016
20.01.2016
29.03.2016
29.03.2016
21.03.2016
29.03.2016
Saimaan kanava on suljettu liikenteeltä 25.1.
Saima kanal är stängd för trafik 25.1.
The Saimaa Canal is closed to traffic 25.1.
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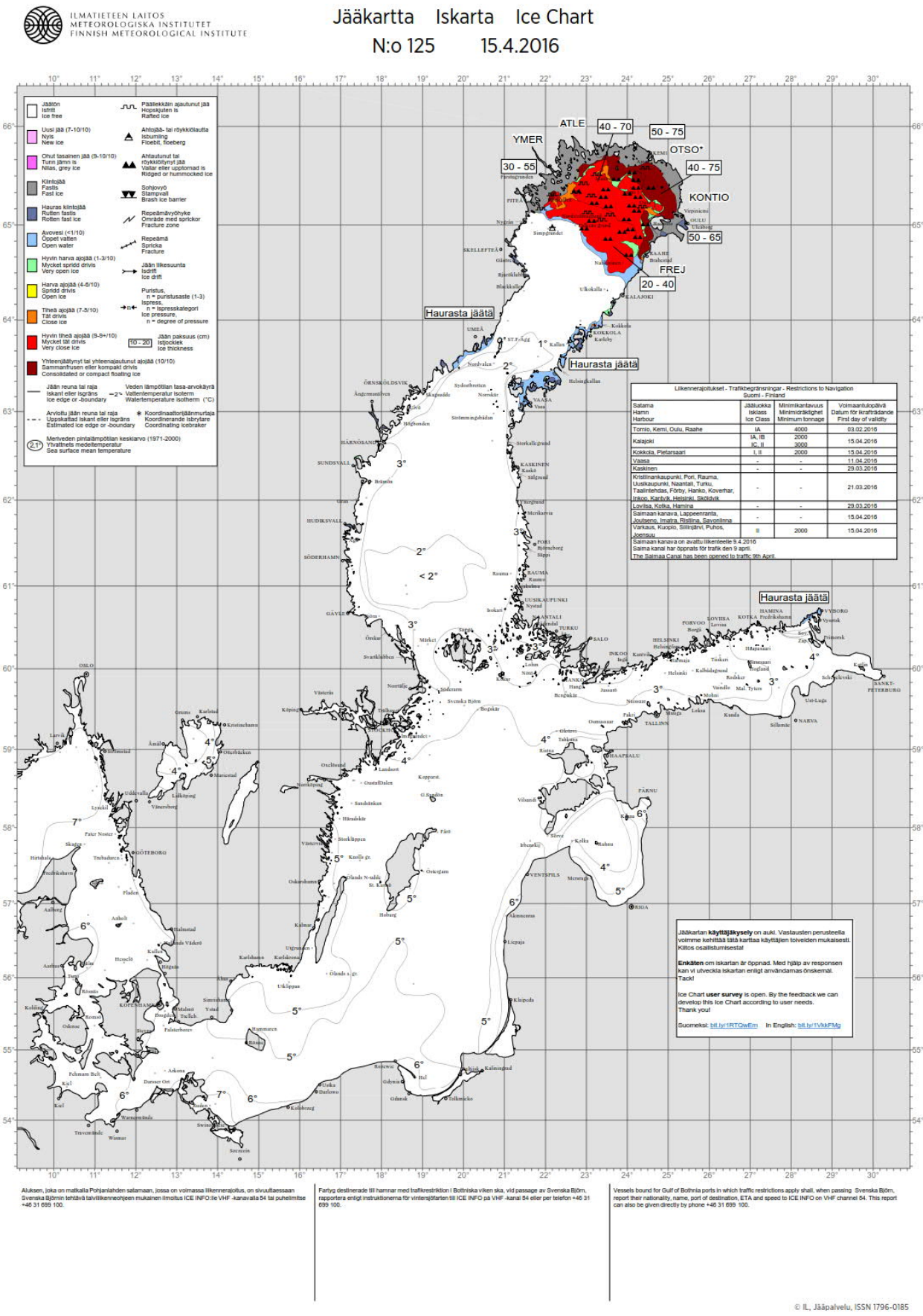
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METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 125 15.4.2016
ATLE
YMER
OTSO*
KONTIO
FREJ
40 - 70
50 - 75
30 - 55
40 - 75
50 - 65
20 - 40
Haurasta jäätä
Haurasta jäätä
Haurasta jäätä
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama Hamn Harbour
Jääluokka Isklass Ice Class
Minimikantavuus Minimidräktighet Minimum tonnage
Voimaantulopäivä Datum för ikraftträdande First day of validity
Tornio, Kemi, Oulu, Raahe
IA
4000
03.02.2016
Kalajoki
IA, IB
2000
15.04.2016
IC, II
3000
Kokkola, Pietarsaari
I, II
2000
15.04.2016
Vaasa
-
-
11.04.2016
Kaskinen
-
-
29.03.2016
Kristinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Skidvik
-
-
21.03.2016
Loviisa, Kotka, Hamina
-
-
29.03.2016
Saimaan kanava, Lappeenranta, Joutseno, Imatra, Ristiina, Savonlinna
-
-
15.04.2016
Varkaus, Kuopio, Siilinjärvi, Puhos, Joensuu
II
2000
15.04.2016
Saimaan kanava on avattu liikenteelle 9.4.2016
Saima kanal har öppnats för trafik den 9 april.
The Saimaa Canal has been opened to traffic 9th April.
Jääkartan käyttäjäkysely on auki. Vastausten perusteella voimme kehittää tätä karttaa käyttäjien toiveiden mukaisesti. Kiitos osallistumisestasi!
Enkäten om iskartan är öppnad. Med hjälp av responsen kan vi utveckla iskartan enligt användarnas önskemål. Tack!
Ice Chart user survey is open. By the feedback we can develop this Ice Chart according to user needs. Thank you!
Suomeksi: bit.ly/1RTQwEm In English: bit.ly/1VkkFMg
Aluksen, joka on matkalla Pohjanlahden satamaan, jossa on voimassa liikennerajoitus, on sivuuttaessaan Svenska Björnin tehtävä talviliikenneohjeen mukainen ilmoitus ICE INFO:lle VHF -kanavalla 84 tai puhelimitse +46 31 699 100.
Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av Svenska Björn, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF -kanal 84 eller per telefon +46 31 699 100.
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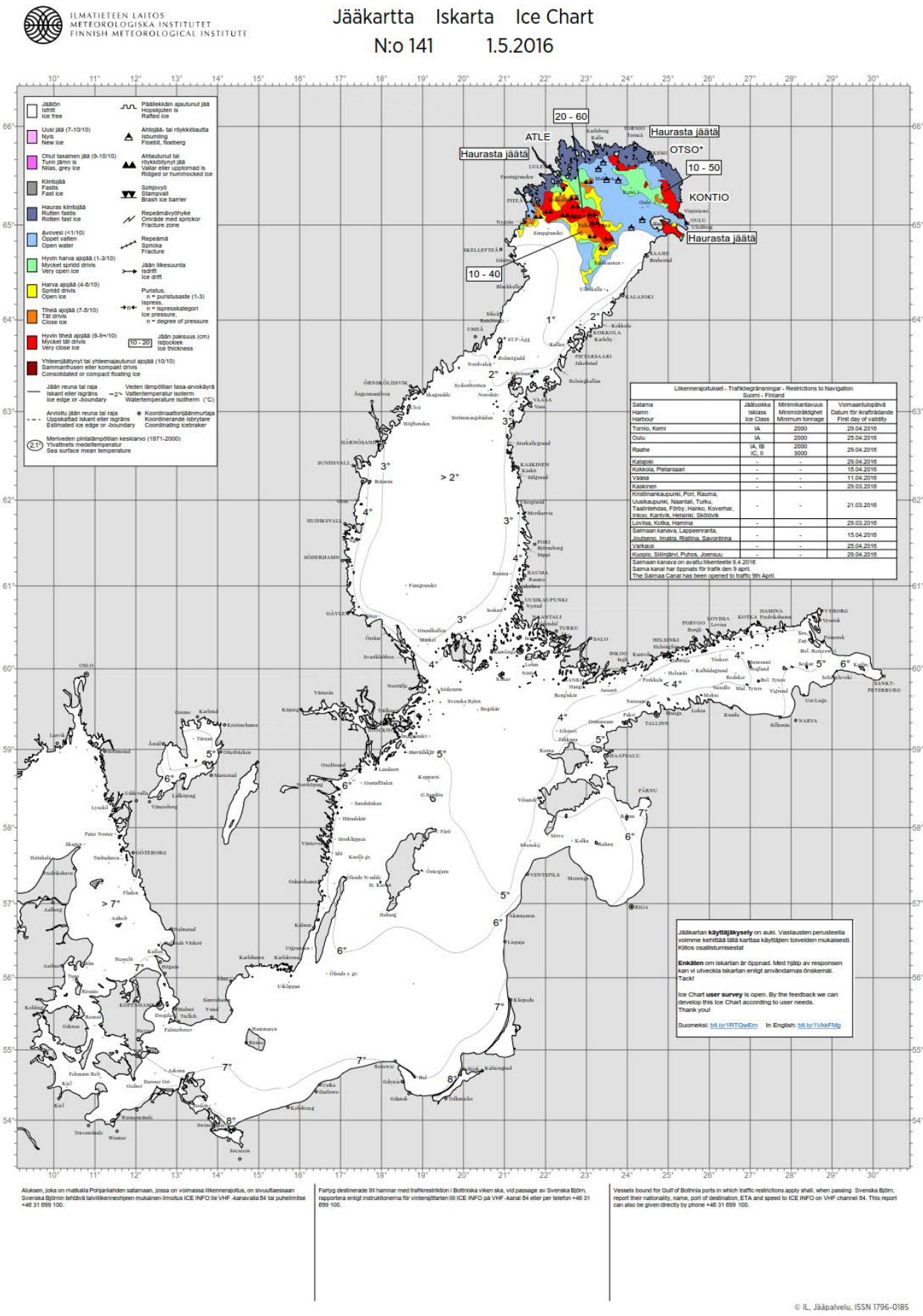
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Jääkartta Iskarta Ice Chart
N:o 141 1.5.2016
20 - 60
Haurasta jäätä
ATLE
Haurasta jäätä
OTSO*
10 - 50
KONTIO
Haurasta jäätä
10 - 40
Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland
Satama / Hamn / Harbour
Jäätäväkkä / Isklass / Ice Class
Minimikantavuus / Minimidräktighet / Minimum tonnage
Voimaantulopäivä / Datum för ikraftträdande / First day of validity
Tornio, Kemi IA 2000 29.04.2016
Oulu IA 2000 25.04.2016
Raahe IA, IB 2000 29.04.2016
IC, II 3000
Kalajoki - - 29.04.2016
Kokkola, Pietarsaari - - 15.04.2016
Vaasa - - 11.04.2016
Kaskinen - - 29.03.2016
Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Skönvik - - 21.03.2016
Loviisa, Kotka, Hamina - - 29.03.2016
Saimaan kanava, Lappeenranta, Joutseno, Imatra, Raatina, Savonlinna - - 15.04.2016
Varkaus - - 25.04.2016
Kuopio, Siilinjärvi, Puhos, Joensuu - - 29.04.2016
Saimaan kanava on avattu liikenteelle 9.4.2016
Saima kanal har öppnats för trafik den 9 april.
The Saimaa Canal has been opened to traffic 9th April.
Jääkartan käyttäjäkysely on auki. Vastausten perusteella voimme kehittää tätä karttaa käyttäjien toiveiden mukaisesti. Kiitos osallistumisestasi!
Enkäten om iskartan är öppnad. Med hjälp av responsen kan vi utveckla iskartan enligt användarnas önskemål. Tack!
Ice Chart user survey is open. By the feedback we can develop this Ice Chart according to user needs. Thank you!
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Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av Svenska Björn, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF -kanal 84 eller per telefon +46 31 699 100.
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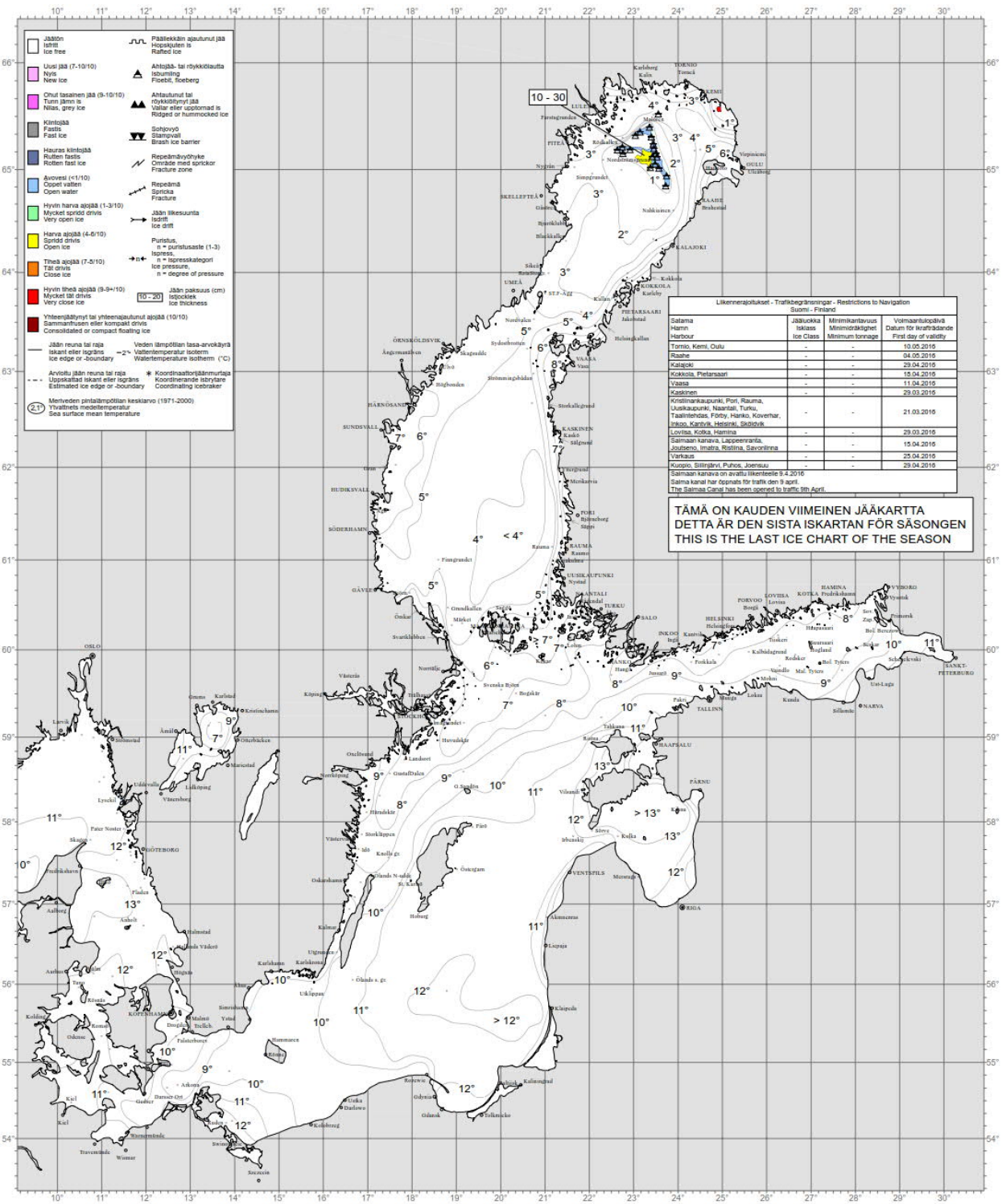
Jääkartta Iskarta Ice Chart

N:o 152 12.5.2016



Liikennerajoitukset - Trafikbegränsningar - Restrictions to Navigation
Suomi - Finland

Satama Hamn Harbour	Jäätuokka Iskass Ice Class	Minimikantavuus Minimidräktighet Minimum tonnage	Voimaantulopäivä Datum för ikraftträdande First day of validity
Tornio, Kemi, Oulu	-	-	10.05.2016
Raahe	-	-	04.05.2016
Kalajoki	-	-	29.04.2016
Kokkola, Pietarsaari	-	-	15.04.2016
Vaasa	-	-	11.04.2016
Kaskinen	-	-	29.03.2016
Kristiinankaupunki, Pori, Rauma, Uusikaupunki, Naantali, Turku, Taalintehdas, Förby, Hanko, Koverhar, Inkoo, Kantvik, Helsinki, Skatudvik	-	-	21.03.2016
Loviisa, Kotka, Hamina	-	-	29.03.2016
Saimaan kanava, Lappeenranta, Joutseno, Imatra, Ristiina, Savonlinna	-	-	15.04.2016
Varkaus	-	-	25.04.2016
Kuopio, Siilinjärvi, Puhos, Joensuu	-	-	29.04.2016

Saimaan kanava on avattu liikenteelle 9.4.2016
Saima kanal har öppnats för trafik den 9 april.
The Saimaa Canal has been opened to traffic 9th April.

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Fartyg destinerade till hamnar med trafikrestriktion i Bottniska viken ska, vid passage av Svenska Björn, rapportera enligt instruktionerna för vintersjöfarten till ICE INFO på VHF -kanal 84 eller per telefon +46 31 699 100.

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APPENDIX 3: SUMMARY OF THE ASSISTANCE EVENTS

ICEBREAKER ASSISTANCE: WINTER 2015-2016

PERIOD	PORT_Group	LED	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	No	92	0	52	34	6
		Yes	11	0	11	0	0
	FIN_2	No	34	0	18	12	4
		Yes	8	0	7	1	0
	SWE_1	No	23	0	14	3	6
		Yes	4	0	3	1	0
	SWE_2	No	21	0	10	8	3
		Yes	6	0	5	0	1
	SWE_3	No	20	0	14	4	2
		Yes	0	0	0	0	0
	SWE_4	No	2	0	1	1	0
		Yes	0	0	0	0	0
2	FIN_1	No	103	0	47	47	9
		Yes	135	0	111	13	11
	FIN_2	No	211	0	132	69	10
		Yes	58	0	54	4	0
	FIN_3	No	237	0	166	50	21
		Yes	4	0	4	0	0
	FIN_4	No	529	0	335	182	12
		Yes	1	0	1	0	0
	FIN_5	No	735	7	340	332	56
		Yes	0	0	0	0	0
	FIN_6	No	344	2	183	134	25
		Yes	16	0	6	4	6
	SWE_1	No	81	0	55	16	10
		Yes	40	0	34	2	4
	SWE_2	No	128	2	28	84	14
		Yes	45	2	41	2	0
	SWE_3	No	188	0	128	45	15
		Yes	3	0	3	0	0
	SWE_4	No	118	0	99	15	4
		Yes	3	0	3	0	0
3	FIN_1	No	89	0	21	53	15
		Yes	153	0	128	19	6
	FIN_2	No	220	0	134	74	12
		Yes	52	0	48	1	3
	FIN_3	No	255	2	174	52	27
		Yes	6	0	6	0	0
	FIN_4	No	563	0	345	200	18
		Yes	0	0	0	0	0
	FIN_5	No	771	3	365	353	50
		Yes	2	0	1	1	0
	FIN_6	No	362	4	179	155	24
		Yes	0	0	0	0	0
	SWE_1	No	40	0	20	15	5
		Yes	57	0	42	6	9
	SWE_2	No	136	0	37	87	12
		Yes	36	0	34	1	1
	SWE_3	No	240	0	165	56	19
		Yes	6	0	5	0	1
	SWE_4	No	122	0	102	14	6
		Yes	2	0	2	0	0
4	FIN_1	No	87	0	21	56	10
		Yes	167	0	136	20	11
	FIN_2	No	192	0	130	50	12
		Yes	79	0	75	1	3
	FIN_3	No	67	2	52	11	2
		Yes	0	0	0	0	0
	FIN_4	No	104	0	69	32	3
		Yes	0	0	0	0	0
	FIN_5	No	169	2	100	59	8
		Yes	0	0	0	0	0
	FIN_6	No	154	0	74	76	4
		Yes	0	0	0	0	0
	SWE_1	No	54	0	31	11	12
		Yes	38	0	32	4	2
	SWE_2	No	95	0	41	49	5
		Yes	18	0	18	0	0
	SWE_3	No	100	0	73	18	9
		Yes	1	0	0	1	0
	SWE_4	No	44	0	42	0	2
		Yes	0	0	0	0	0
5	FIN_1	No	166	0	101	52	13
		Yes	37	0	32	2	3
	FIN_2	No	46	0	38	6	2
		Yes	6	0	6	0	0
	SWE_1	No	74	0	52	12	10
		Yes	13	0	13	0	0
	SWE_2	No	16	0	15	1	0
		Yes	1	0	1	0	0
	SWE_3	No	2	0	2	0	0
		Yes	0	0	0	0	0
	SWE_4	No	1	0	1	0	0
		Yes	0	0	0	0	0

ICEBREAKER ASSISTANCE: WINTER 2016-2017

PERIOD	PORT_Group	LED	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	No	191	0	67	61	63
		Yes	151	2	103	36	10
	FIN_2	No	134	0	87	32	15
		Yes	2	0	2	0	0
	SWE_1	No	61	2	45	6	8
		Yes	0	0	0	0	0
	SWE_2	No	37	0	17	16	4
		Yes	3	0	3	0	0
2	FIN_1	No	183	0	17	51	115
		Yes	182	0	137	34	11
	FIN_2	No	288	5	182	79	22
		Yes	27	0	26	1	0
	SWE_1	No	91	0	61	24	6
		Yes	3	0	2	1	0
	SWE_2	No	142	0	64	66	12
		Yes	13	0	13	0	0
3	FIN_1	No	138	0	12	29	97
		Yes	177	0	123	42	12
	FIN_2	No	184	7	98	65	14
		Yes	111	4	102	4	1
	FIN_3	No	33	0	31	2	0
		Yes	2	0	2	0	0
	SWE_1	No	22	0	15	5	2
		Yes	1	0	1	0	0
	SWE_2	No	38	0	14	22	2
		Yes	3	0	3	0	0
4	FIN_1	No	114	0	14	42	58
		Yes	208	0	143	50	15
	FIN_2	No	235	11	127	86	11
		Yes	91	1	85	4	1
	FIN_3	No	26	0	24	2	0
		Yes	1	0	1	0	0
5	FIN_1	No	229	6	116	93	14
		Yes	59	0	46	8	5
	FIN_2	No	126	6	97	11	12
		Yes	30	0	28	0	2

ICEBREAKER ASSISTANCE: WINTER 2017-2018

PERIOD	PORT_Group	LED	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	No	218	2	112	78	26
		Yes	24	0	18	5	1
	FIN_2	No	36	0	26	10	0
		Yes	0	0	0	0	0
	SWE_1	No	149	2	105	32	10
		Yes	2	0	2	0	0
	SWE_2	No	77	2	51	20	4
		Yes	1	0	1	0	0
	SWE_3	No	35	0	33	2	0
		Yes	0	0	0	0	0
2	FIN_1	No	81	0	18	50	13
		Yes	156	3	110	33	10
	FIN_2	No	281	4	181	72	24
		Yes	22	0	20	2	0
	FIN_3	No	80	0	67	9	4
		Yes	1	0	1	0	0
	FIN_4	No	22	0	12	6	4
		Yes	0	0	0	0	0
	FIN_5	No	253	4	196	43	10
		Yes	1	0	1	0	0
	FIN_6	No	278	1	170	83	24
		Yes	5	0	5	0	0
	SWE_1	No	35	0	15	18	2
		Yes	62	2	50	4	6
	SWE_2	No	131	0	36	88	7
		Yes	33	0	30	0	3
	SWE_3	No	215	1	170	38	6
		Yes	7	0	7	0	0
	SWE_4	No	75	0	64	9	2
		Yes	1	0	1	0	0
3	FIN_1	No	46	1	11	30	4
		Yes	185	8	116	40	21
	FIN_2	No	126	3	38	68	17
		Yes	137	4	124	5	4
	FIN_3	No	267	1	208	46	12
		Yes	12	1	11	0	0
	FIN_4	No	345	4	188	130	23
		Yes	10	0	10	0	0
	FIN_5	No	1408	4	1083	296	25
		Yes	40	0	29	3	8
	FIN_6	No	275	2	149	115	9
		Yes	93	1	73	12	7
	SWE_1	No	4	0	0	4	0
		Yes	89	2	65	14	8
	SWE_2	No	95	2	15	76	2
		Yes	63	14	43	4	2
	SWE_3	No	190	1	136	49	4
		Yes	72	0	71	1	0
	SWE_4	No	641	1	443	139	58
		Yes	10	1	9	0	0
4	FIN_1	No	65	1	14	45	5
		Yes	189	2	127	41	19
	FIN_2	No	89	1	8	70	10
		Yes	208	10	170	17	11
	FIN_3	No	224	0	167	45	12
		Yes	8	0	8	0	0
	FIN_4	No	473	14	276	158	25
		Yes	0	0	0	0	0
	FIN_5	No	1081	6	826	224	25
		Yes	3	0	3	0	0
	FIN_6	No	394	0	250	126	18
		Yes	13	0	11	0	2
	SWE_1	No	28	0	20	8	0
		Yes	97	0	79	12	6
	SWE_2	No	123	0	33	89	1
		Yes	62	2	56	1	3
	SWE_3	No	252	1	189	56	6
		Yes	21	1	18	2	0
	SWE_4	No	371	2	287	60	22
		Yes	9	0	9	0	0
5	FIN_1	No	235	4	113	96	22
		Yes	83	7	65	8	3
	FIN_2	No	185	3	117	52	13
		Yes	60	3	52	2	3
	FIN_6	No	88	2	56	26	4
		Yes	0	0	0	0	0
	SWE_1	No	85	4	59	18	4
		Yes	63	0	51	8	4
	SWE_2	No	79	2	34	38	5
		Yes	24	2	21	0	1
	SWE_3	No	45	0	39	6	0
		Yes	1	0	1	0	0
	SWE_4	No	11	0	11	0	0
		Yes	0	0	0	0	0

APPENDIX 4: SUMMARY OF THE TOWING EVENTS

ICEBREAKER TOWING: WINTER 2015-2016

PERIOD	PORT_Group	TOW	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	No	103	0	63	34	6
		Yes	0	0	0	0	0
	FIN_2	No	42	0	25	13	4
		Yes	0	0	0	0	0
	SWE_1	No	27	0	17	4	6
		Yes	0	0	0	0	0
	SWE_2	No	27	0	15	8	4
		Yes	0	0	0	0	0
	SWE_3	No	20	0	14	4	2
		Yes	0	0	0	0	0
	SWE_4	No	2	0	1	1	0
		Yes	0	0	0	0	0
2	FIN_1	No	216	0	139	60	17
		Yes	22	0	19	0	3
	FIN_2	No	266	0	183	73	10
		Yes	3	0	3	0	0
	FIN_3	No	241	0	170	50	21
		Yes	0	0	0	0	0
	FIN_4	No	530	0	336	182	12
		Yes	0	0	0	0	0
	FIN_5	No	735	7	340	332	56
		Yes	0	0	0	0	0
	FIN_6	No	360	2	189	138	31
		Yes	0	0	0	0	0
	SWE_1	No	120	0	88	18	14
		Yes	1	0	1	0	0
	SWE_2	No	173	4	69	86	14
		Yes	0	0	0	0	0
	SWE_3	No	191	0	131	45	15
		Yes	0	0	0	0	0
	SWE_4	No	121	0	102	15	4
		Yes	0	0	0	0	0
3	FIN_1	No	211	0	118	72	21
		Yes	31	0	31	0	0
	FIN_2	No	269	0	179	75	15
		Yes	3	0	3	0	0
	FIN_3	No	259	2	178	52	27
		Yes	2	0	2	0	0
	FIN_4	No	563	0	345	200	18
		Yes	0	0	0	0	0
	FIN_5	No	773	3	366	354	50
		Yes	0	0	0	0	0
	FIN_6	No	362	4	179	155	24
		Yes	0	0	0	0	0
	SWE_1	No	95	0	61	21	13
		Yes	2	0	1	0	1
	SWE_2	No	167	0	66	88	13
		Yes	5	0	5	0	0
	SWE_3	No	246	0	170	56	20
		Yes	0	0	0	0	0
	SWE_4	No	124	0	104	14	6
		Yes	0	0	0	0	0
4	FIN_1	No	229	0	132	76	21
		Yes	25	0	25	0	0
	FIN_2	No	268	0	202	51	15
		Yes	3	0	3	0	0
	FIN_3	No	67	2	52	11	2
		Yes	0	0	0	0	0
	FIN_4	No	104	0	69	32	3
		Yes	0	0	0	0	0
	FIN_5	No	169	2	100	59	8
		Yes	0	0	0	0	0
	FIN_6	No	154	0	74	76	4
		Yes	0	0	0	0	0
	SWE_1	No	92	0	63	15	14
		Yes	0	0	0	0	0
	SWE_2	No	109	0	55	49	5
		Yes	4	0	4	0	0
	SWE_3	No	101	0	73	19	9
		Yes	0	0	0	0	0
	SWE_4	No	44	0	42	0	2
		Yes	0	0	0	0	0
5	FIN_1	No	202	0	132	54	16
		Yes	1	0	1	0	0
	FIN_2	No	52	0	44	6	2
		Yes	0	0	0	0	0
	SWE_1	No	87	0	65	12	10
		Yes	0	0	0	0	0
	SWE_2	No	17	0	16	1	0
		Yes	0	0	0	0	0
	SWE_3	No	2	0	2	0	0
		Yes	0	0	0	0	0
	SWE_4	No	1	0	1	0	0
		Yes	0	0	0	0	0

ICEBREAKER TOWING: WINTER 2016-2017

PERIOD	PORT_Group	TOW	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	No	326	1	155	97	73
		Yes	16	1	15	0	0
	FIN_2	No	134	0	87	32	15
		Yes	2	0	2	0	0
	SWE_1	No	61	2	45	6	8
		Yes	0	0	0	0	0
	SWE_2	No	40	0	20	16	4
		Yes	0	0	0	0	0
2	FIN_1	No	327	0	118	85	124
		Yes	38	0	36	0	2
	FIN_2	No	314	5	207	80	22
		Yes	1	0	1	0	0
	SWE_1	No	94	0	63	25	6
		Yes	0	0	0	0	0
	SWE_2	No	154	0	76	66	12
		Yes	1	0	1	0	0
3	FIN_1	No	285	0	108	70	107
		Yes	30	0	27	1	2
	FIN_2	No	293	11	198	69	15
		Yes	2	0	2	0	0
	FIN_3	No	35	0	33	2	0
		Yes	0	0	0	0	0
	SWE_1	No	23	0	16	5	2
		Yes	0	0	0	0	0
	SWE_2	No	41	0	17	22	2
		Yes	0	0	0	0	0
4	FIN_1	No	239	0	79	92	68
		Yes	83	0	78	0	5
	FIN_2	No	315	12	201	90	12
		Yes	11	0	11	0	0
	FIN_3	No	27	0	25	2	0
		Yes	0	0	0	0	0
5	FIN_1	No	285	6	159	101	19
		Yes	3	0	3	0	0
	FIN_2	No	154	6	123	11	14
		Yes	2	0	2	0	0

ICEBREAKER TOWING: WINTER 2017-2018

PERIOD	PORT_Group	TOW	Total	Phase_0_1	EEDI_compliant	Non_compliant	NA
1	FIN_1	No	241	2	129	83	27
		Yes	1	0	1	0	0
	FIN_2	No	36	0	26	10	0
		Yes	0	0	0	0	0
	SWE_1	No	151	2	107	32	10
		Yes	0	0	0	0	0
	SWE_2	No	78	2	52	20	4
		Yes	0	0	0	0	0
	SWE_3	No	35	0	33	2	0
		Yes	0	0	0	0	0
2	FIN_1	No	187	3	86	75	23
		Yes	50	0	42	8	0
	FIN_2	No	302	4	200	74	24
		Yes	1	0	1	0	0
	FIN_3	No	81	0	68	9	4
		Yes	0	0	0	0	0
	FIN_4	No	22	0	12	6	4
		Yes	0	0	0	0	0
	FIN_5	No	254	4	197	43	10
		Yes	0	0	0	0	0
	FIN_6	No	283	1	175	83	24
		Yes	0	0	0	0	0
	SWE_1	No	95	2	63	22	8
		Yes	2	0	2	0	0
	SWE_2	No	161	0	63	88	10
		Yes	3	0	3	0	0
	SWE_3	No	222	1	177	38	6
		Yes	0	0	0	0	0
	SWE_4	No	76	0	65	9	2
		Yes	0	0	0	0	0
3	FIN_1	No	178	4	82	70	22
		Yes	53	5	45	0	3
	FIN_2	No	251	7	150	73	21
		Yes	12	0	12	0	0
	FIN_3	No	279	2	219	46	12
		Yes	0	0	0	0	0
	FIN_4	No	355	4	198	130	23
		Yes	0	0	0	0	0
	FIN_5	No	1447	4	1112	299	32
		Yes	1	0	0	0	1
	FIN_6	No	366	3	222	127	14
		Yes	2	0	0	0	2
	SWE_1	No	81	1	54	18	8
		Yes	12	1	11	0	0
	SWE_2	No	152	14	54	80	4
		Yes	6	2	4	0	0
	SWE_3	No	262	1	207	50	4
		Yes	0	0	0	0	0
	SWE_4	No	649	1	451	139	58
		Yes	2	1	1	0	0
4	FIN_1	No	209	3	96	86	24
		Yes	45	0	45	0	0
	FIN_2	No	267	10	150	87	20
		Yes	30	1	28	0	1
	FIN_3	No	232	0	175	45	12
		Yes	0	0	0	0	0
	FIN_4	No	473	14	276	158	25
		Yes	0	0	0	0	0
	FIN_5	No	1084	6	829	224	25
		Yes	0	0	0	0	0
	FIN_6	No	407	0	261	126	20
		Yes	0	0	0	0	0
	SWE_1	No	121	0	95	20	6
		Yes	4	0	4	0	0
	SWE_2	No	183	2	88	90	3
		Yes	2	0	1	0	1
	SWE_3	No	272	2	206	58	6
		Yes	1	0	1	0	0
	SWE_4	No	379	2	295	60	22
		Yes	1	0	1	0	0
5	FIN_1	No	317	11	177	104	25
		Yes	1	0	1	0	0
	FIN_2	No	245	6	169	54	16
		Yes	0	0	0	0	0
	FIN_6	No	88	2	56	26	4
		Yes	0	0	0	0	0
	SWE_1	No	148	4	110	26	8
		Yes	0	0	0	0	0
	SWE_2	No	103	4	55	38	6
		Yes	0	0	0	0	0
	SWE_3	No	46	0	40	6	0
		Yes	0	0	0	0	0
	SWE_4	No	11	0	11	0	0
		Yes	0	0	0	0	0